

THE CUMBRIA BIODIVERSITY ACTION PLAN

Working together to protect Cumbria's
Wealth of Wildlife



BIODIVERSITY

Acknowledgments

This Biodiversity Action Plan is the product of the hard work and dedication of a great many people over a period of nearly three years. It is truly a 'team effort'.

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For more details of the Cumbria Biodiversity Action Plan and Partnership, or to obtain further copies of the full length or summary Plan, contact: The Project Officer; Cumbria Biodiversity Partnership, Cumbria Wildlife Trust, Brockhole, Windermere LA23 1LJ. Telephone 015394 48280.

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Foreword

I am delighted to commend Cumbria's 'Biodiversity Action Plan' (BAP) to you. The Plan, which is the outcome of three years hard work, was the subject of extensive consultation in 2000. Many useful comments were received, and appropriate changes made. My thanks go to all who have contributed to the Plan in any way.

In our County we have a rich 'variety of life' to celebrate and conserve. The Cumbria Biodiversity Action Plan is one of many already produced throughout the United Kingdom. It nests within a national and regional effort to ensure we manage our natural heritage more effectively for the benefit of present and future generations, as well as for its own sake.

The 'Biodiversity approach' means moving beyond the idea of setting aside special areas designated for conservation. It means valuing and conserving wherever it is found.

Few other counties can boast the number or range of habitats and species found throughout Cumbria. In the pages that follow you will find a first set of plans covering 39 habitats and species, with four Action Plans for Common Themes. One of these describes how we can manage this 'variety of life' right at the heart of our cities and towns. If we work together we can turn the tide of the steady decline in the diversity of species and the extent of valued habitats caused by human activity in our County.

This Action Plan has been prepared to implement national biodiversity targets at a local level, but with a focus on local priorities. It seeks to make people in Cumbria more aware of the issues and build wide commitment to taking the necessary actions. It links to a range of other plans and programmes, showing how these can better achieve effective





This Action Plan has engaged the commitment and enthusiasm of many people working together in partnership. The same approach will be needed now to turn the proposals set out here into reality. It is not just the statutory conservation agencies, wildlife campaigners or local and central government that must continue to be involved. It is all of us, in city, town, village and countryside. Farmers and landowners, as well as business and industry, have key roles in ensuring habitats are not lost. It is usually possible to manage change and development in ways that support nature - it just takes a little imagination and care!

What this Action Plan shows is that through joint action we can both retain economic opportunity and vibrant communities and secure and enhance the rich natural environment that adds so much to our 'quality of life'.

The work of producing a further set of species and habitat plans goes on. At the same time, we need to work together to ensure the individual Phase I Plans contained in this volume are implemented. We hope the implementation phase will continue with the full support of all the partners who have helped get us this far. But, most of all, we want to see the Plans prepared so far acted upon locally, in every part of Cumbria. We hope that the BAP will be the catalyst to provide a renewed enthusiasm and commitment to the 'variety of life' found in Cumbria. We hope it means future generations can continue to enjoy nature in the heart of each community and in all parts of our countryside.

John Hetherington
Chairman, Cumbria Biodiversity Partnership
Steering Committee





Introduction



An Introduction to Biodiversity Conservation

I What is 'biodiversity'?

Put simply biodiversity means "the variety of life" and encompasses the complete spectrum of living organisms from plants and fungi to birds, mammals, insects, bacteria and viruses.

Article 2 of the Biodiversity Convention of the Earth Summit, held in Rio de Janeiro in 1992, provides a more scientific definition:

"The variability among living organisms from all sources including...terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"

A particularly important part of biodiversity is the genetic variety within a species, reflected in the differences between local populations of a species, perhaps due to adaptations to different environmental conditions. Biodiversity is more than the sum total of species in a particular area. It also describes the inter-related groups of animals, plants and micro-organisms that form ecosystems and habitats.

Biodiversity includes the unfamiliar as well as the familiar; the rare as well as the commonplace. As such it encompasses not just those species and habitats which have a high profile or are visually striking, though these are important, but also those which are less in the public eye but equally deserving of our attention. Nor is biodiversity confined to "wild" places; it thrives all around us, in our gardens and parks, on roadsides and derelict land.

Biodiversity is more than simply a description of what there is; the term is inextricably linked to a perception of what must be done to maintain and

enhance this great variety of life, which is the purpose of the current document and the implementation of it.

2 Why biodiversity is worth conserving

We depend upon biodiversity for our very existence. Plant and animal life and the ecosystems of which they are part constitute the Earth's irreplaceable 'life support system', providing oxygen, water, food, and shelter for all life forms. Many people would consider this alone to be a good reason to conserve and encourage wildlife. But there are other good reasons, for example:

- Biodiversity is an important contributor to that which people call "quality of life". Our lives would be poorer without the sound of birdsong, colourful flower-rich meadows alive with insects, a diverse landscape rich in wildlife.
- Micro-organisms, plants and animal species provide us with important chemicals used in agriculture, foodstuffs and medicines - some of which will hold the key to human health.
- Many of the crops farmers grow owe their existence to pollination by insects. Crops' ability to be resistant to disease may depend on the existence of wild plant species with which they can be crossed.
- The landscapes and wildlife of Cumbria provide a basis for our leisure and tourism industries.
- Wildlife and the natural environment are an important educational resource.
- Many consider we have a moral obligation to ensure our activities do not threaten the existence of the other species with which we share the planet.

3 Why is Cumbria so special?

Cumbria is a large county, encompassing diverse climatic conditions, topography and geology. This has given rise to a fantastic diversity of biological communities; few other English counties can boast Cumbria's number or range of habitats and species. An illustration of this is the fact that Cumbria supports one quarter of the 400 species identified in the UK Biodiversity Action Plan as being of

particular conservation priority nation-wide. Cumbria, with its human population of under half a million, is still relatively un-spoiled by urban development. This has allowed significant areas of wildlife habitat to survive, particularly in the uplands and coastal areas. However, this does not mean there are no problems or challenges to overcome; issues of rural land use and how they affect biodiversity are as pertinent in Cumbria as anywhere. There are also opportunities to maintain and enhance biodiversity, in the wider countryside and in our cities, towns and villages. Furthermore, the very richness of wildlife in Cumbria puts a special responsibility on us to carefully plan ahead and take necessary conservation action.

4 Changes in Cumbria's wildlife

We live in an age that is experiencing rapid change in the diversity and composition of our wildlife. Research has shown that changes in the way we use and manage land have direct impacts upon wildlife, and often the trend is downwards; once common species such as the lapwing have undergone dramatic declines due to changes in farming practices, and habitats such as lowland raised mires are being damaged or destroyed by peat extraction. Some changes, however, are positive; the recent re-colonisation of otters to Cumbria's rivers is an outstanding example. Other changes that are starting to become apparent are due to climate change; butterflies such as the comma, in the past largely confined to southern England, are spreading into our County. Conversely, we can expect to lose arctic-alpine species from our fell-tops as Cumbria's montane environment becomes milder, because of climate change.

What is clear is that most change is traceable back to the ways in which we manage or use the resources of land, water and air. It is the aim of the Cumbria Biodiversity Action Plan (BAP) to identify such problems - and opportunities - and to propose practical ways of redressing the balance in favour of a sustainable wildlife resource.

5 Biodiversity action planning

How the biodiversity approach is different

The biodiversity planning approach to wildlife

conservation is characterised by the following special elements:

- **Identifying priorities.** We must ensure that our effort is directed to where it is needed most and to address the most pressing issues first. This means targeting active conservation work at certain species and habitats first. This does not mean that others are less important or do not warrant our attention, simply that they are in less urgent need of help.
- **Setting measurable targets.** We often share a common vision of how we would like to see our environment in future years. However, we need to define measurable targets that we can work towards and against which we can measure our progress. It should be understood that aiming to achieve 'high biodiversity' is not necessarily appropriate for all environments; some habitats are naturally species-poor and in such cases we would therefore wish to maintain the appropriate level of 'biodiversity'.
- **Monitoring progress.** We will need to check how well we have done in reaching our targets so that we can continue, if successful, or adjust our approach if not. We in Cumbria will report our progress both locally and nationally to provide a wider picture of the UK's biodiversity. This will help to track how well local, national and international policies are working.
- **Widening the partnership.** One task is to make best use of our limited resources, by better co-ordinating the roles of conservation organisations, local authorities, government agencies and the individual. Another is to involve sectors, such as businesses, which up to now have had a limited role in conservation. There is great potential for everyone to make a real contribution.

The International Context

The Cumbria Biodiversity Action Plan is our County's contribution to an international approach to wildlife conservation and the sustainable use of natural resources.

At the United Nations Conference on Environment and Development (the 'Earth Summit') in Rio de Janeiro in Brazil in 1992, world leaders, including the United Kingdom's Prime Minister, signed the Convention on Biological Diversity. They made a commitment to draw up national strategies to address the losses to global biodiversity and to resolve how economic development could go hand in hand with the maintenance of biodiversity.

The UK Biodiversity Action Plan

As a direct result of the "Earth Summit" the United Kingdom produced *Biodiversity: The UK Action Plan* in 1994, endorsed by local and national government and the private and voluntary sectors. It set out a series of detailed recommendations for action at the nation-wide level that would address the most pressing conservation issues of the day. One recommendation was the setting up of a Steering Group to oversee the implementation of the proposals, and in 1995 this group published *Biodiversity: the UK Steering Group Report*. This contained a list of habitats and species that, due to their scarcity, rate of decline or vulnerability, are considered to be conservation priorities for the United Kingdom. It contained detailed action plans for a number of them, with a timetable to complete remaining plans over the following few years (the latter referred to as "Tranche 2 Action Plans"). These national plans have now all been published. The UK-wide targets they contain, for the management, enhancement, restoration and re-creation of habitats and species populations, have been translated into targets in this Cumbria Action Plan. In this way national priorities and targets will be addressed through local action.

The Regional perspective

Today's increasing emphasis on regional government and development planning is leading us to think also about planning for biodiversity at the regional scale. Some regions of England have produced regional biodiversity action plans, and these concentrate on the roles of organisations which operate on the regional scale, as well as providing an overview and guide for more local action, through means such as County or District Biodiversity Action Plans.

In our region *A Biodiversity Audit of the North West* has recently been produced, detailing the occurrence of key species and habitats in the region and providing vital information about status and conservation issues relating to these. That document is not an action plan, however, but is being used to inform the production and implementation of local biodiversity action plans throughout the North West, such as in Cumbria. To facilitate this, the partnership of organisations who delivered the Audit of the North West have now formed into a North West Biodiversity Forum, although currently there is no intention to produce a regional biodiversity action plan.

The North West Development Agency is committed to a systematic project to catalogue and evaluate the Region's special assets, including its biodiversity. The Regional Assembly, through the production of Regional Planning Guidance, is also committed to biodiversity conservation, including the linking of BAPs to the statutory development plan process.

The Local Perspective

Although regional, national and international action and policies have pervasive influences on biodiversity, it is at the local level where most action is actually delivered. The county scale is amenable to translating national and regional priorities into action 'on the ground', since it is at this scale that many partner organisations operate. The Cumbria BAP will help to deliver action at the local level, taking into account national and local priorities.

The Rationale for the Cumbria Biodiversity Action Plan

I Objectives of Cumbria BAP

Our vision is of a Cumbria as rich or richer in wildlife than it is today. To realise this vision will need a great deal of thought, commitment and working together in partnership over the coming months and years. It will require us to prioritise and set ourselves milestones against which to measure our progress. It will require people from all walks of life to have a greater understanding of the issues and have the enthusiasm to take the necessary actions.

Specifically, the objectives of the Cumbria BAP are essentially three-fold, to:

- Implement national biodiversity targets at the local level.
- Address local priorities not identified in the UK plan.
- Engender greater awareness and understanding of Cumbria's biodiversity and wider participation in its conservation.

Implementing national biodiversity targets at the local level

One important function of the Cumbria BAP is to contribute towards the implementation of the UK BAP. Very often, national targets will only be met by action "on the ground" at the local level, for example by restoration or re-creation of habitats, management of land, or monitoring of species populations. It should be acknowledged that many targets will only be fully met by realising change at the national level, for example by improvements to grant schemes for farmers or through wildlife legislation. In such cases the local BAP partnership

may contribute through representation at national forums or through lobbying.

Addressing local priorities not identified in the UK plan

It is important to ensure that the Cumbria BAP reflects the particular character and distinctiveness of Cumbria, in so far as its wildlife is concerned.

The county scale of delivering action for biodiversity allows for the identification of local priorities, which may not be recognised or given appropriate emphasis in the UK BAP. On one level, the Cumbria BAP should consider targeting action at species or habitats not identified in the UK BAP as a national priority; examples include the barn owl and the variable damselfly. On another level, whilst the Cumbria BAP includes action for many national priority species or habitats, local circumstances may require us to adapt the action that is needed to the local situation.

Engendering awareness, understanding and participation

Cumbria's biodiversity is important to the people that live and work in the County, for many reasons; perhaps best summed up by 'quality of life'. Exploring the links between our everyday lives and wildlife is an important step in building a shared responsibility for the natural environment. Many different groups of people have an impact upon the natural environment. It is therefore important for us to share information about how our lives - at work, leisure or in the home - can actively conserve and enhance biodiversity, and to enable and encourage others to play their part. The Cumbria BAP aims to work towards these goals.

2 The Cumbria BAP in relation to other local initiatives

The Cumbria BAP will complement and dovetail with partners' existing initiatives, plans and strategies, some of which are outlined below:

Agri-environment Schemes and Woodland Grant Scheme

MAFF's Agri-environment schemes - primarily Countryside Stewardship and Environmentally

Sensitive Areas (ESA) - provide financial incentives to help farmers and landowners to manage their land in ways which protect and enhance wildlife. As such these schemes are a major mechanism for achieving biodiversity benefits 'on the ground' and have the potential to deliver significant contributions to BAP targets. Similarly, the Forestry Commission's Woodland Grant Scheme provides financial assistance to farmers and landowners for the planting and management of native woodland, providing important opportunities to contribute to biodiversity objectives.

English Nature's Natural Areas profiles

Natural Areas, developed by English Nature in conjunction with The Countryside Agency, are tracts of countryside that are readily recognised by their special characteristics of wildlife, landscape and land use. They are intended to provide a framework for setting conservation objectives at the local level (in most cases at a sub-county level). They are not constrained by administrative boundaries; for example the West Cumbria Coastal Plain Natural Area spans parts of the Boroughs of Allerdale, Copeland and Barrow, and of South Lakeland District.

Natural Area Profiles form a basis from which the Cumbria BAP has set many of its targets. But whereas the Profiles are visionary in their objectives and unconstrained by what can actually be achieved using current mechanisms, the Cumbria BAP proposes more realistic targets and, importantly, the mechanisms and timetables to implement them.

Cumbria Landscape Strategy

The Cumbria Landscape Strategy was produced in 1998, by a partnership lead by Cumbria County Council. The strategy provides an overview of the characteristic landscape types in the county (outside of the Lake District National Park) and proposes a mechanism to work towards a 'shared vision' of the future development and management of these landscapes. This 'vision' encompasses the need to maintain the viability of Cumbria's economy and communities while protecting and enhancing the quality of the whole countryside, including aesthetic beauty, historic value and wildlife habitats. Landscape and biodiversity are inextricably linked and very

often the objectives of both go hand in hand.

Occasionally conflicts occur; and resolutions to them need to consider the often complex set of factors at play in the locality concerned. We should also recognise that if we are to make good some of the losses to our wildlife habitats, for example to restore and expand native woodland cover in appropriate places, then we must also allow for changes in the character of the landscape.

Local Environment Agency Plans (LEAPs)

The Environment Agency's wide range of duties and powers relating to environmental protection and management (such as improving air quality, managing water resources and fisheries, furthering the conservation of biodiversity) are addressed on a river catchment basis by Local Environment Agency Plans (LEAPs). LEAPs will be one way of implementing certain objectives in the Cumbria BAP at the local level. Whilst the Cumbria BAP has generally not set out targets at a fine spatial scale, such as a river catchment, it is the function of LEAPs to do so, by interpreting BAP objectives to action "on the ground".

Local Agenda 21

The notion of 'sustainable development' is being championed by Local Agenda 21 groups around Cumbria, at the County, District and local level. Sustainable development is based on the idea that the quality of people's lives and the health of our communities are affected by a combination of economic, social and environmental factors. Clearly, biodiversity is a powerful test of sustainability as there are few human activities that do not impact upon the natural environment. The Local Agenda 21 programme is closely related to the aims of the Cumbria BAP, and vice versa. It provides one way in which biodiversity conservation at the local level can be achieved and monitored, by way of communities working with local authorities and organisations to identify problems, seek practical solutions and seize opportunities to protect and improve the local environment.

Structure Plan and Local Plans

Under the provisions of the Town and Country Planning Act 1990 local authorities have a duty in their Development Plans (comprising Structure, Local and Minerals & Waste Plans) to include

policies that act to conserve the natural beauty and amenity of land, including wildlife. In addition, Regulation 37 of the Habitats Regulations 1994 requires these plans to contain policies which encourage the management of features of the landscape of major importance for wildlife.

Local Authorities will look to the Cumbria BAP for guidance on policies appropriate to Development Plans, during their review over the next few years. In this way, it is envisaged that Development Plans will play an important function in delivering biodiversity targets in Cumbria, by both safeguarding statutorily and locally designated sites, by species protection and by restoring, creating and managing habitats and landscape features.

Yorkshire Dales National Park BAP

A small proportion of the Yorkshire Dales National Park falls within the extreme south east part of Cumbria. A BAP for the Yorkshire Dales has been developed along similar lines to the Cumbria BAP, and the two have complementary roles. In the area of "overlap" the smaller scale of the Yorkshire Dales BAP allows for a finer scale of prescription, down to a site level in many cases, but drawing, where appropriate, from the Cumbria BAP objectives.

3 Organisation of the Cumbria Biodiversity Partnership

This first phase of the Cumbria Biodiversity Action plan has been prepared by a wide Partnership of organisations, including the statutory agencies, local authorities, representatives of farming and landowning interests, research and educational institutions, businesses, voluntary organisations and community groups. In addition a number of individual naturalists contributed their particular expertise.

The Partnership works through a Steering Group with a broad representation of organisations, supported by a Technical Working Group and a Public Involvement Working Group, drawn from the wider partnership. A dedicated Project Officer co-ordinates the work on a day to day basis.

The individual action plans which make up the majority of this document were drafted by a

number of Focus Groups, consisting of experts and practitioners involved in the conservation of the species and habitats selected for plans. These groups will also play a key role in the implementation and monitoring of individual action plans.

A full account of the make-up and function of the Partnership is given in Appendix 3.

Identifying Priorities for Action and Setting Targets

I Why the need to identify priorities?

Resources for biodiversity conservation are precious so we must ensure that they are directed to where the need is most pressing. By careful targeting, we can make sure that what we do will benefit the widest range of species and habitats, not just the rare or threatened, but all of Cumbria's biodiversity.

Different levels of prioritisation are involved. Firstly, we have identified those species and habitats that require special attention; then we have prioritised action that will address a particular problem or opportunity. In addition, priority issues have been highlighted which over-arch all habitats and species, and these are presented as Action Plans for Common Themes. Indeed, addressing the pervasive issues - those that affect Cumbria's wider environment of town, coast and countryside - will perhaps achieve greatest over-all progress.

The Cumbria BAP (as with the UK BAP) contains individual action plans for both habitats and species. This dual approach has been designed to get maximum over-all benefit. As all species are found within a particular habitat or habitats, then if we

conserve habitats effectively, we will look after a great many species and achieve the greatest over-all effect. Species were chosen to have an action plan if, for example, they have ecological requirements that would not be accommodated in the standard management of habitats, if introductions are being considered, or if survey work is particularly needed. It is necessary to understand that species selected for individual action plans must not be viewed as more “important” than other species, but that they are a selection of those that do require particular action in the short term to ensure their conservation. Those species that are not selected for particular action within the first or second phases of the Cumbria BAP have not been forgotten; indeed many of these are highlighted under Key Species in the relevant habitat action plan.

2 Selection of species and habitats for action plans

Cumbria is home to a particularly rich diversity of habitats and species, and this makes the selection of priorities all the more difficult. Practical reasons have dictated the number of individual species and habitat action plans that could be produced within a reasonable time-scale, and of course available resources will also limit the number that can be implemented over the coming months and years.

This document contains plans for 18 habitats and 21 species. Further plans will be produced over the coming few years, in a second phase (see Appendix 4). These will be inserted into the loose-leaf folder in which this first round will be presented, following the consultation process.

A range of criteria were taken into consideration when selecting those species and habitats to have individual action plans. These include (among others) the degree of vulnerability, scarcity, rate of decline, proportion of the UK resource in Cumbria, and the likely effectiveness of local conservation action. Appendix 5 lists the criteria.

Procedure for selection

At the outset it was recognised that it was very important to get the selection right and to arrive at a list that reflected County priorities, within the

constraints of time and available resources and with which the Partnership would be comfortable.

Local practitioners and experts were consulted on which species and habitats, under their particular sphere of knowledge, they would recommend for consideration under an individual action plan, taking into consideration the established criteria (listed in Appendix 5). After a lengthy process of consultation with members of the Partnership a list was arrived at which fulfilled the required criteria and which was of a manageable length.

The lists were then put to the wider Partnership for their views. Any concerns raised over those habitats and species selected (or not selected) for phase 1 were taken into consideration in the choice of phase 2.

3 Setting Targets

Every individual habitat and species action plan within this document contains conservation targets. These targets act as milestones on the road to achieving our over-all conservation objectives and they provide goals for all partners to work towards and contribute to. It is important that the targets we set ourselves are challenging but realistic. This is so that we extend ourselves to undertake something more than the merely adequate and encourage others to do the same. It is also so that we collectively gain a sense of progress and achievement, and know when and how to change track if unsuccessful.

Targets have been set using various parameters: in terms of the hectareage of habitat in favourable management, under restoration or re-creation, or in terms of the range and ‘health’ of species populations. Other targets have also been set in terms of actions, for example in undertaking to hold a certain number of habitat management training days per year. These targets are usually of a shorter term than those reflecting ‘on the ground’ change in habitats and species.

The targets set out in the Cumbria BAP represent our local contribution to the national targets in the UK BAP. English Nature’s Natural Area Profiles were used as a framework for the local

apportionment of national targets (see also Section B), in discussion with local partners. In many cases, especially for those habitats and species for which Cumbria holds a high proportion of the UK total, the achievement of our local targets will be nationally significant.

From Plans to Action

I The Partnership approach

Today, more than ever before, there are a great many organisations and individuals directly involved in or having an impact upon wildlife conservation. Different organisations tend to specialise in different types of work, and this means that a high degree of co-ordination and partnership working needs to happen if people's time and money is to be put to most effective use.

By keeping the partnership wide, there is an increased likelihood of inspiring organisations and individuals to take on new roles, or to clarify understanding of where partners fit into the bigger conservation picture.

In summary, working in partnership helps to:

- Share workloads, resources and skills.
- Ensure activities are co-ordinated and that duplication is avoided.
- Promote communication, wider understanding between organisations and inspire confidence
- Develop links between work undertaken at national and local levels.

2 The roles of key groups of people

Below is a brief summary of the kinds of ways in which different groups of people are contributing to biodiversity conservation and how they can

further contribute:

Farmers, Foresters and Landowners

Cumbria is, of course, a county very largely composed of land that is farmed or used for forestry, and it follows that much of our biodiversity is contained on this land. Indeed traditional farming practices are responsible for many of the habitats that we so cherish today, such as hay meadows. Farmers, foresters and landowners, therefore, are central to achieving and maintaining biodiversity and a rich natural environment.

Farming practices, along with other forms of industry, have changed over the last few decades towards a more intensive regime of food production, and with this has come changes in the make-up of wildlife on our farmland. Few would deny that the farming economy- especially sheep and cattle rearing on which Cumbria is so heavily reliant - is in a state of crisis. Farmers and landowners are expected to combine the need to farm in an economically viable way with the responsibility of maintaining biodiversity on the land they farm. This has never been an easy task, and in the prevailing economic climate is proving for many to be unsustainable.

However, the increasing prevalence of woodland and agri-environment grant schemes, which provide farmers with grants to farm in ways which maintain and enhance wildlife habitats, has the potential to be part of a solution to the dual problem of depressed farm incomes and declines in wildlife. The extent to which such schemes achieve these aims will depend on many factors, but a recent change in policy, in which production subsidies are being progressively re-channelled into schemes such as Countryside Stewardship and the Organic Farm Scheme, is encouraging.

Some farmers and landowners choose to create or manage parts of their land as areas for rough shooting. This often is good habitat for wildlife and therefore may have benefits for over-all biodiversity on the farm.

Advice on land management for conservation and information on available grants is readily available from a number of organisations in Cumbria. These

mechanisms will be maintained and developed to support the farmer to care for and enhance biodiversity as part of the farm business.

In the drafting of the Cumbria BAP, organisations representing the interests of farmers, foresters and landowners have been closely consulted to explore the role that the sector may be able to play in the plan's implementation. We are conscious of the need for the rights of landowners to be upheld, in particular with respect to access to privately-owned land.

Industry and Commerce

Today's consumer is increasingly aware of environmental issues and demands that products and services are provided in ways that limit harm to biodiversity and the environment. Businesses are increasingly seeing themselves as having a key responsibility to care for the local environment.

Businesses can contribute in many ways, for example:

- by adopting an Environmental Management System approach, which helps to assess their environmental impacts and to take opportunities to manage and create wildlife areas.
- by sponsoring local conservation work, or even "Championing" a species through the UK or Cumbria BAPs.
- raising awareness of environmental issues among staff, suppliers, clients, and other businesses in the local area.

Already, partnerships between industry and conservation bodies are proving to pay dividends for biodiversity and for business. For example, Glaxo Wellcome's "championing" of conservation work on the medicinal leech UK BAP has provided high profile publicity for the company and allowed for much needed local conservation work to go ahead.

Government Departments and Agencies

Local representatives of government departments, especially the Ministry of Agriculture, Fisheries and Food, and Government Office for the North West, play central roles in the maintenance and enhancement of biodiversity. Through their roles in influencing the allocation of resources, forming

regional policy, and influencing national and European policy, Government has far-reaching influences upon the county's biodiversity.

Statutory agencies, especially English Nature, the Environment Agency and the Forestry Commission, have pivotal roles to play in biodiversity conservation, as regulators and statutory undertakers of designated sites, water and air resources, forestry and in the provision of grants and advice on land and water management. They feature centrally in delivering many of the objectives of the Cumbria BAP. The Countryside Agency contributes, for example by lobbying for reform of policy that affects the countryside and by the provision of grants for community-based natural heritage schemes and land management initiatives. Other Agencies, such as the Highways Agency have important roles to play for particular aspects; in this case, for example, in the management of motorway and trunk road verges.

Local Authorities

A fundamental over-arching principle of the work of Local Authorities (District/Borough Councils and County Council) is summed up by the term "sustainable development". This can be defined as the degree to which human activities in town and countryside can be undertaken without net loss of biodiversity or degradation of the environment. Many of the issues under the remit of Local Authorities are linked to "sustainability", often impacting upon biodiversity and/or presenting opportunities to contribute towards its conservation. Relevant topics include planning and development control, environmental protection, waste disposal and recycling, transport, economic development, community development, education.

Several Local Authorities in Cumbria are developing strategies for sustainable development through a process called Local Agenda 21, which uses the opinions and knowledge of local individuals, organisations and businesses to identify issues of sustainability in their area with a view to devising solutions that will be viable economically, socially and environmentally.

The planning and development control functions of Local Authorities have particular influences upon

biodiversity, both by helping to steer inappropriate developments away from sites of nature conservation interest, by ameliorating any adverse impacts and by providing for restoration and management of sites for nature conservation purposes. The role of the Development Plan in biodiversity conservation is discussed further in Section B.

Area-based countryside management bodies and Coastal Partnerships

Countryside services in certain parts of Cumbria are undertaken by three area-based bodies, the Countryside Management Service (for the Arnsdale and Silverdale AONB), Solway Rural Initiative Ltd. (for the Solway Coast AONB) and the East Cumbria Countryside Project. The North Pennines Partnership co-ordinates conservation and other rural management within the AONB of that name. These organisations work in partnership with local authorities and others to deliver a wide range of services towards environmental improvements and rural development, and are key deliverers of action for biodiversity in the county.

Three coastal partnerships - Solway Firth, Duddon Estuary and Morecambe Bay - provide a framework for the integrated and sustainable management of our coastal environments. They thus play important roles in securing the future of biodiversity associated with Cumbria's coast.

Parish Councils

Parish councils provide an important mechanism to communicate with and gain feedback from communities and are often the instigators of community and village initiatives that have wildlife conservation objectives. Increasingly, Parish Councils are being called upon to deliver and promote environmental sustainability as part of their role, and are therefore becoming pro-active in supporting community action.

The Voluntary sector

There are many voluntary organisations operating in Cumbria whose sole function is to promote and undertake nature conservation. One of the strengths of the voluntary sector is its direct link to the public; the substantial and growing membership of voluntary organisations represents a potent

political force and a dedicated and informed conservation "workforce" which can be rapidly mobilised when the need arises. At the same time, a high degree of professionalism within the voluntary sector is enabling it to have its voice heard on the wider stage of decision-making at the local, regional and national level. Voluntary organisations have an important educational and campaigning role, gaining influence at the local and national level. A large number of smaller organisations specialise in a particular part of biodiversity, for example Butterfly Conservation or the two Bat Groups operating in the County. These organisations play particularly valuable roles in species recording and monitoring, providing specialist advice and in education and awareness-raising.

A number of voluntary organisations in Cumbria own and manage land, either entirely or in part for its intrinsic ecological value. These include the National Trust, Cumbria Wildlife Trust and RSPB. In many cases these hold some of the richest areas of biodiversity in the County, and many of which welcome the public. In addition, voluntary organisations, notably the Farming and Wildlife Advisory Group, operate advisory services for farmers and landowners regarding management of land and available grants.

Universities, Colleges and Research Institutions

It is important to have accurate, up to date, scientifically rigorous information on which to base conservation policy as well as decision-making on a site by site basis. The need for this information has never been greater, as the range of factors - economic, social, environmental - having an influence on biodiversity become ever more complex.

In addition to that obtained by volunteers and amateur naturalists, much of the information on the likely causes of changes in the abundance or distribution of species has resulted from scientific research conducted or funded by the various universities, colleges and other institutions operating in Cumbria. These include University of Central Lancashire (Newton Rigg Campus), Lancaster University, Durham University, Glasgow University, the Centre for Ecology and Hydrology, Freshwater Biological Association, and organisations such as the

RSPB and the Game Conservancy Trust who undertake research as part of wider conservation remit.

The Individual

We all, as individuals, make decisions on a regular basis; decisions about what type of transport to use, which products to buy, which politicians to vote for. We often underestimate the powerful role of the individual in contributing towards the sum of biodiversity conservation. Contributions may take many forms; putting out food for birds, choosing locally or organically produced food, getting friends and neighbours to think about biodiversity and how they could “do their bit”.

Cynics may say that the individual is powerless to make meaningful contributions towards biodiversity conservation. Yet collectively each of us has the power to make huge conservation achievements, if, for example we all refused to use peat or water-worn limestone in our gardens and demanded of retailers less harmful alternatives.

3 Role of Focus Groups, Key Deliverers and Partners

The individual species and habitat action plans within this document contain tables of objectives, targets and proposed actions. Against each action there is a list of organisations that have agreed to be involved in the realisation of the actions. One or more organisations (and in a few cases individuals) have been identified as Key Deliverers, and are listed in bold type. It is their role to co-ordinate the actions and report on their progress; Partners in these actions are listed subsequently. The actions will be carried out by this partnership of organisations.

It is proposed that Focus Groups, consisting of Key Deliverers, Partners and others, will be responsible for overseeing the implementation of groups of action plans. They will have a pivotal role in the Cumbria Biodiversity Partnership and they will report regularly on the progress of action plans to the Steering Committee.

4 Funding Biodiversity Conservation

Perhaps the over-riding strength of working as a partnership is that organisations can pool resources to achieve a task that otherwise would have been impossible individually. Many of the tasks set out in the BAP will be resourced in this way. Some of the money to pay for the plan's implementation will have already been secured by organisations that have undertaken to carry out particular tasks, often through collaborative working. Other tasks will be achieved by the refinement or change of emphasis of an ongoing work programme. Yet many tasks that have been identified as being important are currently un-funded, and during the coming months costs will have to be assigned to these actions in particular, so that bids can be made to potential funding bodies.

Recently introduced sources of funding are becoming increasingly important for biodiversity conservation. They include: European Structural Funding, the Landfill Tax Credits scheme, and the Heritage Lottery Fund (and other Lottery-sourced funds). These and other funds will be among those applied for to implement elements of the Cumbria BAP that are un-funded. This is likely to be done as a major Partnership bid.

An exciting area of possible funding that has started to be explored and deserves further consideration is that of commercial sponsorship. Examples include Glaxo Wellcome's sponsorship of the national action plan for the medicinal leech, manifested locally in the company's funding of recent survey work for the species in Cumbria.

A major source for funding conservation is through various grants for land management from MAFF, known collectively as “agri-environment schemes”. In Cumbria these include the Lake District and the Pennine Dales Environmentally Sensitive Areas (ESA), and the Countryside Stewardship Scheme. These schemes provide farmers and land-managers with grants to manage their land in ways which benefit biodiversity, as well as taking into account landscape, historical and cultural aspects. To help secure a future for biodiversity of farmed land in Cumbria it is of major importance that funding and

effective targeting of agri-environment schemes (or any similar future schemes) is at least maintained, if not increased.

Monitoring, Reporting and Review

I The need for Monitoring, Reporting and Review

In many ways, rather than being the end of a process, the production of the Cumbria BAP is just the beginning. The objectives, targets and actions that partner organisations have agreed to work towards will require further development and incorporation into existing work programmes. What is published in the BAP will not be “the last word” on biodiversity conservation in the County; the mechanisms required to implement particular objectives will evolve, new partners will hopefully be brought on board and new action plans will be added. This will easily be accommodated into the loose-leaf BAP, and updates and revisions will be made available for insertion into the “living” document.

Monitoring the implementation of the BAP is important for several reasons. Firstly, we need to know how well the mechanisms proposed are achieving the objectives and targets we have set, ultimately in terms of the area and quality of habitats and in the range and health of species populations. It follows that if our prescription for action is not delivering, adjustment of work programmes will be required. Monitoring is also important in that it allows us to report on progress - both within the Partnership but also more widely, to the wider population of Cumbria through the media, and to the monitoring process of the UK BAP. Reporting is important also in the sense that it maintains momentum and sense of purpose and encourages

and inspires continued and further action.

2 Monitoring habitats and species - data availability and need

The ultimate requirement for monitoring is that we test how well the programmes of action have delivered the desired changes in habitats and species. Another related “end-point”, the extent to which programmes of awareness-raising and education have been successful, also requires measurement and monitoring, but this is likely to fall outside the scope of this Plan.

Individual action plans contain specific actions for monitoring; these will need to be developed into a form that will feed into the regular report on actions outlined in the previous section. Gathering information on habitat extent/quality and species populations is in general extremely time-consuming and/or expensive, and in many cases it will not be possible nor indeed desirable to have very frequent monitoring which relates actions to habitats and species. The frequency of habitat and species information required to interpret how well programmes of action are working will vary from habitat to habitat and, particularly, from species to species.

3 Reporting beyond the Partnership

The UK BAP contains agreed national targets, for example for habitat restoration, creation or management, and for species populations. Clearly, delivery of targets in the Cumbria BAP (and all other County-wide or other local scale of plan in the UK) will contribute towards these. The mechanism for linking reporting of local BAPs with the UK BAP is currently being developed.

At another level, we will wish to report notable successes to the wider community in Cumbria. Indeed reporting on BAP targets will be one part of a wider reporting process on “indicators of sustainable development”, currently being developed nationally, regionally and for Cumbria for

as diverse a range of issues as health, crime, landscape and economy. As biodiversity is sensitive to so many factors described under the banner of sustainable development, the reporting of targets in the Cumbria BAP will provide a potent indicator of sustainability in Cumbria.

4 Review of the Cumbria BAP

As outlined above, regular monitoring of action plans will be undertaken, and this will inform an assessment of the need to review and amend particular action plans. If amendments are considered substantial enough, revised sections will be made available as inserts into the loose-leaf BAP document. The timetable for this cannot be predicted, however. It is intended that progress reports will be made available for insertion into the document.

This first edition of the Cumbria BAP, containing 39 species and habitat action plans and 4 'Action Plans for Common Themes', represents the first phase of plan production. In the subsequent phases, to be started once implementation of phase one is underway, additional priority species and habitat action plans will be added. This will allow the Cumbria BAP to even more thoroughly address the conservation of the huge number of species and habitats within the county.

Using the Action Plans

The main body of the Cumbria BAP that follows is a suite of 39 habitat and species action plans, together with 4 'Action Plans for Common Themes'. The latter plans set out objectives for conservation issues that over-arch the suite of species and habitat action plans.

The primary purpose of the action plans is to stimulate and guide conservation ACTION. The

most important part of each plan therefore is the Objectives, Targets and Action Section that follows the supporting text for each.

The aim of each species or habitat plan

Essentially the aim of each action plan is to:

- Define the species or habitat in question.
- Explain why it is a conservation priority in Cumbria.
- Identify the issues or problems that are thought to affect the species/habitat.
- Summarise any existing work on the species/habitat.
- Explain the context of the Cumbria plan in relation to the UK BAP and links with other Cumbria species/habitat plans.
- Set out an agreed set of objectives, targets and actions, with the likely contributors and a timetable for enactment.

The last of these aims is by far the most important element of each plan, as it is the 'action' part. It is also the part that has received most attention and consultation during drafting for it is here that partners' future potential roles and commitments lie.

A detailed explanation of the sub-sections of individual action plans is given in Appendix 6.

Note regarding Costings. During the production of action plans initial work to attach estimates of costs of actions was undertaken. Further work is required over the coming months to obtain comprehensive costings for all action plans. Those costs that have so far been identified have not yet been shown in the action plan tables.



Action Plans

for Common Themes



Land Management and Policy for the Wider Environment

Introduction

The way land is managed is a fundamental determinant of the biodiversity that it supports. The great majority of the land surface in Cumbria is managed in some way, predominantly for agriculture or forestry, and these land uses are therefore critical to Cumbria's overall biodiversity resource. Policies that affect land management also affect biodiversity, and none can have a more fundamental impact over the past decades than the Common Agricultural Policy (CAP). Reform of CAP is urgently needed if its pervasive and devastating effects upon biodiversity can start to be halted and reversed. Reform is indeed underway, with emphasis moving away from production support towards encouraging a broader approach to rural development, such as financial incentives for farmers to manage their land in ways that benefit biodiversity. Recent increases in funding of these 'agri-environment' schemes, such as Countryside Stewardship, are a move in the right direction.

Advice to farmers and land managers on managing land for biodiversity as part of an economically viable business is available from a number of organisations in Cumbria. The provision of this specialist advice is a key element in achieving biodiversity conservation in the wider countryside.

A significant area of land important for biodiversity is managed by public bodies and utilities. Much is already being done, but there is exciting potential for all such bodies to make a real contribution by managing their land holdings in ways which protect and encourage biodiversity. It is hoped that biodiversity targets will also be incorporated into the plans and policies of all the statutory agencies, for example the Highways Agency in their management of motorway and trunk road verges. It is this holistic approach, involving all the spheres involved in land management in the wider countryside that will need to be realised if our whole biodiversity resource is to be conserved and enhanced.

Broad Objective A		Seek to achieve sustainable uses of Cumbria's land and waters in ways which conserve and, where possible, restore and enhance biodiversity		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Maintain and develop existing Agri-environment and woodland grant schemes (or develop new schemes) to maintain, enhance and restore Cumbria's biodiversity on agricultural and wooded land	I Using existing forums, input into discussions of maintaining and enhancing biodiversity through the appropriate design, targeting and funding of agri-environment schemes.	CBP Steering Committee	S	CP
	2 Monitor and report on the extent to which agri-environment and woodland grant schemes contribute to BAP targets for appropriate habitats and species. By 2003.	MAFF FC, EN	M	RM

Broad Objective A **Seek to achieve sustainable uses of Cumbria's land and waters in ways which conserve and, where possible, restore and enhance biodiversity**

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Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Using the findings of the above assessment, seek to implement any suggested amendments to agri-environment and woodland grant schemes and their geographical coverage in Cumbria. By their first review after 2003.	MAFF FC	M	PL/ SS
	4 Pursue mechanisms by which Common Land can be brought into sympathetic conservation management.	MAFF, EN, NFU, CLA, NT, LDNPA	O	PL
2 Seek to influence reform of the Common Agricultural Policy towards better protection and management of biodiversity	1 Lobby relevant government ministries and agencies at appropriate levels to address the issues of biodiversity on farmland.	CBP Steering Committee	O	PL
3 Consider the costs and benefits of pursuing alternative forms of land-use in Cumbria, including consideration of maintaining large areas of unintensively-managed land	1 Hold a forum meeting at which ideas can be presented and discussed with relevant organisations. By 2003.	CWT, EN	M	CP
4 Maintain and improve advisory mechanisms for landowners and farmers, in order to maintain, restore and enhance biodiversity	1 Carry out a review to identify any gaps in the current wildlife advisory mechanisms in Cumbria, and others which have an impact upon wildlife, and make recommendations for future improvements. By 2001.	FWAG, ECCP, SRI, EN, CWT, FC, EA, LDNPA, MAFF	S	A
	2 Integrate elements of Cumbria's BAP into appropriate existing advisory mechanisms and literature.	MAFF, FWAG, ECCP, SRI, EN, CWT, EA, LDNPA	S/M	A
	3 Incorporate land management advisory mechanisms into Wildlife Sites programme. By 2001.	CWT	S	A

Broad Objective A

Seek to achieve sustainable uses of Cumbria's land and waters in ways which conserve and, where possible, restore and enhance biodiversity

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
5 Use nature reserves and other land designations to bring appropriate land into sympathetic conservation management	1 Review and amend reserves acquisition policies to ensure they take account of UK and Cumbria BAP where appropriate and necessary, and support acquisition of key sites by conservation and other organisations.	EN, CWT, RSPB, NT, Woodland Trust	M	PL/SS
6 Incorporate biodiversity objectives into the management of land under the control of public bodies and utilities	1 Liaise with relevant authorities and companies to explore opportunities for achievement of biodiversity targets through management of motorway/trunk road verges, railway verges and other railway land, land surrounding electricity cables, gas pipelines/installations, land in and around reservoirs, and other public and utility-owned land. By 2002.	CBP Project Officer	M	SS
	2 For land in Local Authority and public utility ownership, seek to assess the nature conservation value and the potential for its maintenance and enhancement.	LAs, Public Utilities	O	SS
7 Implement appropriate elements of the Cumbria BAP through the plans and policies of Partner organisations	1 Review Local Environment Agency Plans and other statutory agency policy documents to ensure that they have adequate policies to protect BAP habitats and species. Make appropriate amendments to the Plans where necessary at their next revisions.	EA, FC, MAFF, Highways Agency	M	PL

Broad Objective B Maintain and where necessary, seek to improve the quality of Cumbria's air, water, soils and climate to provide a sustainable medium for a healthy biodiversity

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Influence the activities of industry, businesses, domestic and leisure activities, to maintain and improve conditions for biodiversity	I Publicise good practices of use of water and air to domestic, agricultural and industrial users.	EA, LAs, DETR, MAFF	O	CP
2 Represent Cumbria in strategic approaches to addressing problems of Climate Change	I Encourage the North West Biodiversity Forum to explain the likely effects of climate change to appropriate audiences in partnership with the North West Climate Group and Sustainability North West.	CBP Steering Committee	O	CP/PL
3 Seek to protect soils from contamination and erosion	I Identify issues of soil contamination and erosion, and advocate protection measures through all appropriate mechanisms, including agri-environment and other land management schemes, and through advisory mechanisms to farmers and land managers.	NT, EN, MAFF, EA, FWAG, CCC	O	All

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CBP = Cumbria Biodiversity Partnership; CCC=Cumbria County Council; CWT=Cumbria Wildlife Trust; DETR=Department of the Environment, Transport and the Regions; EA=Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; FC=Forestry Commission; FWAG = Farming and Wildlife Advisory Group; HA=Highways Agency; LAs=Local Authorities; LDNPA=Lake District National Park Authority; MAFF=Ministry of Agriculture, Fisheries and Food; NT=National Trust; NWW=North West Water Ltd.; RSPB=Royal Society for the Protection of Birds; SRI=Solway Rural Initiative.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

Legislation and Planning

Introduction

Local Authorities, through their role in formulating Development Plans and in the development control process, play important roles in determining the future of Cumbria's biodiversity. These strategic land-use and development policies and their implementation have a vital role to play not just in seeking to protect our most important and valued existing wildlife areas, such as Sites of Special Scientific Interest (SSSI) or Wildlife Sites, but also to optimise opportunities for creating wildlife habitats. This can happen by discussion with developers at the pre-application stage and through planning conditions and site restoration post development.

It is hoped that the development of a local Biodiversity Action plan such as this one will help both planners and conservationists to use the planning and development control process to better protect and enhance biodiversity. Central to this must be an improved understanding - on the part of all parties- of the issues. The provision of training for planners and conservation officers and the availability of information and sharing of "best practice" are central to the achievement of this aim.

The statutory underpinning of development plans is provided by a range of wildlife legislation, such the 1981 Wildlife and Countryside Act (as amended). It is acknowledged that better protection (and management) for SSSI is urgently needed if these sites are to remain the "jewels in the crown" of our countryside. This and other improvements are currently being progressed by Government in a wide-ranging review of countryside legislation which will have important benefits for Cumbria's biodiversity.

Broad Objective A Implement the Cumbria Biodiversity Action Plan through the planning and development control process				
Operational Objective	Action Required	Suggested organisational involvement	Time- scale	Type
1 Develop increased involvement of Local Authorities in the Cumbria Biodiversity Action Plan	1 Hold Forums to facilitate the endorsement and implementation of the Cumbria BAP by Local Authorities. By 2001.	CBP Steering Committee	S	A/ CP
2 Ensure that planning policies, planning guidance and implementation through the development control system reflect the Cumbria Biodiversity Action Plan aims and objectives	1 Review Local Plans and the Cumbria and Lake District Joint Structure Plan to develop and incorporate policies which promote protection (both from direct loss and through degradation) of habitats and species.	LAs, EN, CWT, EA	O	PL
	2 Investigate the value of producing Biodiversity Supplementary Planning Guidance to interpret the policies of the Structure and Local Plans and/or a sustainable development matrix for development control officers. By 2001.	CCC, DCs, EN, CWT, EA, LDNPA	M	PL

Broad Objective A

Implement the Cumbria Biodiversity Action Plan through the planning and development control process

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Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Produce a Best Practice Guide for Local Authority planners & land managers on key issues relating to the conservation of species and habitats highlighted in the Cumbria BAP. By 2003.	CCC, EN, DCs	M	PL
	4 Develop the use of pre-application discussions, planning conditions and obligations and site restoration following development to ensure that the viability of populations of BAP species is not adversely affected, and to enhance and extend BAP habitats.	LAs, EN, CWT, EA	O	PL
	5 Incorporate considerations of biodiversity conservation into "strategic development sites".	CCC, DCs, EN	O	PL
	6 Monitor the effect of development on BAP habitats and species within SSSI and Wildlife Sites, and regularly report findings to appropriate bodies.	EN, CWT, LAs	O	RM
3 Seek to ensure that the training needs of planning & nature conservation officers are identified and met	1 Undertake biodiversity training day(s) for planners (and other Local Authority staff) as part of Cumbria Planning Training Scheme. Minimum of one every two years.	CCC, EN, CWT, DCs	S/O	A
	2 Provide training, to clarify the role of the planning officer and the constraints of the planning process, to nature conservation officers within Cumbria. First session end 2001.	CCC	S/O	A
4 Review planning permissions and other consents for Natura 2000 sites under the Habitat Regulations	1 Review existing planning permissions on Natura 2000 sites.	LAs	M	PL

Broad Objective B		Ensure nature conservation and environmental legislation achieves effective protection and management of Cumbria's biodiversity		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure effective protection and management of land of importance for biodiversity, through appropriate legislation and its enactment	1 Seek to influence relevant government ministries and agencies, at appropriate levels and times, for continued improvement of wildlife legislation and the means to implement it.	CBP Steering Committee	M	PL
2 Ensure that biodiversity concerns are adequately addressed in the standards set and policies devised for air, water and soil quality	1 Establish air, water and soil quality objectives that will sustain biodiversity by 2005, and aim to meet targets by pursuing all appropriate mechanisms.	EA, DETR, EN, NWW, LAs	M/L	PL

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
 CBP = Cumbria Biodiversity Partnership; CCC=Cumbria County Council; CWT=Cumbria Wildlife Trust;
 DETR=Department of the Environment,Transport and the Regions; EA=Environment Agency; EN = English Nature; LAs=Local Authorities; LDNPA=Lake District National Park Authority; NWW=North West Water Ltd.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

Introduction

Biodiversity conservation is not the sole preserve of conservation organisations - important though these are - but needs to embrace a wider group of people if it is to be most effective. We all, as individuals, in our everyday lives, in our work and at leisure, have a role to play. The aim for the Cumbria Biodiversity partnership is to help everyone value and enjoy wildlife and realise the many practical ways they can help.

It is important that young people are educated and enthused about environmental issues and biodiversity conservation, for many reasons, not least because it is they who will be stewards for our towns and countryside in future years. On another level, a love for and understanding of the natural world, once instilled in a person can prove to be a lifelong inspiration and source of fulfilment.

Education is as important for adults as it is younger people - we need to share knowledge and understanding in imaginative ways that appeal to a wide audience. People's contribution to the many voluntary conservation organisations plays a crucial role, benefiting wildlife and rewarding those who take part, whether in surveys, practical management, fundraising or in encouraging others to get involved.

Biodiversity conservation should be seen as a major part of the development of Local Agenda 21 - the movement which seeks to achieve community solutions to environmental and social issues in the pursuit of 'environmental sustainability'. Local Agenda 21 in Cumbria is proving to be a successful way of mobilising people, and has the potential for making important contributions to biodiversity conservation.

Broad Objective A Seek to realise the potential for all members of society to value and enjoy biodiversity and to contribute to its conservation and enhancement

Operational Objective	Action Required	Suggested organisational involvement	Time- scale	Type
I Enable all appropriate groups of people to contribute towards the implementation of the Cumbria BAP	1 Produce customised action sheets for various "user groups" which interpret and explain how each can deliver the objectives of the Cumbria BAP. Consider sheets for, among others, landowners/farmers, businesses, Local Authorities, outdoor education/adventure groups. By 2001.	CBP PIWG	M	A/ CP
	2 Ensure elements of public involvement and awareness are integrated into biodiversity projects/literature of partner organisations.	CBP PIWG	O	CP
	3 Encourage and enable the public to help monitor changes in the abundance and distribution of species, including chosen "indicator species" (see below).	CBP PIWG Cumbria Sustainability Network, CBDN	O	RM/ CP

Broad Objective A **Seek to realise the potential for all members of society to value and enjoy biodiversity and to contribute to its conservation and enhancement**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
2 Ensure integration of biodiversity process with Local Agenda 21 processes to achieve complementary aims	1 Ensure biodiversity is on the agenda of County and District-based LA21 groups, and vice versa, in order to maintain and develop strategic linkages and to explore mechanisms for delivering 'on the ground' help and advice to local initiatives.	CBP Project Officer, LA 21 Officer's Group, LAs	O	CP
	2 Establish suitable biological indicators of environmental sustainability by end 2000.	Cumbria Sustainability Network Working Gp.	S	RM/CP
3 Increase opportunities for children's education to contribute towards biodiversity conservation awareness and involvement	1 Use the Education 21 Partnership to promote biodiversity conservation awareness to children.	Education 21 Partnership	O	A/CP
	2 Promote school children's involvement with wildlife conservation through The Wildlife Trusts' Wildlife Watch club, the RSPB's Wildlife Explorers and activities undertaken by the National Trust, including Guardianships and minibus tours.	CWT, RSPB NT	O	CP
	3 Seek to continue to fund a dedicated Wildlife Watch co-ordinator for Cumbria.	CWT	O	CP
4 Seek to enhance people's involvement with wildlife conservation	1 Encourage wider membership of local and national wildlife conservation organisations.	RSPB, CWT, WT, FWAG, NT	O	CP
	2 Promote people's involvement with practical conservation tasks in their local area.	BTCV, CMS, CWT, ECCP, Groundwork LAs, RSPB, SRI, VAC, NT, LDNPA, EN	O	CP/SS

Broad Objective A **Seek to realise the potential for all members of society to value and enjoy biodiversity and to contribute to its conservation and enhancement**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
5 Seek to increase and improve people's access to and contact with wildlife and natural environments	1 Expand and enhance the existing network of publicly accessible nature reserves in Cumbria, including the designation of further Local Nature Reserves. Where possible, each Parish (or equivalent administrative area) in Cumbria to have at least one accessible "wildlife site" by 2015.	LAs, EN, CWT, WT, RSPB, SRI, NT, VAC	L	SS/ PL
	2 Review and improve interpretative material at accessible nature reserves and other accessible sites.	LAs, EN, CWT, WT, RSPB, NT, SRI, LDNPA	O	CP
6 Maximise the use of the broadcast media and other means of communication to spread information on Cumbria's biodiversity and its conservation to the widest possible audience	1 Develop and maintain the Cumbria Biodiversity Website.	CBP PIWG	O	CP
	2 Use appropriate journals, newsletters and mailings to communicate information on biodiversity conservation and campaigns to farmers and landowners.	NFU, CLA, MAFF, FWAG	O	CP
	3 Publicise biodiversity conservation success stories and stimulate public involvement through imaginative use of media.	All	O	CP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BTCV = British Trust for Conservation Volunteers; CBDN = Cumbria Biological Data Network; CBP PIWG = Cumbria Biodiversity Partnership's Public Involvement Working Group; CMS = Countryside Management Service of Arnsdale and Silverdale Area of Outstanding Natural Beauty; CWT = Cumbria Wildlife Trust; ECCP = East Cumbria Countryside Project; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; LA21 = Local Agenda 21; LAs = Local Authorities; NT = National Trust; RSPB = Royal Society for the Protection of Birds; SRI = Solway Rural Initiative; VAC = Voluntary Action Cumbria; WT = Woodland Trust.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

Introduction

Cumbria needs a range of information for effective biodiversity conservation, education and research to be achieved. A large amount of information currently exists throughout the County, but an efficient and effective system of collation, storage, retrieval and exchange of data is required between the statutory, voluntary and local authority sectors. In addition to this, information needs to be available to a wider audience to inspire and educate about the wealth of wildlife to be found in Cumbria.

A group of organisations has entered into an agreement to share data for use in their day-to-day work. This “Joint Working Agreement” (JWA) was made in the Spring of 1999 by English Nature, Environment Agency, Cumbria County Council, Cumbria Wildlife Trust, Tullie House Museum and the Lake District National Park Authority. This group is known collectively as the Cumbria Biological Data Network (CBDN). One result of this will be better co-ordination of data collection and storage. Although the JWA does not include the creation of a single local Biological Records Centre for Cumbria, this is under consideration as a future possibility.

Broad Objective A		Ensure that biological and geological data is collected, collated and exchanged in order to enable more effective nature conservation and education to be achieved			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Implement, regularly review and publicise the Cumbria Biological Data Network (CBDN) Joint Working Agreement (JWA)	1 Review the JWA, including membership, in 2002 to ensure the system is effective and achieving its aims. Amend as necessary.	CBDN	S	RM/CP	
	2 Develop a list of CBDN defined sites.	CBDN	O	RM	
	3 Publicise the JWA and what it sets out to achieve by for example, articles in member publications, recorder meetings etc	CBDN members	S/O	CP	
2 Assess the need and options for a Local Records Centre for Cumbria	1 Discuss at the review of the JWA in 2002, taking guidance from the National Biodiversity Network into account.	CBDN	S	RM	
	2 Involve all relevant organisations in the discussions; for example, LAs, NT, RSPB, other voluntary/special interest groups (eg bats, badgers), by end 2001.	CBDN, LAs, NT, RSPB, other potential partners	S	CP	

Broad Objective A **Ensure that biological and geological data is collected, collated and exchanged in order to enable more effective nature conservation and education to be achieved**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Encourage species and habitat recording activities amongst organisations and general public in Cumbria, to assist in biodiversity conservation initiatives	1 Continue the current recording schemes, networks and feedback to recorders. Include in review of JWA in March 2001.	CBDN members	O	RM/CP
	2 Institute an annual "recorders meeting" to bring people together and inspire recording effort, in 2001 and beyond.	THM, CBDN members	S/O	CP
	3 Fund survey effort by local experts and special interest groups, according to CBDN agreed priorities.	CBDN	O	RM/CP
	4 Seek appropriate ways to ensure that a summary of existing data (to exclude sensitive information) is available in a publicly accessible format, by the end of 2001.	CBDN, NFU, CLA	S	CP
	5 Set up and manage a simple system for recorders to send in their records, (explore possibilities with recorders at "recorders meeting" in 2001).	CBDN, THM	S	RM/CP
4 Maintain up to date data systems	1 Ensure all new species data collated are entered into the system within 6 months of completion of projects or receipt of other records.	CBDN members	O	RM
	2 All existing post 1970 records for at least BAP (national and local) species and habitats, nationally rare, nationally scarce and locally rare/scarse species, entered into the computerised system by end 2001.	CBDN	S	RM
	3 Develop a standard approach to the compilation of habitat locations, area and condition data by end 2000, with all BAP habitat locations digitised by end 2001.	CBDN	S	RM

Broad Objective B		Ensure that relevant biological information is readily accessible to those involved in the implementation of the Cumbria Biodiversity Action Plan		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Enable organisations involved in the implementation of the Cumbria BAP to have ready access to appropriate biological information	1 Ensure that Local Authorities have adequate and up to date information (preferably in GIS/Recorder format) to identify on 'constraints maps' the location of BAP species and habitats (particularly those that are limited in extent), thereby alerting planners to the possible need to seek advice from conservation professionals.	CBDN , EN, EA, CWT, LAs	O	RM/SS
	2 Ensure those involved in the provision of advice to farmers and landowners and the delivery of biodiversity actions have access to all relevant records to inform appropriate and efficient targeting of effort and resources.	CBDN	O	SS/SP/A

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CBDN=Cumbria Biological Data Network; CLA=Country Landowners' Association; CWT=Cumbria Wildlife Trust; EA=Environment Agency; EN = English Nature; LAs=Local Authorities; NFU=National Farmers' Union; NT=National Trust; RSPB=Royal Society for the Protection of Birds; THM-Tullie House Museum, Carlisle.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

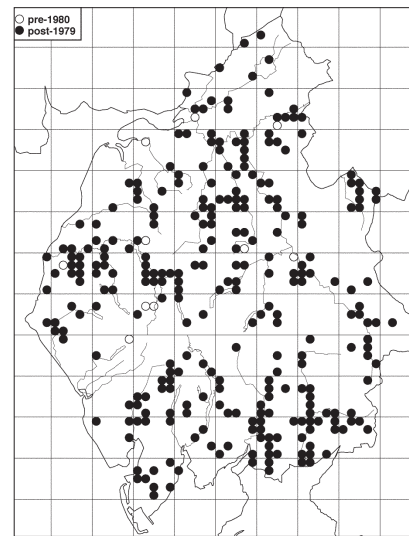
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

Bats



All UK bats and their roosts are protected by law. English Nature must be consulted prior to undertaking any building or maintenance work which will affect a bat roost.

Map shows location of bat roosts (all species)



Current status

There are sixteen species of bat breeding in Britain, with others occasionally occurring as vagrants. Of these, eight species have been recorded in Cumbria and a further two have been identified by electronic bat detector only. This Action Plan concerns all the bat species found in Cumbria.

The basic level of current knowledge of the status and distribution of British bat species suggests a general decline in populations nationally (Harris *et al.* 1995). Table 1 indicates the status and habitat of each in Cumbria.

The commonest bat, the pipistrelle, is estimated to have declined by 70% between 1978 and 1993 (National Bat Colony Survey). It is therefore included on the list of Priority Species in the UK Biodiversity Action Plan.

Recently, it has been discovered that the pipistrelle is two distinct species, distinguished by the frequency of their echo location. However, for the purpose of this Plan "pipistrelle" refers to both species.

Legal protection

The bats and their roosts are fully protected by the Wildlife and Countryside Act 1981 (as amended), and are listed on Annex IVa of the Habitats and Species Directive 1992. All UK bat species are also listed in Appendix III of the Bern Convention, and all except the pipistrelle are listed in Appendix II.

All UK bat species are included in Appendix II of the Bonn Convention.

Relevant ecology/management requirements

Adult bats start mating in the autumn and can continue throughout the winter hibernation period and into the spring.

Whilst hibernating, often in underground sites, they go into a state of torpor by reducing heart rate, breathing rate and body temperature.

Females congregate to form nursery colonies in late spring where each generally produces a single baby, usually in June. The babies are weaned at around five weeks. At three weeks, nearing adult size, they are able to fly out at dusk with the adults and feed using ultrasonic echolocation to locate insect prey. Generally the nursery roost disperses around August. Sexual maturity is usually reached in the second year.

Bat colonies can be mobile and move regularly, particularly during the summer months. Roosts at this time may be in trees or buildings, including houses, churches, bridges, and occasionally in underground sites. Lack of disturbance at times when bats are giving birth or in hibernation is critical for their survival.

Bats require insect rich habitats to feed in.

Table 1: Local status and habitat of Cumbrian bat species

Species	Local Status	Habitat
Noctule <i>Nyctalus noctula</i>	Widespread but uncommon; mobile populations; breeding roosts recorded.	Tree dweller; predominantly in lowlands. Occupies woodpecker and rot holes. Seldom in buildings. Will utilise bat boxes. Feeds over deciduous woodland, parkland, pasture, water and forest edges.
Daubenton's bat <i>Myotis daubentonii</i>	Widespread; hibernacula and breeding roosts recorded.	Bridges, tunnels, caves, mines, stone buildings and trees. Has been found hibernating underground at high altitude (550m). Feeds over rivers, canals and other water bodies. Will forage in riparian woodland.
Natterer's bat <i>Myotis nattereri</i>	Widespread; hibernacula and breeding roosts recorded. Less common than Daubenton's.	Similar to Daubenton's and can be found together; bridges, old buildings, barns, trees and underground sites. Feeds in woodland and parkland. Has recently been recorded in some upland areas, mainly using riparian habitats.
Whiskered bat <i>Myotis mystacinus</i>	Widespread but uncommon; breeding roosts and hibernacula recorded.	Older, mainly stone buildings, churches, trees and often in bat boxes. Feeds mainly in deciduous woodland
Brandt's bat <i>Myotis brandtii</i>	Widespread but uncommon; hibernacula and breeding roosts recorded. "Swarming" sites recorded.	Similar to whiskered.
Brown long-eared bat <i>Plecotus auritus</i>	Widespread and common; hibernacula and breeding roosts recorded.	Old buildings, churches, barns (often with trees close by), underground sites and trees. Often found in bat boxes. Feeds in deciduous and coniferous woodland often within the canopy; around parkland trees, gardens, along hedgerows.

Species	Local Status	Habitat
Common pipistrelle <i>Pipistrellus pipistrellus</i> (45kHz)	Widespread and common; breeding roosts recorded but species recognition only recently recorded; rarely found in hibernation.	Wide age range of buildings; favours modern structures, trees occasionally and bat boxes. Feeds over diverse habitats; rural and urban gardens, woodland, farmland, or near water.
Soprano pipistrelle <i>Pipistrellus pygmaeus</i> (55kHz)	Widespread and common; breeding roosts recorded but species recognition only recently recorded; rarely found in hibernation.	As common pipistrelle, but further work is required to establish how these two species differ in habitat requirements.
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Rare. Three UK breeding sites known. A single bat-detector record of a night roost in Cumbria, and several foraging records.	Tree dweller; hollow trees, cracks, bat boxes and buildings. Sometimes shares nursery roost with pipistrelle or Brandt's bats. Feeds mainly around riparian and woodland edge habitats.
Leisler's bat <i>Nyctalus leisleri</i>	Rare. Unconfirmed bat detector record for Cumbria. Present in adjacent counties (Yorkshire and Dumfries and Galloway).	Woodland bat, similar to noctule but will roost in buildings. Feeds in open deciduous and coniferous woodland, over water bodies, parkland and around street lamps in suburban areas.

Current issues

Loss of habitat

- Disturbance of breeding and hibernation roosts.
- Loss of both maternity and hibernation roost sites through damage or destruction.
- Ineffective wildlife legislation and enforcement to protect bats and their roosts.
- Loss of feeding habitat through changes in land use and unsympathetic management, resulting in the loss of insect-rich feeding habitats, such as wetlands, woodlands, unimproved grasslands and riparian habitats.
- Loss of flight line features such as tree lines, ditches and hedgerows.

Pesticides

- Use of timber treatment chemicals harmful to bats.
- Careless use of synthetic pyrethroid sheep dips leading to losses of invertebrate food sources.
- Decline in invertebrate populations due to modern agriculture's heavy reliance upon pesticides and veterinary products, such as certain anthelmintics used to control parasitic worms in livestock.

Direct conflict with human interests

- Poor public image and understanding of bat behaviour and requirements, and a lack of understanding of the legislation protecting bats.
- Conflict between bats' welfare and that of the human occupants, where the two inhabit the same building.

Current action

- Monitoring of bat populations by the Cumberland and the Westmorland and Furness Bat Groups. This includes regular survey and monitoring programmes, such as the National Bat Monitoring Programme, the National Bat Colony Survey and local hibernacula surveys. The Westmorland and Furness Bat Group produces an annual report.
- Roost records are forwarded to English Nature, and bat records for the county are sent to Tullie House Museum.
- Local and national research projects into mating, field activity.
- Bat group members regularly give talks and host walks to educate the public about bats and to improve public understanding and tolerance.
- Consultation system in place between EN and local volunteer bat groups to protect threatened roosts.
- EN has produced a guidance note to cover the presence of bats in barns which are the subject of planning applications for conversion to dwellings and for traditional barn renovations. LDNPA is currently producing its own version, to be used as a Supplementary Planning Guidance Note.
- Bat conservation measures are taken into account in building conservation plans within Environmentally Sensitive Area schemes.
- Following the Cumbria Bats in Bridges Survey, Cumbria County Council has put a mechanism in place to protect actual and potential bridge roosts. North West Water's constraints procedure for water pipe bridge maintenance includes searches for bat colonies.
- Most Local Planning Authorities have clear species protection policies within the latest versions of their Local Plans. Some Authorities, however, have more general policies not mentioning protected species specifically.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for pipistrelles in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Maintain existing populations and range of pipistrelles.
- Restore pipistrelle populations to pre-1970 numbers.

UK Contact Point and Lead Partner

The UK Contact Point for bats is English Nature, whose nominated officer is based at the Peterborough HQ. The UK Lead Partner for bats is the Bat Conservation Trust, whose nominated officer is based at their London office.

Local contacts

Westmorland and Furness Bat Group - Shirley Martin (015395 35700)

Cumberland Bat Group - Geoff Norman (016973 51540)

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to bats:

Phase I

- upland oak woodland
- hay meadows and lowland pastures
- mesotrophic standing waters
- upland mixed ash woodland
- purple moor-grass and rush pasture
- rivers and streams
- wet woodlands
- ancient and/or species-rich hedgerows
- cities, towns and villages

Phase II

- parkland, wood pasture and veteran trees

References

Harris S, Morris, P, Wray, S and Yalden, D. 1995. A review of British mammals: population estimates, and conservation status of British mammals other than cetaceans. JNCC. Peterborough.

Objectives, targets and proposed actions for bats in Cumbria

Broad Objective A	Maintain and enhance current bat populations in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Maintain and improve opportunities for roosting, foraging and hibernating bats	1 Identify as Wildlife Sites, bat sites that meet selection guidelines (amending guidelines if necessary) by 2002.	CWT, BGs	M	SS/SP
	2 Provide advice on management and grants to owners and occupiers of Wildlife Sites with bats by 2008.	CWT	L	A/SS
	3 When next reviewed, consider targeting the Woodland Grant Scheme, Forest Design Plans, Countryside Stewardship schemes, ESAs and other relevant agri-environment and forestry schemes to land in the vicinity of important roost sites, with the aim of enhancing terrestrial and aquatic habitats used by bats.	MAFF, FC	O	PL/SS
	4 Ensure that the requirements of bats are incorporated into the conservation objectives for appropriate SSSI by 2002.	EN	M	SS
	5 Improve and implement agreed mechanism to protect bats in bridges maintained by Cumbria County Council, including completion of baseline survey (by 2004).	CCC, EN, LDNPA	M/O	RM/SP
	6 Develop Bats in Bridges project with other organisations that maintain bridges, by 2003.	EN, LDNPA, Highways Agency, Railtrack, RP, BW, NWW	M	SP
	7 Produce Best Practice Guidance Note on bats for Local Authorities (as part of a wider Best Practice 'pack') by 2003.	CCC, EN, LDNPA, DCs, YDNPA	M	LP/A
	8 Contact public health/pest control organisations to ensure that they are passing on the correct advice to the public and know where to get help. By 2000 and ongoing.	EN, DCs	S/O	A

Broad Objective A		Maintain and enhance current bat populations in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	9 Promote the use of less harmful, bat friendly insecticides such as permethrin for timber treatment in roof spaces.	EN, BGs	O	CP/A
	10 Install and maintain bat boxes, particularly in areas where opportunities for roosting are scarce. Six new schemes in Cumbria by 2005. Sites to be targeted, following on from survey work.	BGs, EN, NT, FE, CWT, FWAG, CLA, NWW	M	SP
	11 Provide advice by leaflet to general public, property/landowners, developers, builders, architects, timber treatment companies, tree surgeons and farm suppliers to improve awareness of bats and the legislation by 2001.	EN, BGs	S	CP
	12 Include bat protection measures in building maintenance programmes and development proposals.	MAFF, FWAG, LAs, BW, NT, EN	O	SP
2 Increase knowledge of bat distribution and habitat use	1 Encourage public involvement in summer roost counts.	BGs	O	CP
	2 Produce a strategy to prioritise future survey requirements of bat habitats and roost types, by 2001.	BGs, EN, THM, LDNPA	S	RM
	3 Seek funding to assist implementation of above strategy. By 2002.	EN	M	RM
	4 Carry out priority systematic surveys of bat habitats/roost types as set out in the strategy.	BGs, EN	O	RM
	5 Data that are gathered to be disseminated to organisations which can make good use of them for conservation purposes.	BGs, THM, EN	O	RM
3 Monitor bat populations in Cumbria	1 Continue to record roost locations and bat numbers.	BGs, THM, EN	O	RM

Broad Objective A**Maintain and enhance current bat populations in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	2 Ensure that efficient data storage and retrieval systems (with locations on GIS) are in place and distributed to relevant bodies by 2001.	THM, BGs, EN, CWT	S	RM
	3 Ensure that records collated are returned to the recorder each year.	THM, BGs, EN	O	RM
	4 Take part in BCT bat monitoring programme for the duration of that project.	BGs	S	RM
	5 By 2001, consider the usefulness and feasibility of setting up a Cumbrian foraging habitat monitoring project.	BGs, EN	S	RM
	6 Ask the public for assistance in identifying roosts and monitoring, where appropriate.	BGs, EN	O	CP

Broad Objective B**Encourage greater understanding of bat ecology and conservation**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Increase public awareness of bats and their requirements	1 Produce a general leaflet for bat roost owners, to promote greater understanding of bat behaviour.	EN, BGs	S	A/ CP
	2 Bat groups to recruit 5 new members in the county and train them for Roost Visitor Licences by 2003.	BGs	M	CP
	3 Continue talks and walks to reach as wide an audience as possible.	BGs, NPAs, NT, ECCP	O	CP
	4 Produce press releases to inform the public about bat conservation, when topical issues/opportunities arise.	BGs, EN,	O	CP
	5 Contact relevant conservation groups in Cumbria and request inclusion of bat articles in membership publications or newsletters.	EN, BGs	O	CP

Broad Objective B	Encourage greater understanding of bat ecology and conservation			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	6 Contact and maintain working relationships with developers, builders, architects, timber treatment companies, tree surgeons and property owners to improve awareness of bats and the legislation.	EN , BGs, LDNPA	O	A/ CP
	7 Ensure that people working with bats are aware of the correct procedure when the law is broken. By end 2001; thereafter ongoing.	EN , BGs	S/O	A
	8 Continue contact with Police Wildlife Liaison Officers to ensure that they are kept up to date with the legislation.	EN	O	A

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BCT = Bat Conservation Trust; BGs = Bat Groups; BW = British Waterways; CCC = Cumbria County Council; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; EN = English Nature; EA = Environment Agency; FE = Forest Enterprise; FRCA = Farming and Rural Conservation Agency; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture Fisheries and Food; NPAs = National Park Authorities; NT=National Trust; NWW=North West Water Ltd.; RP=Rail Property; THM = Tullie House Museum.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

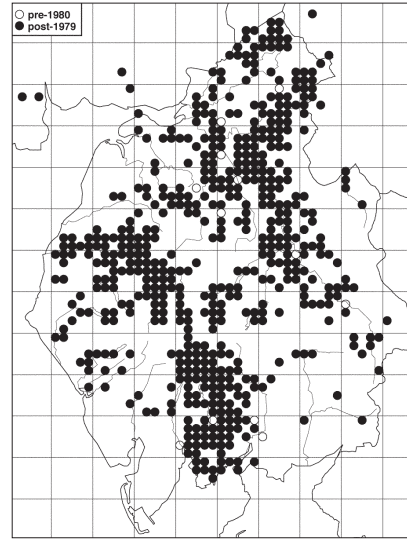
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Red Squirrel

[*Sciurus vulgaris*]

When faced with competition from grey squirrels, red squirrels survive best in large blocks of coniferous woodland.



Current status

The red squirrel is distributed throughout the northern Palaearctic, from the British Isles in the west, to the east coast of Russia. Once ubiquitous in Britain, the species has undergone a drastic decline over the last 50 years and is now essentially restricted to Scotland, Cumbria, Northumberland, County Durham, West Lancashire and Merseyside, with small isolated populations in Norfolk, the Isle of Wight, three small islands in Poole Harbour and North Wales.

Reasons for the decline of the red squirrel in Britain include loss and fragmentation of habitat and disease. However, the most important factor appears to be competition with the introduced American grey squirrel. The grey squirrel was introduced to Britain in the late 19th Century and has replaced the red squirrel in most of its former British range. Grey squirrels are better adapted to broad-leaved and mixed woodlands, enabling them to out-compete the reds, which are more adapted to coniferous woodlands.

The red squirrel still occurs throughout most of Cumbria, with the strongest populations in the north of the county. The main interface area where the two species are directly competing is in south Cumbria, to the south of Grasmere. Grey squirrels are also moving into the county, apparently from Scotland.

Legal protection

The red squirrel is fully protected by the Wildlife and Countryside Act 1981 (as amended), and is listed in Appendix III of the Bern Convention. At least seven Sites of Special Scientific Interest and three National Nature Reserves support red squirrel in Cumbria.

Relevant ecology/management requirements

Red squirrels need a consistent and diverse food supply consisting of tree seeds, nuts, berries, buds, shoots, flowers, lichen, fungi and, occasionally, insects. The autumn and winter seed harvest is extremely important both for over-winter survival and for breeding success the following year. Red squirrels need to increase their body weight by

10% in order to survive the winter and maintain good condition for breeding. The autumn and winter food runs out by late spring and between April and August natural food becomes scarce. Mortality in red squirrels is high, with five out of six young dying in their first year. They can, however, live for 4-7 years in the wild and have lived up to 10 years in captivity. Causes of mortality include lack of food, disease, predation and road deaths.

When faced with competition from grey squirrels, research indicates that red squirrels will survive best in large blocks of coniferous woodland.

In woodlands where red squirrel conservation is considered a priority, large-seeded deciduous species such as oak, beech, hazel and chestnut should be excluded from planting mixtures to discourage ingress by greys. Small-seeded broad-leaved species can be planted to increase diversity and provide extra sources of food for red squirrels.

The UK Red Squirrel Group advocates the establishment of refuge sites where management is geared to red squirrel conservation. These will essentially be large conifer blocks, greater than 200 hectares in size, surrounded by a buffer zone of non-squirrel habitat to help prevent incursions of greys.

Current issues

- Exploitation competition with grey squirrels.
- Loss, fragmentation and unsympathetic management of woodland habitats for red squirrels.
- Disease (e.g. parapox virus) causing depletion of populations and even local extinctions.
- Road mortality.

The most important threat to the survival of the red squirrel in Cumbria is the spread of the grey squirrel.

Current action

- The Joint Nature Conservation Committee has produced a UK Strategy for red squirrel conservation and a UK Red Squirrel Group has been established to implement it.
- The red squirrel is the subject of a Species Recovery Programme run by English Nature.

- A red squirrel conservation partnership, NPI Red Alert North West, has been running since 1993, with a Project Officer based at Cumbria Wildlife Trust, to implement conservation action in the region. The Project has local groups who deliver targeted action and a five year regional action plan has been developed. It should be noted that the project does not have permanent funding and the partnership organisations will need to take on the work of the project if it does not continue.
- Records are collated by NPI Red Alert NW and Tullie House Museum.
- Numerous research projects are underway to investigate habitat manipulation, disease and reintroduction.
- The Lake District Environmentally Sensitive Area scheme provides opportunities for protecting and managing farm woodlands, and can incorporate measures to aid red squirrel conservation.
- Most Local Planning Authorities have clear species protection policies within the latest versions of their local plans. Some Authorities however, have more general policies not mentioning protected species specifically.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for red squirrel in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- To maintain and enhance current populations where appropriate through good management.
- To re-establish red squirrel populations, where appropriate.

UK Contact Point and Lead Partner

The UK Contact Point for red squirrel is English Nature, whose nominated officer is based at the Peterborough office.

The UK Lead Partner for red squirrel is the UK Red Squirrel Group, whose nominated officer is based at the Peterborough office of the Joint Nature Conservation Committee.

Local contacts

Project Officer, NPI Red Alert North West, based at Cumbria Wildlife Trust, Brockhole, Windermere, LA23 1LJ. Phone: 015394 48280.

Associated plans in the Cumbria BAP

There are potential conflicts between this plan and other Cumbria Biodiversity Action Plans, for example the native woodland plans which may act in favour of the grey squirrel. Other conflicts can occur where conifer removal will be required to fulfil the targets of other BAPs, e.g. lowland raised mire and limestone pavement. An overall balance will be required to ensure that some sites can be managed for red squirrels.

The following Cumbria habitat action plans are of relevance to red squirrel:

Phase I

- upland oak woodland
- upland mixed ash woodland
- wet woodland
- limestone pavement
- ancient and/or species-rich hedgerows
- lowland raised mire

Phase II

- parkland, wood pasture and veteran trees
- scrub communities (other than juniper)
- black grouse
- farmland birds

Objectives, targets and proposed actions for red squirrel in Cumbria

Broad Objective A **Maintain viable self-sustaining populations of red squirrels through good habitat and species management and, where appropriate, protect populations currently threatened by small size and proximity to grey squirrel populations**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Survey and monitor squirrel populations.	1 Monitor red and grey squirrel populations at key sites using standardised techniques (hair tubes and time/area observation counts) every four years starting 1999.	NPIRANW, EN, FE, NT, NWW	○	RM
	2 Collate public sightings on a centralised database, produce annual distribution maps (including on GIS) and circulate to all appropriate organisations.	NPIRANW, THM	○	RM
	3 Monitor conservation efforts and review plan every five years.	NPIRANW	○	RM
2 Ensure that red squirrels are taken into account in all relevant policy decisions and that the law relating to red and grey squirrels is enforced.	1 Ensure that targets for red squirrels are included in Forest Design Plans and forestry strategies, where appropriate.	FE, FC	○	SS/ SP
	2 Raise awareness of the law relating to red and grey squirrels through local awareness campaign by 2000 and liaise with Police Wildlife Liaison Officer to advise on appropriate enforcement.	EN, NPIRANW	○	CP

Broad Objective A		Maintain viable self-sustaining populations of red squirrels through good habitat and species management and, where appropriate, protect populations currently threatened by small size and proximity to grey squirrel populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Protect viable red squirrel populations through good habitat management and by the establishment of refuges.	1 Identify suitable refuge sites (conifer blocks >200 ha) and liaise with landowners to incorporate red squirrel actions into management plans; 10 sites by 2005.	NPIRANW, FC, FE, EN, NWW	M	SS/ SP
	2 Ensure that the requirements of the species are incorporated into the conservation objectives for appropriate SSSIs by 2002.	EN	M	SS/ SP
	3 Identify and liaise with landowners in the buffer zones and ensure that appropriate conservation measures are in place; 10 sites by 2005.	NPIRANW, FC, FE, EN	M	SS/ SP
	4 Provide advice to all woodland owners on appropriate action for red squirrels.	NPIRANW, LDNPA, FC ECCP, FE, FWAG, EN, MAFF	O	A
	5 Promote measures for red squirrel conservation through the Woodland Grant Schemes and Woodland Improvement Grant schemes.	FC, NPIRANW	O	SP/ SS
4 Alleviate threats to red squirrel populations.	1 Promote targeted grey squirrel control in the interface area and ensure that control occurs on all appropriate nature reserves and sites owned/managed by conservation /forestry bodies by 2004.	NPIRANW, FE, FA, NT, DCs, LDNPA, YDNPA, NWW	S/M	SP
	2 Support supplementary feeding in the interface area when natural food sources are limited, subject to advice regarding diseases.	NPIRANW, LDNPA, NT, FE, NWW	O	SP
	3 Assist with research into disease and respond to outbreaks.	NPIRANW	O	RM

Broad Objective A		Maintain viable self-sustaining populations of red squirrels through good habitat and species management and, where appropriate, protect populations currently threatened by small size and proximity to grey squirrel populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	4 Investigate red squirrel road mortality through one year survey and produce report by 2000.	NPIRANW, THM	S	RM
	5 Identify road mortality black spots and install 10 road signs and 10 rope bridges in appropriate locations by 2005.	NPIRANW, CCC	S/M	RM/SP
5 Raise awareness of red squirrel conservation	1 Raise awareness of red squirrel conservation through ongoing public relations campaign to include 10 talks and 8 press releases per year for the duration of the project.	NPIRANW PR Group	O	CP
	2 Take part in annual National Red Squirrel Week.	NPIRANW	O	CP
	3 Raise awareness in schools through promotion of NPI Red Alert Education Pack.	NPIRANW, Schools	O	CP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CWT = Cumbria Wildlife Trust; ECCP = East Cumbria Countryside Project; EN = English Nature; FA = Forestry Authority; FC = Forestry Commission; FE = Forestry Enterprise; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NPIRANW = NPI Red Alert North West; NT = National Trust; THM = Tullie House Museum.

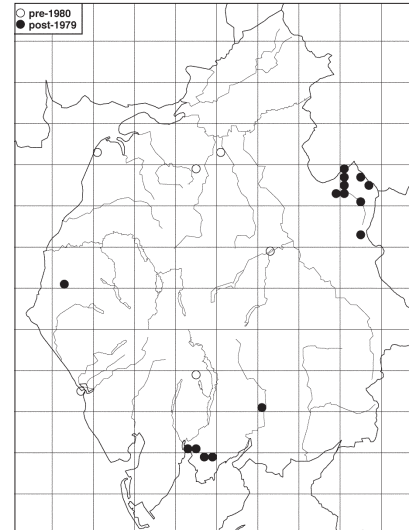
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Water Vole

[*Arvicola terrestris*]



Although sometimes called water rats, water voles are not rats but voles. They can be distinguished from the brown rat by their blunter faces, short ears and shorter hairy tails; brown rats have almost hairless tails.

Current status

The water vole is the largest member of the UK vole family. Sometimes called water rats, they are about 20cm long (head and body), with a tail up to 2/3 this length. They have small ears, a blunt muzzle and a soft and shaggy coat which is usually brown but can be black in some colonies.

The water vole used to be a common sight in lowland Britain, crouching at the water's edge or swimming close to the banks of waterways. However, a national survey in 1989 and 1990 showed that water voles had gone from two thirds of the sites where they had lived before. It seemed likely that half of these populations had been lost since 1980, which makes it one of the most rapidly declining animals in the UK (Strachan & Jefferies, 1993).

Historically, water voles were common throughout the Lake District from Furness to the Scottish borders (Macpherson, 1892). Limited and ongoing survey work by Cumbria Wildlife Trust Mammal Group and others has identified a small number of areas in Cumbria where water vole are still found, the healthiest populations being around Alston.

The water vole is listed as a priority species in the UK Biodiversity Action Plan.

Legal protection

The water vole has been included on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). The water vole's places of shelter or protection are protected, but the voles themselves are not. One National Nature Reserve and one Site of Special Scientific Interest support water vole in Cumbria.

Relevant ecology/management requirements

Water voles live along riverbanks, in burrows with entrances, 4-8cm in diameter, above and below the water. They are active both day and night, usually for periods of 2-4 hours. They create runs in dense vegetation within 2m of the water's edge. "Lawns" of closely cropped grass, occasionally with piles of chopped food, may surround burrow entrances. Male voles occupy sections of river bank about 130m in length, while females have ranges about 70m long. They leave their droppings in latrines which often show a trampled mass of old droppings with fresh ones on top.

In summer, they actively range along riverbanks, but most of the winter is spent within the burrow, although they do not hibernate and need a year round food supply. They are herbivorous, and eat green shoots in preference to fruits and seeds, but have to rely more on below-ground rhizomes during the winter. Preferred species include river margin reeds, rushes, bur-reed, reedmace and reed sweet-grass.

Water voles have been shown to prefer banks greater than 1m high, with slopes of less than 35°, and vegetation down to the water's edge. They appear to be more abundant on slow flowing streams, 1-3m wide, with muddy bottoms. In the Pennines, water voles are found on small upland streams, possibly at altitudes that mink do not normally reach.

Predation by the introduced American mink has been shown to have a severe impact on water vole populations. Removal of mink is unrealistic for large areas, but can be carried out locally in nature reserves and along key sections of rivers, to protect remaining water vole populations. Recent observations of a correlation between falling mink

numbers and rising otter numbers leads to a suggestion that otters displace mink. Therefore, it may be that work to encourage otters will also benefit water voles.

Habitat degradation and pollution have contributed to the decline of the water vole. Riverside works, such as dredging and clearance of bankside vegetation, can remove the plants water voles depend on for food, and cause disturbance. A more sensitive approach to riverbank management needs to be encouraged to protect water voles in appropriate areas. Dredging and other work should be scheduled so it does not affect both banks simultaneously, and retention or planting of bankside vegetation should be carried out wherever possible.

Current issues

- Habitat degradation and loss; heavy grazing of river banks, river engineering, dredging and clearance of bankside vegetation, and lack of suitable management.
- Population fragmentation; as populations become discrete and smaller they are more likely to become extinct.
- Predation, especially by mink. Mink can eliminate water vole populations within two years.
- Pollution through contamination of water bodies by chemicals such as PCBs and heavy metals, and inputs from agriculture and sewage works. These are thought to have a detrimental affect, although this has not yet been quantified.
- Persecution; water voles may be mistakenly identified as rats and poisoned with rodenticides.

Predation by mink is thought to be the main cause of declines in water vole populations, exacerbated by habitat loss and fragmentation.

Current action

- A few sites are appropriately managed by landowners in conjunction with the Environment Agency.
- Cumbria Wildlife Trust Mammal Group members are continuing their water vole survey.
- The Vincent Wildlife Trust has resurveyed the 2,970 sites of the national water vole survey in Britain over 1997/98.

- Cumbria Wildlife Trust and Tullie House Museum are collecting records.
- The Wildlife Trusts and the Environment Agency have produced a water vole slide pack to raise public awareness.
- The Environment Agency is preparing and implementing appropriate management actions for water voles within their Local Environment Agency Plans (LEAPs), where relevant.
- The Environment Agency has guidelines for general ditch and river bank management.
- Most Local Planning Authorities have clear species protection policies in their local plans.
- Trapping of mink occurs widely throughout Cumbria.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for water vole in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Maintain the current distribution and abundance of the species in the UK.
- Ensure that water voles are present throughout their 1970s range by the year 2010, considering habitat management and possible translocation of populations to areas from where they have been lost.

UK Contact Point and Lead Partner

The UK biodiversity Contact Point and Lead Partner for the water vole is Environment Agency, whose nominated officer is based at the Reading office.

Local contacts

Environment Agency, Penrith office.

Phone: 01768 866666.

Erica Donnison, English Nature, Kendal office.

Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria BAP action plans are of relevance to the water vole:

Phase I

○ rivers and streams

○ mesotrophic standing waters

References

Macpherson, H. A. (1892) *A Vertebrate Fauna of Lakeland*, David Douglas, London.

Strachan, R. & Jefferies, D. (1993) *The water vole (Arvicola terrestris) in Britain 1989-1990: Its Distribution and Changing status*, The Vincent Wildlife Trust, London.

Objectives, targets and proposed actions for water vole in Cumbria

Broad Objective A	Maintain current water vole populations			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Survey and monitor the population and make information available for conservation purposes.	1 Commission a review of existing information to establish the historical status of the water vole in Cumbria. By 2000.	EA, EN, THM, CWT, CWTMG	S	RM
	2 Commission a targeted survey of Cumbria to establish current population status and distribution of water vole and American mink. By 2002.	EA, EN, CWTMG, CCC, CWT, LDNPA, THM	M	RM

Broad Objective A		Maintain current water vole populations			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
	3 Monitor selected sites every five years from 2006 (number/location of sites to be decided when survey results available).	EA, CWTMG, EN, CWT	O	RM	
	4 Assist with future UK water vole surveys in Cumbria, as appropriate.	EA, EN, CWTMG, BW,VWT, THM, CWT	O	RM	
	5 Maintain database of local water vole sites (in a useful format, including GIS/Recorder) and make information available to relevant bodies, including all relevant planning authorities. By end 2000 and updated regularly thereafter.	THM, CBDN	S/O	RM/SS	
2 Increase public awareness of the importance of the water vole and its habitats	1 Provide advice to landowners/ occupiers about water vole habitat requirements and legislation.	EA, EN, FWAG, MAFF, CWT	O	A	
	2 Raise awareness by public appeal for records of water vole and mink by 2001.	THM, CWT, CWTMG	S	CP	
	3 Distribute nationally-produced leaflets about water voles to those who can affect water voles. By 2001.	EA, EN, CWT	S	CP	
	4 Give talks about water voles to relevant audiences as opportunities arise, targeting riparian owners in relevant areas.	CWTMG, CWT, EN, EA	O	CP	
3 Maintain and improve habitats for water voles	1 Following the results of A1.2, include the needs of water voles in the management plans/statements of appropriate SSSIs, and Nature Reserves by 2002-2007.	CWT, EN, NT, LAs	M/L	SS	
	2 Incorporate water vole conservation into relevant habitat policies and agri-environmental schemes, especially Countryside Stewardship and Environmentally Sensitive Areas. By 2005.	MAFF	M	SS	
	3 Provide advice on management and grants to owners and occupiers of Wildlife Sites, by 2008.	CWT, FWAG	L	A/SS	

Broad Objective A		Maintain current water vole populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	4 Monitor the success of a sample of habitat improvement initiatives.	EA, EN, CWTMG, CWT	O	RM
4 Alleviate threats to water voles	1 Carry out water vole habitat survey and develop appropriate mitigation within known water vole areas, to ensure that engineering works in relation to river banks, road verges and bridges do not damage water vole habitat. With reference to EA guidelines.	CCC, EA, NWW, EN, HA	O	SS CP SP/ CP
	2 Target appropriate areas for publicity to avoid the use of rodenticides and herbicides, and to promote good riparian management. By 2002.	EA, FWAG, MAFF, EA, EN, CLA	S	
	3 Promote control of mink in key water vole areas.	MAFF, EA, EN, CWT, NWW	O	

Broad Objective B		Increase water vole populations to 1970 levels by 2010		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Increase the number of sites where water voles occur to 1970 levels by 2010.	1 Determine Cumbria's contribution to the national water vole re-introduction programme, by 2001.	EN	S	RM
	2 Identify possible (re)introduction sites by 2003.	EA, EN, FWAG, MAFF, BW, LDNPA, CWT	M	RM
	3 Create or restore conditions suitable for water vole introduction, taking the lead from national strategy by 2008.	EA, FWAG, MAFF, BW, LDNPA	L	SS
	4 Contribute to national targets to introduce water voles to appropriate unoccupied sites by 2010.	EN, EA, CWT	L	SP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
BW = British Waterways; CCC = Cumbria County Council; CWTMG = Cumbria Wildlife Trust Mammal Group; CWT = Cumbria Wildlife Trust; EA = Environment Agency; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; HA=Highways Agency; LDNPA = Lake District National Park Authority; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust; THM = Tullie House Museum; VWT = Vincent Wildlife Trust.

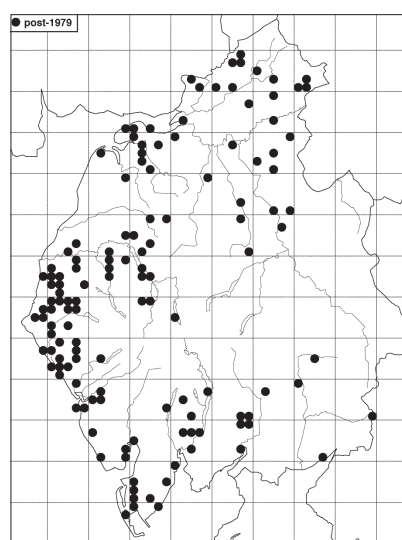
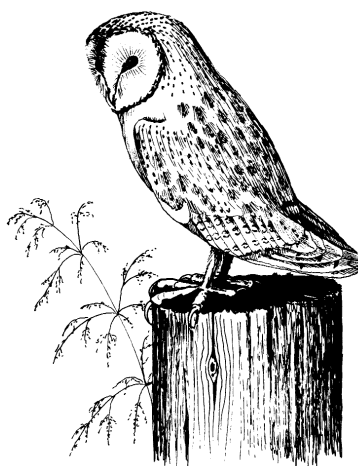
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

Barn Owl

[*Tyto alba*]

Short-tailed field voles are the primary food of barn owls.



Current status

The barn owl is slightly smaller than the tawny owl and although largely nocturnal, it is also active at dusk and can be seen hunting along the edges of fields and along roadside verges.

The barn owl is a cosmopolitan species found mainly within the latitudes 40° N and 40° S of the equator. In 1932 an RSPB survey estimated a population of 745 pairs in the area that is now Cumbria (12000 pairs nationally). A survey between 1982-85 suggested a population of 120 pairs (5000 nationally) - a decline of 84% in the County (Shawyer 1998). Between 1997-99 work by the Cumbria Raptor Study Group suggested a current minimum of between 127-148 pairs, although this is likely to be an underestimate through gaps in coverage and it should be noted that populations fluctuate from year to year as a

result of changes in weather and food supply. The barn owl is listed as an amber species on the list of Birds of Conservation Concern.

Current strongholds are the Solway Basin, the western Border Moors, the lower Eden Valley, the northern portion of the West Cumbria Coastal Plain and the western edge of the Lake District Fells and Dales. Small numbers are found in the south of the county. The species appears to be scarce within the Lake District.

Legal protection

The barn owl is protected at all times under Schedule 1 of the Wildlife and Countryside Act (1981) as amended. It is also listed under Schedules 3 and 9 of the Wildlife and Countryside Act, which controls its sale and release.

The barn owl is also listed under Annex A of COTES '97. (Control of Trade in Endangered Species (Enforcement) Regulations 1997).

Relevant ecology/management requirements

The barn owl is essentially a sedentary species with little or no seasonal migration. The adults remain as a pair throughout winter and provided there is enough prey for them to reach breeding condition, the breeding cycle begins in April. The number of young produced is mainly dependent on the availability of food, although bad weather can also account for some failures.

The barn owl needs a safe nesting site, roosting site and foraging area. The sites that provide the best habitat for prey items are areas of rough grazing, forest-edge grasslands and wide arable field margins. Where all these features occur at an altitude of less than 200 metres there is a reasonable expectancy that barn owls should occur. In the absence of rough grazing, the use of wide field margins and conservation headlands may provide opportunities for hunting areas by barn owls.

The most commonly used nest sites are old buildings, hay barns, old elms and oaks. The eggs (4-7) are generally laid in April and larger clutches can occur in areas where prey is especially abundant. Occasionally, two clutches are laid. There is high mortality of the young owls; it has been suggested that in order to maintain the current barn owl population, at least three owlets per nest need to fledge. Individuals are capable of breeding at one year old.

The diet, based on pellet analysis, indicates that 90% of their food is made up of voles, mice, rats and shrews. The remaining 10% is made up of bats, moles, rabbits, weasels, birds, amphibians and invertebrates. The primary prey species is short-tailed field vole followed by common shrew, pygmy shrew, wood mouse and young brown rat.

Current issues

Loss of suitable habitat due to agricultural change

This has come about through the intensification of grazing and the change from hay making to the more intensive silage system, which supports fewer

prey species. The concurrent increase of field size and hence decrease in hedgerow and field margin length has added to habitat loss. There is evidence to suggest that hedges cut low on roadsides exacerbates the frequency of road casualties, since owls fly low over such hedges onto oncoming vehicles. A further factor is a tightening of hygiene rules for storage of grain and other foodstuffs that would have previously benefited the rodent population and consequently owls.

Loss of nest and roost sites

There is evidence nationally that the loss of large trees, either through Dutch elm disease, storms or hedgerow management (use of flails), coupled with barn conversions and general decay of agricultural buildings may be limiting barn owl densities. Lack of nesting sites appears to be a limiting factor in Cumbria.

Toxic pesticides

The increased use of pesticides, related to the intensification of agricultural production, has had a detrimental impact on barn owls. The main problem appears to be secondary poisoning due to owls eating chemical-laden rodents. The potential hazard of rodenticides is dependent on the nature and extent of their use and the intensity of owl predation on rodents that have been exposed to rodenticides. Of 145 barn owl corpses analysed from 1983-1993, 10% were found to contain second generation rodenticides; only three had accumulated lethal doses. Concern persists, however, that many instances of poisoning may go undetected, either because corpses are not found, or because the cause of death in corpses that are found is being attributed to starvation (Newton *et al.* 1990).

Climatic Factors

It has been suggested that the long-term deterioration of winter climate might be an additional factor in the long-term decline of the barn owl in Britain, affecting both food availability and survival. This has been based on an analysis of snow cover using Meteorological Office data over the past 60 years. Although the validity of these conclusions has been questioned, there is good evidence to suggest that continuous snow cover results in localised high mortality. In Cumbria over recent years, the snow cover has been less prolonged in lowland areas leading to a higher survival rate in barn owls.

Increased urbanisation, including road construction

Whilst prey-rich feeding habitats and nesting sites have been lost to various forms of development, the impact nationally is thought to be minimal when compared to the loss of habitat through agricultural change. However, increased road construction has led to an estimated doubling of road deaths in the barn owl population nationally since the 1950's to 3,000 - 5,000 per annum.

Other hazards

Drownings of barn owls in stock water troughs are occasionally reported. The problem can be avoided by the placement of matting or planks of wood in the trough.

Overall, it is the loss of suitable habitat that has probably had the most significant effect upon barn owl populations.

Current action

Population monitoring

The Cumbria Raptor Group carries out annual monitoring of the barn owl through a network of volunteers and promotes the use of nest boxes to encourage breeding. This work is centred around the ringing of barn owls through the British Trust for Ornithology scheme and has allowed the study of juvenile mortality and dispersal through ringing recoveries. Geographical coverage of monitoring is incomplete.

Provision of nest sites and site protection

Agri-environment schemes provide grants for the restoration of traditional barns, including provision for barn owls.

Provision for barn owls can also be achieved through the use of appropriate conditions attached to planning permissions for barn conversions and other developments.

Most Local Planning Authorities have clear species protection policies within the latest versions of their local plans. Some Authorities however, have more general policies not mentioning protected species specifically.

The World Owl Trust

The Cumbria-based World Owl Trust has been working on barn owl conservation since 1972. It has monitored Cumbrian barn owl populations, provided nest boxes, created and improved barn owl hunting habitat through its 'Operation Phoenix' scheme, purchased meadows, and undertaken a programme of education and advice. An Owl Conservation Centre is maintained at Muncaster Castle. The Trust's Director is the Barn Owl Conservation Network Advisor for Cumbria, and works closely with local farmers and the Farming and Wildlife Advisory Group to encourage 'barn owl-friendly' farming practices.

Context in relation to other plans:

UK Species Action Plans

There is no UK Action Plan for barn owl.

Local contacts

Cumbria Raptor Study Group: Pete Davies 016973 71249

World Owl Trust: Tony Warburton, 01229 717393; FAX 01229 717107. E-mail: admin@owls.org

Associated plans in the Cumbria BAP

The following Cumbria action plans are of relevance to barn owl:

Phase I

- ancient and/or species-rich hedgerows
- hay meadows and lowland pastures
- purple moor grass and rush pasture
- song thrush
- bats
- water vole

References

Newton, I., Wyllie, I. and Freestone, P. (1990). Rodenticides in British barn owls. *Environmental Pollution* 68: 101-117.

Objectives, targets and proposed actions for barn owls in Cumbria

Broad Objective A		Maintain the current population and seek to expand it into appropriate areas			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Promote the correct management prescriptions to provide hunting areas on farmland	1 Identify areas of farmland with the highest potential for promotion of barn owl management prescriptions and provide advisors and project officers with necessary information. By 2005.	CBC, WOT, CWT, RSPB, EN, FWAG, LDNPA	M	RM/A	
	2 Seek to ensure the uptake of positive management agreements through agri-environment schemes in areas identified as being of importance for barn owls.	MAFF	O	SS	
	3 Promote management prescriptions in a targeted way, including providing advisors and project officers with information on the location and management requirements of barn owls. By 2005.	CBC, RSPB, EN, CWT, FWAG, MAFF, LDNPA, WOT	M	CP	
	4 Ensure that the requirements of the barn owl are incorporated into the conservation objectives for appropriate SSSI by 2002.	EN	M	SS	
2 Promote the appropriate management of banks, road verges and grass margins of municipal areas	1 Identify areas with potential for management for barn owls by 2001.	CBC, WOT, RSPB, NWW	S	RM	
	2 Liaise with Local Authorities and Highways Agency over appropriate management by 2002.	CBC, WOT, RSPB, EN, LAs	M	SS	
3 Maintain and improve opportunities for nesting and roosting	1 Identify areas already in use by barn owls by 2002.	CBC, WOT, RSPB, EN, NWW	M	RM	
	2 Identify areas with potential for barn owl restoration (see also Objective A1), and set targets for siting of nest boxes by 2002.	CBC, WOT, RSPB, EN, CCC, FWAG, MAFF, NWW	M	RM	
	3 Seek available funding for the building and installation of nest boxes in suitable feeding habitat, by 2002.	CBC, WOT, RSPB, EN, CWT, FWAG, MAFF	M	RM/CP	

Broad Objective A		Maintain the current population and seek to expand it into appropriate areas			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
	4 Include recommendations for maintaining and improving roost sites in buildings in the proposed Best Practice Guidance note for Local Authority planners and land managers. By 2003.	CCC, DCs, LDNPA	M	A/SS	
	5 Consider the practicality of identifying important and discrete foraging sites, outside of statutory sites, as Wildlife Sites, by 2002 (if data available).	CWT	M	SS	
4 Promote appropriate hedgerow management around black-spots for barn owl road casualties	1 Identify high risk areas for barn owls in relation to road casualties, by 2002.	CBC, WOT, RSPB	M	RM	
	2 Identify and liaise with those responsible for the management of hedgerows in areas of high risk of road casualty by 2002, and record level of success.	CBC, WOT, RSPB, EN, CWT,	M	SS	
	3 Include information and advice on specific problems facing barn owls in CCC's forthcoming Farming and the Public Highway leaflet to be produced 2001-2002.	CCC, CBC, RSPB	S/M	CP	
5 Disseminate information on the practical ways in which barn owls can be helped	1 Review existing advisory literature and, if required, produce a leaflet or leaflets covering the issues raised above and other identified threats (poisoning, drowning in water troughs) and opportunities. By 2002.	CBC, WOT, RSPB, EN, CWT, CLA, FWAG, MAFF	M	A/CP	
	2 Identify audiences and geographical areas towards which advisory work should be targeted. By 2002.	CBC, WOT, RSPB, EN, CWT, CLA, FWAG, MAFF	M	A/CP	

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Promote a county wide survey of the barn owl	1 Ensure an open exchange of existing data by 2002.	CBC, WOT, RSPB, EN, THM, CWT	M	RM
	2 Draw up proposals for a monitoring strategy by 2005.	CBC, WOT, RSPB, EN	M	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CBC = Cumbria Bird Club; CLA = Country Landowner's Association; CWT = Cumbria Wildlife Trust; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; NWW=North West Water Ltd.; RSPB=Royal Society for the Protection of Birds; THM=Tullie House Museum; WOT=World Owl Trust.

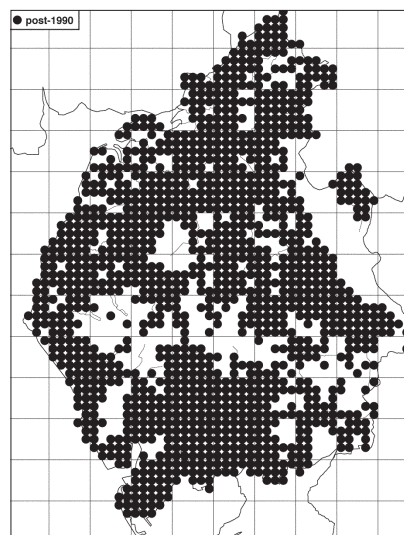
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Song Thrush

[*Turdus philomelos*]



Although commonly associated with parkland, hedgerows and gardens, the song thrush is actually a bird of primary forest. It has adapted to the former habitats in Britain following the clearance of the majority of primary forest in this country over the past few thousand years.

Current status

The song thrush is a common and familiar species of many types of habitats, including gardens and open spaces in urban areas. From the time of the 1968-1972 Breeding Bird Atlas (Sharrock 1976) when it was recorded as one of the most common British birds, it has declined nationally by 66% on farmland with an overall decline of 52% across all habitats.

The song thrush is found from Ireland across to central Asia. It reaches Norway in the north and occurs as far south as the Caspian Sea. The southern populations are mainly resident but the northern populations are partially or entirely migratory.

The species is found throughout the United Kingdom although it has displayed a marked decrease in south-east England over the past 25 years.

In Cumbria the species is widespread although absent from some of the higher ground in the Pennines and the Lake District.

The song thrush is included within the UK BAP as a priority species and is listed as a “red” species in Birds of Conservation Concern.

Legal protection

The song thrush is protected under the Wildlife and Countryside Act 1981 (as amended).

Relevant ecology/management requirements

The song thrush is essentially a bird of primary forest, both broadleaved and coniferous, with ample undergrowth. The conversion of the lowlands to areas with small woods, parkland, hedgerows and gardens has resulted in a switch of habitat so that in some urban areas, the densities of birds can exceed those which are found in woodland.

Unlike many of its cousins, the song thrush prefers to forage under trees and close to field edges. The main food item is earthworms and, at certain times of the year, snails. The change in agricultural practices away from spring-sown to autumn-sown crops has resulted in the reduction of open areas on which to forage. This has been compounded by the conversion of invertebrate-rich permanent pasture to intensive arable cultivation and the loss of field margins. In autumn, song thrushes take large numbers of hedgerow fruits, particularly yew, sloe, elder and guelder rose, but this resource has also declined severely through the loss of hedges. The invertebrates that song thrushes feed on are mostly taken from close to the surface of damp, nutrient-rich soils. During periods of dry weather the surface layers of soil become desiccated and most invertebrates withdraw below the reach of song thrushes. Earthworms appear to be particularly important during the spring, when other types of invertebrates are less available, so dry weather may be particularly damaging during the breeding season.

Snails become an important source of food in late summer, when soils are at their driest, and also during freezing conditions in winter. Snails appear to be taken mainly when other prey are not available.

Song thrushes in the United Kingdom have a protracted breeding season, usually from March to August, and up to three broods may be produced, with a mean clutch size of 4-5 eggs. In the lowlands, they nest mainly in hedges and farmland woods, with densities of 27-43 pairs per km² being recorded in a variety of studies. By contrast, densities in some garden habitats, with abundant nest sites, can reach 170-280 pairs per km².

Song thrushes are known to suffer considerable mortality during severe winters, such as 1962-63,

when freezing conditions make it difficult for them to obtain food. In the UK song thrushes are partial migrants and can therefore escape severe weather in some circumstances, but there is evidence to suggest that males and females may tend to winter in separate areas, with females migrating away from breeding areas and males being resident or undertaking only small winter movements. Although winter weather undoubtedly has an effect upon the song thrush population, it is probably not the single causal factor responsible for the current decline.

Current issues

Changes in farming and other land use practice

- Song thrushes are dependent, particularly in spring, on soil invertebrates, and spring tillage would formerly have provided a plentiful supply at this critical time of the year, when there are young to be fed. Changes in agricultural practices have led to a reduction in spring cultivation, and this may have reduced the feeding areas available during the early part of the breeding season.
- The use of pesticides on farmland, open spaces and gardens has been suggested as a factor that may be related to the decline of the song thrush. If an effect does exist, this may result from direct toxicity (although evidence of this is lacking) or indirect toxicity (through a reduction in prey such as earthworms and molluscs). It will be important in future research to distinguish between these two possibilities.
- Molluscicides, such as Methiocarb, are routinely used to control slugs on oil-seed rape, a crop which has seen a dramatic increase in planting over the past thirty years. These molluscicides also kill earthworms and are thought to be having a detrimental effect on song thrush populations by reducing their food supply. Other chemicals such as carbofuran (an insecticide and nematicide) and MBCs (systemic fungicides) are toxic to non-target species including earthworms and birds.
- The removal of hedges and cutting of those remaining in late summer. This operation removes the fruiting branches before the arrival of freezing conditions when the fruits are most important as an alternative to invertebrates.
- The loss of hedges (and potential song posts), and the severe cutting back of many which remain, combined with the lack of management of many farm woodlands (leading to loss of

young coppice), might be expected to have an effect on song thrush numbers. However, there is as yet no direct evidence that overall populations are being limited by a shortage of suitable nest sites, or that enforced nesting in sub-optimal habitat is leading to reduced breeding success.

Predation

- Both sparrowhawks (as predators of adults) and magpies (as predators of chicks) have been suggested as factors in the decline of the song thrush. Recent studies by the British Trust for Ornithology have demonstrated that this is not the case. Cats are also predators of urban and rural bird populations but no data are available on their likely impacts upon the song thrush population.

Hunting pressure in southern Europe

- The song thrush is a quarry species in Spain and France, where large numbers are killed for food. However, even though a proportion of British song thrushes winter in southern Europe, information from ringing studies has indicated that the number shot has not increased.

Current action

- Until recently, the song thrush was not considered a species of conservation concern, and hence little direct action has yet been taken to help the species. However, current hedgerow and woodland restoration work, facilitated by grant aid from (among others) MAFF's ESA and Countryside Stewardship schemes and Forestry Commission's Woodland Grant Scheme, whilst not targeted at the song thrush, is likely to have brought some benefits.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for song thrush in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Halt the decline in numbers of song thrush in the UK by the year 2000.
- Maintain the range and population levels of song thrush and where possible restore them to that of the 1970 estimate.

- Identify and implement priority research in order to formulate future conservation action.

UK Contact Point and Lead Partner

Royal Society for the Protection of Birds, The Lodge, Sandy Beds. SG19 2DL. Tel. 01767 680551.

Local contacts

Royal Society for the Protection of Birds. North of England Office (Newcastle-upon-Tyne). Tel. 0191 281 3366.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to song thrush:

Phase I

- juniper
- ancient and/or species-rich hedgerows
- upland oak woodland
- upland mixed ash woodland
- wet woodland
- cities, towns and villages

Phase II

- parkland, wood pasture and veteran trees
- scrub communities (other than juniper)

References

Sharrock, JTR. 1976. *The Atlas of Breeding Birds in Britain and Ireland*. Poyser: Tring and Birkhamstead.

Objectives, targets and proposed actions for song thrush in Cumbria

Broad Objective A	Maintain the current population and expand it into appropriate areas				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Promote appropriate hedgerow management (using appropriate actions in hedgerow BAP, listed again here for reference)	1 Encourage favourable management of ancient and/or species-rich hedges, especially favourable cutting practices, using among other mechanisms FWAG's hedgerow leaflets/technical information.	FWAG, CLA, NFU, MAFF, ADAS, LDNPA, ECCP	O	CP	
	2 Consider the development of hedge management skills through training, especially for contractors.	FWAG, CA, MAFF, ADAS	O	A/CP	
	3 Encourage the retention and favourable management of ancient and/or species-rich hedgerows that form an integral part of, enhance, or link Natura 2000 and other designated sites.	LAs, EN, FWAG, CLA, NFU, MAFF	O	SS	
2 Raise awareness of the problems associated with the use of pesticides with farmers and gardeners	1 Produce and distribute a leaflet entitled "Song thrushes and Farming" by 2002.	RSPB, FWAG, CBC, NFU	M	CP	
	2 Campaign to reduce the demand for wildlife-damaging products, particularly slug pellets and other chemicals by providing information and advice on alternatives to garden centres/retail outlets and gardeners through all appropriate media.	CWT, FoE, Greenpeace	O	CP	
3 Promote the value of spring-sown crops, root crops and scrub (including gorse) as a habitat	1 Incorporate into the proposed leaflet entitled "Song thrushes and Farming" by 2002.	RSPB, MAFF, FWAG, CBC, NFU	M	CP	
4 Promote the provision of bird food in gardens	1 Promote the provision of bird food in gardens through the CWT Wildlife Action Pack and other appropriate means.	CWT, Groundwork, RSPB, CBC	M	CP	
5 Monitor changes in Cumbria's song thrush population	1 Decide upon the future survey and monitoring needs for song thrush by 2002.	CBC, RSPB	M	RM	

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

ADAS = Agricultural Development and Advisory Service; CBC = Cumbria Bird Club;

CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; FoE = Friends of the Earth;

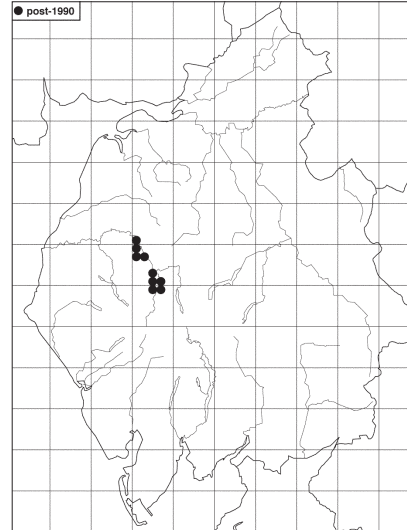
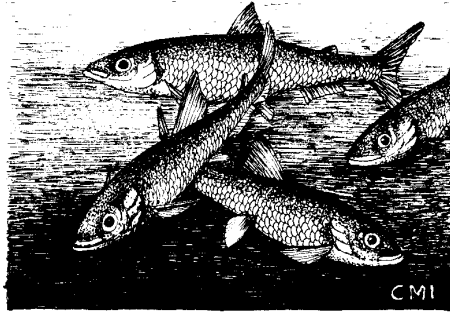
FWAG = Farming and Wildlife Advisory Group; Groundwork = West Cumbria Groundwork Trust; LAs =

Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; NFU = National Farmers Union;

RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Vendace

[*Coregonus albula*]

The introduction of additional fish species to lakes by anglers as live bait is a threat to both British vendace populations. Young roach compete with vendace for food, while ruffe eat vendace eggs.

Current status

The vendace is one of three whitefish species native to the British Isles. It is a silver, streamlined fish with a life span of approximately 6 years. Its preferred habitat is deep, cold lakes and it is non-migratory.

Vendace occur in many lakes in north west Europe, from northern Scandinavia and north west Russia in the north, to Bavaria in the south; and from the English Lake District in the west, to western Russia in the east. In the United Kingdom, it has been known to occur in only 4 lakes, two in south Scotland and two in Cumbria.

In mainland Europe the species is exploited in commercial fisheries and over-fishing can threaten populations, but the most common threat is due to eutrophication. This factor is believed to have been responsible for the elimination of the two Scottish populations.

The last time vendace was recorded in Scotland was in the 1970s. Established vendace populations are now only found in Bassenthwaite Lake and Derwent Water in Cumbria. The vendace is consequently a declining species in Britain and is considered to be the UK's rarest freshwater fish.

There are no long term records of the population dynamics of vendace in the Lake District. In the 1960s the status of the populations in both Bassenthwaite Lake and Derwent Water was considered to be good, but later surveys in the 1980s and 1990s revealed inconsistent breeding success of vendace in Bassenthwaite Lake. Both lakes still contain populations of up to several tens of thousands of fish, although in some years the over-wintering stock in Bassenthwaite may drop to as low as a few hundred individuals.

No significant trend in the abundance of adult vendace was apparent in either lake between 1992 and 1997.

The status of the Derwent Water populations is considered to be acceptable, whereas that of the Bassenthwaite population is considered to be extremely poor.

Legal protection

The vendace is fully protected by the Wildlife and Countryside Act 1981 (as amended) and is listed on Annex V of the Habitats Directive 1992. It is also listed in Appendix III of the Bern Convention. Both Derwent Water and Bassenthwaite Lake are Sites of Special Scientific Interest; the latter is also a National Nature Reserve. Both lakes are candidate Special Areas of Conservation.

Relevant ecology/management requirements

The life-span of vendace is approximately 6 years and fish of this age may be around 28cm in length. The eggs of the species are small (less than 2mm in diameter). They are scattered in the winter in large numbers in inshore gravel areas, often in a depth of 1 to 2 metres of water. The eggs have a long incubation period and hatch in the spring. They are susceptible to smothering by silt during the incubation period; this process is exacerbated by turbulent weather. As they are not covered by gravel, unlike salmon and trout eggs, they are also susceptible to predation for the same period.

The diet of the species has been extensively studied, and in all ages of fish, zooplankton have been found to dominate. Competition for food with other fish species can be severe and there can be marked fluctuations in population size.

It is a general feature of vendace populations that they can contain a large number of individuals during the summer after a successful hatch in the spring, and that numbers are likely to fall markedly during the following winter. Over-winter mortality occurs for various reasons but the main causes are likely to be young fish which have built up insufficient reserves prior to winter; allied to very low winter plankton populations.

The British Isles lies towards the limits of the distribution of vendace and offers a relatively small number of sites capable of meeting their requirements. The oxygen demands of the species are high and they require a deep water thermal refuge from the relatively high summer temperatures which occur in shallow surface waters.

Clean gravel areas are also required for spawning and incubation during the winter and spring. Beds of macrophytes are also likely to be an important part of these processes.

Current issues

- Eutrophication caused by nutrient enrichment adversely affects vendace, for two reasons. Firstly, dead algae accumulate in the hypolimnion (the deep cold waters which develop in thermally stratified lakes in summer) as the growing season progresses and their decay can cause complete de-oxygenation of these deep waters. Secondly, the accumulation of organic deposits on the spawning grounds can lead to poor egg survival. Commissioned by English Nature and EA, CEH has recently completed a study of the status of the spawning beds in both lakes. The report concludes that potential spawning grounds in Bassenthwaite lake were heavily silt laden with no or only very sparse cover of macrophytes. In Derwent Water, the preponderance of sites studied were considered suitable for spawning, with much less silt and many more macrophytes in evidence.
- Pollution from point and diffuse sources could have a major impact on populations. It is likely that most diffuse pollution would result in enrichment of the water, which is discussed above. Point source problems, however, could occur for entirely different reasons, including the following example: the A66, which runs alongside Bassenthwaite Lake, carries a heavy load of industrial traffic including tankers containing toxic material. An accident involving this traffic could have serious consequences for the Bassenthwaite population.
- Habitat degradation could occur for a number of reasons, but the most likely is as a consequence of eutrophication, the impact of which is outlined above.

- Introduction of additional fish species to waters containing vendace places additional stress on the population. Roach, ruffe and dace have become established in Bassenthwaite Lake in the last decade, and roach, and recently dace, are now found in Derwent Water. Although direct evidence is lacking the most likely cause of the introductions is through the escape of live bait used by pike anglers. Roach are a threat to vendace mainly due to the zooplankton diet of the younger fish which puts them in competition with the vendace. In addition, increased consumption of zooplankton, which eat planktonic algae, can result in accelerating the effects of eutrophication. Ruffe, on the other hand, consume vendace eggs which lie exposed on the lake bed in winter and spring, and they are believed to constitute the main threat arising from the presence of other fish species in Bassenthwaite.
- Dace present a problem of a different nature. As a riverine coarse fish, their presence in Bassenthwaite in significant number is somewhat surprising. Their direct impact is uncertain but their indirect impact is already significant. Adult dace are similar in size to vendace and they occupy a similar position in the water column, making differentiation between the species by echosounding effectively impossible. This makes monitoring of the vendace population extremely difficult.
- Vendace require cold waters, rich in oxygen as a refuge from warm summer temperatures. Any rise in temperatures locally, whether due to climate change or any other reasons, will impact adversely on the habitat available for the species.
- Following an assessment of the trophic status of Bassenthwaite lake and a catchment-wide study of phosphate sources, it was concluded that over 70% of the soluble phosphorus entering the lake came from Keswick sewage works. Phosphate stripping was therefore introduced to Keswick works at the end of 1993.
- Emergency procedures for dealing with accidental spillages from lorries on the A66 adjacent to Bassenthwaite lake are in place. One of the main features of these procedures is a series of road drain traps to contain spillages. This work was promoted by the National Rivers Authority and the Environment Agency, with most of the costs met by Cumbria County Council and the Highways Agency.
- A water level management plan for Bassenthwaite lake has been produced.
- A collaborative research programme by CEH and EA between 1995 and 1998 investigated the implications of the recent fish species introductions to both lakes.
- Remedial action to control the populations of recently introduced species is not considered to be feasible.
- Monitoring of the vendace populations in both lakes has been carried out by CEH under a programme of monitoring funded by the EA as part of the Urban Waste Water Treatment Directive. Much of this work concentrates on echo sounding, which is becoming less robust as an assessment technique in both lakes due to the recent acquisition of additional species, which form a component of the deep water fish community.
- Organised by the EA, an annual UK BAP steering group meeting for vendace is held each September and is attended by a range of organisations with an interest in the species in both England and Scotland.
- The EA has recently commissioned CEH to carry out an investigation into possible translocation options for Cumbria's vendace. This study is aimed at identifying locations which could be used for extending the distribution of the species or establishing replacement populations.
- The EA has also commissioned CEH to investigate the sediments in Bassenthwaite lake, with a view to identifying the nature of the sediments as well as their likely sources, so that management options can be evaluated.

Current action

- In the early 1990s research into both populations (carried out by The Institute for Freshwater Ecology - now under the name Centre for Ecology and Hydrology) was commissioned by the National Rivers Authority, and further work on the Bassenthwaite population was funded by North West Water Limited. Since little work had been done on the populations prior to this time, much of the work was aimed at assessing their current status, fundamental ecology and producing recommendations for conservation action.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for vendace in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Ensure the continued survival of the species in Bassenthwaite lake and Derwent Water.
- Reintroduce a self-sustaining population to one of the Scottish lochs by 2005, and subsequently to the second loch if the first reintroduction is successful and cost-effective.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point and Lead Partner for the vendace is the Environment Agency, whose nominated officer is based at the Environment Agency's Penrith Office.

Local contacts

Centre for Ecology and Hydrology, Windermere Laboratory, whose nominated officer is Ian Winfield. Phone: 015394 42468.

English Nature Kendal Office, whose nominated officer is Erica Donnison. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria BAP action plans are of relevance to vendace:

Phase I

- mesotrophic lakes

Phase II

- schelly

Objectives, targets and proposed actions for vendace in Cumbria

Broad Objective A	Maintain, and where appropriate enhance, existing vendace populations			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Monitor the populations in Bassenthwaite and Derwent Water	1 Undertake appropriate monitoring by netting/echo sounding on an annual or biennial basis.	EA, EN, LDNPA, NWW, CEH	○	RM
2 Ensure that existing populations are safeguarded	1 Ensure that the review of consents in SACs takes account of the needs of vendace.	EA	M	SP
	2 Ensure that emerging issues are reflected in the management plans for both sites.	LDNPA, NT	○	SP
	3 Evaluate the findings of the sediment study on Bassenthwaite lake and if appropriate promote remedial action.	EA, EN, LDNPA	M	RM
	4 Establish an investigation into the feasibility of providing artificial spawning areas in Bassenthwaite lake (in the short term this option is unlikely to be viable).	EA, EN, LDNPA, Private Sponsors	M/L	RM

Broad Objective A		Maintain, and where appropriate, enhance existing vendace populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	5 Commission a study to examine the feasibility of captive breeding and keeping of vendace.	EA, EN, LDNPA, CEH, Private Sponsors	S	RM
3 Raise awareness of the importance of Cumbria's vendace populations with the general public, key interest groups and organisations	1 Provide information via appropriate media	EN, EA, LDNPA	O	CP

Broad Objective B		Increase the number of vendace populations in Cumbria by at least one		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Investigate potential sites for the establishment of a new or replacement population	1 Assess the suitability of Cumbria's still waters as recipient sites, by studying their physical, chemical and biological characteristics.	EA, CEH, EN	O	RM
	2 Identify the two most suitable sites.	EA, CEH, EN	O	RM
	3 Carry out an introduction.	EA, EN, Private Partner, CEH	M	SP

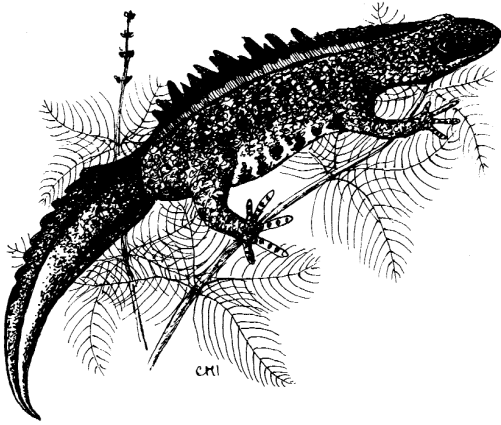
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CEH=Centre for Ecology and Hydrology (Formerly Institute of Freshwater Ecology); EA = Environment Agency; EN = English Nature; LDNPA = Lake District National Park Authority, NWW = North West Water Limited.

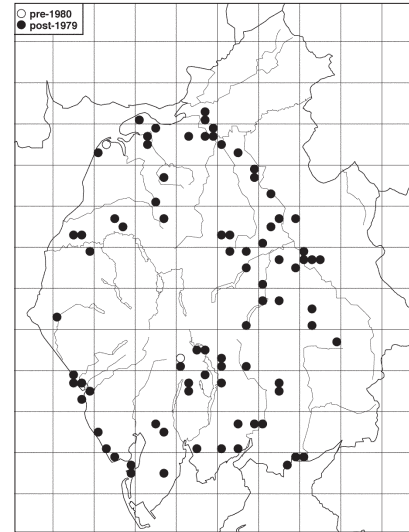
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Great Crested Newt

[*Triturus cristatus*]



Although people usually associate newts with ponds, these are only required for breeding. For most of the year newts live in areas of rough grassland and other terrestrial habitats in the vicinity of their breeding ponds.

Current status

The great crested newt is one of the six amphibian species that are native to the UK. It is the largest newt found in the UK, reaching up to 16cm in length.

The great crested newt has a wide distribution from northern France, Britain and southern Scandinavia, through central Europe to the Ural Mountains in Russia. It has declined over much of its western European range, such that it is now recognised as threatened in eleven countries. The UK is a major stronghold of the species, where it is still widespread. The species is considered to be locally numerous in parts of lowland England and Wales. It is absent from Northern Ireland.

The species has suffered a decline in recent years, with studies in the 1980s indicating a national rate of colony loss of about 2% over five years.

Historically, Macpherson, writing in 1892, recorded that the great crested newt "is more local in Lakeland than in the south of England, but I do not know that it can be termed uncommon with us". The limited survey effort of recent years suggests that the great crested newt is scattered throughout the lower lying areas of Cumbria.

Legal protection

The great crested newt is fully protected by the Wildlife and Countryside Act 1981 (as amended), and is listed on Annexes II and IVa of the Habitats and Species Directive 1992. It is also listed in Appendix II of the Bern Convention. Seven Sites of Special Scientific Interest support great crested newt in Cumbria.

Relevant ecology/management requirements

Great crested newts require ponds for breeding. Outside the breeding season they need terrestrial habitats associated with ponds for foraging and hibernation, generally within 500m of their breeding ponds.

During the winter great crested newts hibernate in frost free holes in the ground, before returning to their breeding pond to court, mate and lay eggs. The eggs are laid singly in the folded leaves of water plants and hatch into legless larvae. It takes about three months for the larvae to develop into young newts which then leave the water. For up to three years the newly emerged animals generally stay away from their birth pond whilst becoming sexually mature. Great crested newts can live up to 18 years in the wild and 25 years in captivity.

The best breeding ponds are unpolluted and of medium size (500-750m²). Suitable landscapes require a high density of ponds (at least three per km²) and should be interconnected by suitable habitat (e.g. hedgerows with associated corridor of rough grassland) in order to support a viable population of newts. The creation of new ponds and the linking of ponds through changes in land management are therefore important conservation measures.

The most suitable plant content of the breeding ponds is 50% cover of emergent vegetation and 50-75% cover of submerged vegetation suitable for egg laying (e.g. water mint and water forget-me-not). Areas of open water are important for courtship displays. Moderate shade can be tolerated but is not ideal. Trees and scrub that shade ponds should ideally be cleared from the south-east margin around to the west to allow sunshine to reach the pond, thereby enabling the plants to grow and reducing leaf fall into the pond. The build-up of leaves in a pond affects water quality and hastens the natural succession to dry land.

Management in the late autumn may occasionally be necessary to achieve the desired state by de-weeding and de-silting the pond. Agricultural run-off and other chemicals lower the diversity of the plant community.

Great crested newts cannot co-exist with carnivorous fish species as they predate the newt larvae.

It is estimated that 250 adult newts require at least a hectare of suitable terrestrial habitat adjacent to their breeding pond. This should consist of a mosaic of woodland, scrub and rough grassland.

Current issues

- The loss of lowland ponds through neglect, infilling and development pressures.
- The loss and fragmentation of terrestrial habitats.
- Stocking of ponds with fish, which is normally detrimental to great crested newts.
- Presence of domestic wildfowl reducing pond suitability for great crested newts through eutrophication of water and vegetation damage.
- The general lowering of ground water levels in urban, industrial and intensive agriculture areas causing ponds to dry out.
- Pollution, such as run-off of agricultural chemicals, degrading suitable great crested newt habitat.

The main reason for the decline of the great crested newt is the loss of habitat, particularly of lowland ponds through neglect, infilling and development pressures.

Current action

- A comprehensive survey, initially to confirm presence at known sites and later to survey other likely sites, started in 1999, funded by English Nature, Environment Agency and Cumbria County Council, and assisted by Cumbria Wildlife Trust.
- Cumbria Wildlife Trust Amphibian and Reptile Group members are continuing their survey of possible great crested newt sites.
- Cumbria Wildlife Trust and Tullie House Museum are collecting records.
- Most Local Planning Authorities have clear species protection policies within the latest versions of their local plans. Some Authorities have more general policies not mentioning protected species specifically.
- English Nature recently published the results of a symposium on the species, which includes papers on survey techniques, planning issues, legislation and habitat management.

- General leaflets have been published by English Nature, Countryside Council for Wales, and by British Coal.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for great crested newt in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Where feasible, restore populations to 100 unoccupied sites each year for the next five years, creating new ponds and managing habitat where necessary.
- Maintain the range, distribution and viability of existing great crested newt populations.

UK Contact Point and Lead Partner

The UK Contact Point for the great crested newt is English Nature, whose nominated officer is at their Peterborough headquarters.

The UK Lead Partners for the great crested newt are Froglife, the British Herpetological Society and The Herpetological Conservation Trust.

Local contacts

Erica Donnison, of English Nature, Kendal. Tel.: 01539 792800.

Associated plans in the Cumbria BAP
The following Cumbria species/habitat action plans are of relevance to the great crested newt:

Phase I

- water beetle *Hydroporus rufifrons*
- white-faced dragonfly
- ancient and/or species-rich hedgerows
- basin mires
- lowland raised mires
- upland heathland
- mesotrophic standing waters
- cities, towns and villages

Phase II

- medicinal leech
- pillwort

References

Macpherson, H. A. (1892) *A Vertebrate Fauna of Lakeland*, David Douglas, London.

Objectives, targets and proposed actions for great crested newt in Cumbria

Broad Objective A		Maintain the range, distribution and viability of existing great crested newt populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Survey and monitor the population	1 Carry out a review of existing information to establish the historical status of the great crested newt in Cumbria by 2000.	THM, CARG, EN	S	RM
	2 Commission a systematic survey of Cumbria to establish current population status and distribution of great crested newt by 2001.	EN, EA, CCC, LDNPA, CWT, CARG	S	RM

Broad Objective A

Maintain the range, distribution and viability of existing great crested newt populations

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Monitor selected sites every five years from 2006.	CARG, EN, CWT	O	RM
	4 Maintain an up to date database (in GIS/Recorder) of Cumbrian great crested newt sites and make information available to relevant bodies, including planning authorities, conservation, land management and advisory bodies. By 2001.	THM, EN, CBDN, CWT	S/O	RM
2 Increase public awareness of the importance of the great crested newt and its habitats	1 Provide advice to landowners/occupiers about great crested newt habitat requirements and the legislation.	EN, LDNPA, FWAG, CWT, MAFF	O	A
	2 Raise awareness by public appeal for records of great crested newts in garden ponds. Start in 2000 and complete report by 2003.	CARG, EN, THM, WGs	M	CP
	3 Distribute information about great crested newts to advisory organisations and other relevant bodies during 2001.	EN	M	A/CP
3 Ensure that planning and legislation systems take into account the requirements of great crested newts	1 Include guidance on great crested newt protection and conservation in the proposed Best Practice Guidance for Local Authorities. By 2003.	CCC, EN, DCs, LDNPA	M	A/PL
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including sites supporting great crest newts, by 2002 (if data available).	CWT, LAs	M	A/SS
4 Maintain and improve habitats for great crested newts	1 Include the needs of great crested newts in the management plans/statements of appropriate SSSIs, Nature Reserves.	CWT, EN, NT, LDNPA, FE, NWW	M/L	SS
	2 Provide advice to owners/occupiers of sites with great crested newt Wildlife Sites, by 2008.	CWT	L	A/SS

Broad Objective A **Maintain the range, distribution and viability of existing great crested newt populations**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Consider additional measures to conserve great crested newt at ESA and CS Scheme reviews.	MAFF	O	SS
	4 Take opportunities to improve ecological quality of ponds under Agri-environment Scheme, WES and other management agreements (for sites with and without current populations of newts) and encourage the creation of new ponds, ideally creating a group of ponds at varying successional stages.	MAFF, EN, FWAG, CARG, CWT, LDNPA, NT, EA	O	SS
	5 Monitor success of a sample of habitat improvement initiatives.	EN, CARG, CWT	O	RM
	6 Use existing EA licensing system to prevent introduction of fish and, where possible, allow for the removal of fish from key great crested newt areas.	EA, EN	O	SP/SS

Broad Objective B **Restore populations to two unoccupied sites each year for the next five years**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Increase number of sites where great crested newts occur	1 Identify possible (re)introduction sites by 2002.	EN, FWAG, MAFF, CWT, CARG, LDNPA	M	RM
	2 Create or restore conditions suitable for great crested newt introduction by 2003.	EN, FWAG, MAFF, CARG	M	SS
	3 Introduce great crested newts to ten unoccupied sites by 2005, according to IUCN re-introduction guidelines.	EN	M	SP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
BHS = British Herpetological Society; CCC = Cumbria County Council; CARG = Cumbria Amphibian & Reptile Group; CWT = Cumbria Wildlife Trust; EN = English Nature; EA = Environment Agency; FWAG = Farming and Wildlife Advisory Group; FE = Forest Enterprise; F = Froglife; HCT = The Herpetological Conservation Trust; MAFF = Ministry of Agriculture, Fisheries and Food; NWW = North West Water; LDNPA = Lake District National Park Authority; LAs = Local Authorities; NT = National Trust; THM = Tullie House Museum; WGs = Watch Groups.

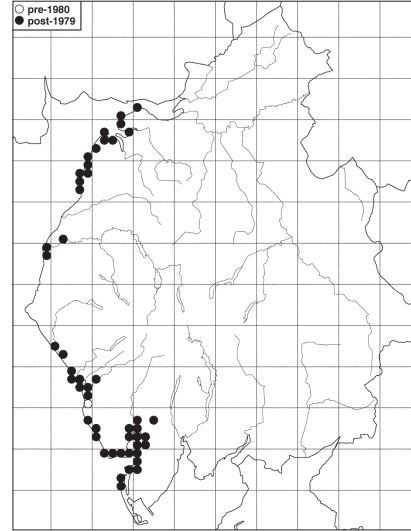
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Natterjack Toad

[*Bufo calamita*]



Natterjack toads avoid competition with other amphibians by breeding in temporary pools which dry out before species such as common frog and common toad have fully metamorphosed.

Current status

The natterjack toad is one of the six amphibian species that are native to the British Isles. It is confined to Europe and is found in 20 other European countries. It is considered to be endangered in five countries including the UK, and is declining in many others. In the UK, the number of known sites for the natterjack toad has declined by about 75% within the past 100 years, but despite this it is estimated that the UK holds about 6% of all known natterjack toad sites.

Cumbria supports approximately 50% of all British natterjack toad sites, although with habitat creation and introductions being carried out in southern England, this proportion might change. Cumbrian natterjack toad populations have been classified in terms of their size:

Class 1 (at least several hundred individuals)	5 sites
Class 2 (high 10s to low 100s adults)	7 sites
Class 3 (up to low 10s of adults)	11 sites

The natterjack toad has recently become extinct at its Workington site, and many others appear to be declining in numbers of adults largely due to habitat deterioration.

Legal protection

The natterjack toad is fully protected by the Wildlife and Countryside Act 1981 (as amended), and is listed on Annex IVa of the EC Habitats Directive 1992. It is also listed in Appendix II of the Bern Convention. Six Sites of Special Scientific Interest support natterjack toad colonies.

Relevant ecology/management requirements

Natterjack toads require a combination of suitable breeding pools for egg laying and larval development and an adequate area of terrestrial habitat for adults and juveniles once metamorphosed.

For breeding natterjacks require shallow temporary pools of about neutral pH. Shallow water warms up quickly, aiding the development of juveniles and enabling them to metamorphose before the pools dry up. Pools which tend to dry up in late summer also tend to harbour fewer invertebrate predators of toad larvae and are less likely to be used by amphibians such as common frogs and toads which have a longer breeding cycle and compete with natterjacks for food and other resources.

Outside the breeding season natterjack toads live on dry land and this is as important a habitat as the breeding ponds. Adult natterjacks hunt their prey (mainly ground beetles) by running after them, and require short turf or bare ground to enable them to do this. They cannot move easily once vegetation starts to become rank and their prey becomes less easy to detect. It is also essential that suitable places to hide throughout the day and to hibernate in winter are available. Sandy banks allow them to create burrows and stone walls or piles of stones also provide excellent hiding places.

In Cumbria the natterjack toad is largely coastal in distribution, mainly utilising ponds in sand dune slacks and ponds and ditches in the upper regions of saltmarshes. Occasional tidal inundation of such pools is tolerated by natterjacks, but tends to make them unsuitable for other amphibian species. There are two inland sites in the county, one in a disused sand quarry where the toads breed in shallow depressions, the other on heather moorland where ditches and pools are used.

Ideal habitat management will maintain a short sward. Where sheep, or other grazers are not present, scrub removal and cutting of vegetation may be necessary. Ponds may occasionally need deepening slightly to ensure that they retain water long enough for the larvae to metamorphose successfully.

Current issues

- Loss of breeding ponds by siltation or destruction by infilling or inappropriate management (such as over-deepening).
 - Deterioration of the quality of breeding ponds by the encroachment of vegetation, e.g. sea club rush.
 - Loss of terrestrial habitat through lack of suitable management or destruction through inappropriate management or development.
 - Breeding ponds becoming unsuitable due to presence of predators or competitors.
 - Ponds drying up too quickly during the breeding season in dry summers.
 - Where tidal inundation over the winter is a feature of the site, an input of fresh water is essential to reduce the salinity in time for the natterjack toad breeding season. Developments which either prevent the tidal inundation or affect the freshwater input (such as sea walls) will be detrimental to the survival of the natterjack at that site.
- Inappropriate management or lack of management is currently the greatest threat to the natterjack toad at its existing sites in Cumbria.

Current action

- The Cumbrian natterjack toad populations are monitored on an annual basis by a team of volunteers. Records are collated by John Buckley of the Herpetological Conservation Trust and Trevor Beebee of the British Herpetological Society. Dr Beebee produces the Natterjack Sites Register, an annual update of status in all sites.
- English Nature is attempting to ensure that appropriate management is in place in all the Sites of Special Scientific Interest which support populations of natterjack toads through a Wildlife Enhancement Scheme.
- Management for the natterjack toad is carried out by Cumbria Wildlife Trust, National Trust, Royal Society for the Protection of Birds and Lake District National Park Authority at those sites for which they are responsible.
- English Nature organises an annual meeting to discuss population monitoring and report back on any management work required on natterjack toad sites. This enables efforts to be targeted appropriately over the coming year.
- The Cumbria Amphibian and Reptile Group is a special interest group of Cumbria Wildlife Trust, and undertakes survey and data collation work, largely on the common amphibians. The Group has undertaken some survey of sites for natterjack toad.
- Most Local Planning Authorities have clear species protection policies within the latest versions of their local plans.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for natterjack toad in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Sustain all existing populations and, where appropriate, restore each population to its size in the 1970s.
- Expand the number of populations within their former range by carrying out at least five further translocations by 2005.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point for the natterjack toad is English Nature, whose nominated officer is based at the Peterborough office. The UK Biodiversity Lead Partner for the natterjack toad is the Herpetological Conservation Trust.

Local contacts

Erica Donnison, English Nature, Kendal office, 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to natterjack toad:

Phase I

- coastal
- upland heathland.

Objectives, targets and proposed actions for natterjack toad in Cumbria

Broad Objective A	Maintain and enhance (where appropriate) existing natterjack toad populations			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure that the location and requirements of the natterjack toad are fully taken into account in the planning process	1 Ensure that all relevant planning authorities are aware of current sites by 2001.	EN, HCT	S	A
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including sites supporting natterjack toads, by 2006.	CWT, LAs	L	SS/A
2 Ensure that all extant natterjack toad sites are under favourable management	1 Encourage owners/occupiers of SSSI to enter the Wildlife Enhancement Scheme by 2001.	EN	S	SS
	2 Encourage non-SSSI site landowners to enter into Countryside Stewardship or Environmentally Sensitive Area agreements by 2001.	MAFF FWAG, EN LDNPA, HCT	S	SS

Broad Objective A		Maintain and enhance (where appropriate) existing natterjack toad populations		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 For sites not covered by WES, CSS, or ESA, endeavour to secure appropriate management using alternative sources of financial assistance, by 2005.	HCT	M	SS
	4 Provide advice on management and grants to owners and occupiers of Wildlife Sites with natterjack toads, by 2008.	CWT	L	A
3 Raise awareness of the importance of the Cumbrian natterjack toad population	1 Provide information to landowners/occupiers about the natterjack's habitat requirements and relevant legislation, using appropriate media (e.g. organisational newsletters etc).	HCT, EN, CWT, LDNPA, MAFF, FWAG, NT, EA, CLA	O	A/CP
	2 Include guidance on natterjack toad protection and conservation in the proposed Best Practice Guidance for Local Authorities. By 2003.	CCC, EN	M	A
4 Monitor all extant natterjack toad populations in the county	1 EN to continue to organise the annual liaison meeting for natterjack recorders.	EN	O	RM
	2 Natterjack recorders to monitor their allotted sites annually, recording spawn strings, larval numbers and toadlet emergence each year.	EN, natterjack recorders, HCT	O	RM
	3 Encourage more people to get involved with recording natterjacks.	HCT, EN	O	CP
	4 Maintain an up to date database (in GIS/Recorder) of Cumbrian natterjack toad sites and make information available to relevant bodies, including planning authorities, conservation, land management and advisory bodies. By 2001.	EN, THM, CBDN, HCT, CWT	O	RM

Broad Objective B **Increase the number of natterjack toad populations in the county by at least one**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Reintroduce the natterjack toad to at least one site from which it has gone extinct, or to at least one new site if no suitable previous site is available	1 Assess the suitability of recently extinct sites for a reintroduction, if none, look more widely for a suitable site/s. Sites to be determined by end 2003.	HCT, EN, LDNPA, CARG	M	RM
	2 Carry out reintroduction by end 2005 if an appropriate site is found. If no suitable sites in existence, encourage favourable management on likely sites.	HCT, EN	M	SP

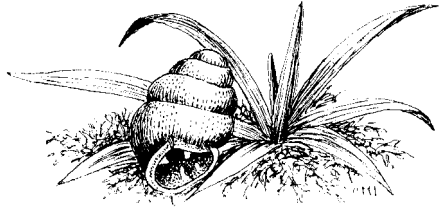
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CARG=Cumbria Amphibian and Reptile Group; CWT = Cumbria Wildlife Trust; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; HCT = Herpetological Conservation Trust; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture Fisheries and Food; NT = National Trust; RSPB = Royal Society for the Protection of Birds

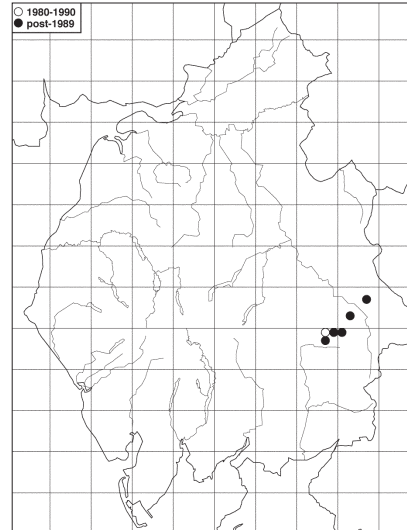
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Geyer's Whorl Snail

[*Vertigo geyeri*]



Although Geyer's whorl snail requires grazing by livestock to maintain an open sward, too high a grazing level is detrimental, due to trampling of the ground and increased nutrient levels from dunging.

Current status

Geyer's whorl snail is usually less than 2mm high, the shell having four and a half glossy pale brown whorls with fine growth lines.

It lives in calcareous flushes and fen meadows at the base of short sedges, especially long-stalked yellow-sedge, black bog-rush and in various mosses. In favourable warm, wet conditions the snail may be found in large numbers, but more often, especially in drought conditions, they can hardly be found. Geyer's whorl snail shares many of its habitats with the sandbowl snail (for which see separate plan). Geyer's whorl snail is a Boreo-Alpine species, ranging from Ireland to Russia and Lapland to Switzerland. It is rare throughout, except perhaps in Sweden, and is declining through loss of its habitat.

known from two other sites in England, both in Yorkshire, and very small. There are three sites in Wales around Anglesey and some good populations in Scotland on Islay and in Perthshire. Geyer's whorl snail is listed by Bratton (1991) as Endangered (RDBI) and is on the IUCN Red List. It is a Priority Species in *Biodiversity: The UK Steering Group Report (1995)*.

Legal protection

Geyer's whorl snail has no legal protection in the UK. It is, however, listed in Annex II of the Habitats and Species Directive. Almost all Cumbrian sites lie within three Sites of Special Scientific Interest; one of the SSSIs is also a candidate Special Area for Conservation.

There are some significant sites in Cumbria, around Sunbiggin Tarn and Crosby Garrett Fell. It is only

Relevant ecology/management requirements

Little is known of the life cycle of Geyer's whorl snail, but it is probably short. Eggs are laid in warm, wet weather. They hibernate when cold and aestivate (enter into a torpid state) when dry.

The species inhabits short herbage and tolerates exposure to extreme weather conditions. It does not tolerate much shade. The species therefore probably benefits from grazing, which prevents scrub encroachment, but not from excessive trampling or over-grazing.

Current issues

- Application of fertiliser to the site would result in rapid growth of vegetation and therefore shading of the snails' habitat.
- Inappropriate levels of grazing. A moderate level of grazing is beneficial to the species as it keeps the sward short and allows light to reach the ground, but intensive grazing is harmful because it results in trampling of the snails and excessive fertilisation from animal dung. Cessation of grazing would be detrimental, resulting in shading of the habitat.
- Water extraction, drainage, ditching or any other disturbance to the water table will adversely affect the integrity of the habitat and therefore the species.

The above three issues are likely to be most important in Cumbria. Other potential threats could include pollution, forestry, quarrying and dumping.

Current action

- Cumbria Wildlife Trust manages a nature reserve, which holds the species.
- English Nature is investigating how certain SSSIs can be managed for the species, through the Site Management Statement process.
- A survey of Geyer's whorl snail in Cumbria has been undertaken, funded by English Nature and the Conchological Society of Great Britain and Ireland.
- A study of the ecology of Geyer's whorl snail is being undertaken by the Countryside Council for Wales and the National Museum of Wales.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for Geyer's whorl snail in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Maintain known populations.
- Survey to establish the current distribution of the species by the year 2000.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point and Lead Partner for Geyer's whorl snail is the Countryside Council for Wales, whose nominated officer is at the Bangor office.

Local contacts

Species expert: Conchological Society of Great Britain and Ireland (Dr Barry Colville, Pool Foot, Clappersgate, Ambleside, LA22 9NE, 015394 34067)

General contact: Erica Donnison, English Nature, Kendal 01539 792800

Associated plans in the Cumbria BAP

The following Cumbria action plans are of relevance to Geyer's whorl snail:

Phase I

- sandbowl snail
- calcareous grassland
- slender green feather moss
- purple moor grass and rush pastures

Phase II

- springs and flushes

References

Bratton (1991) *British Red Data Book: Invertebrates other than Insects*. JNCC. Peterborough.

Objectives, targets and proposed actions for Geyer's Whorl snail in Cumbria

Broad Objective A		Maintain current populations of Geyer's whorl snail in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure the planning and legislation system protect Geyer's whorl snail in Cumbria	1 Consider notification of all sites which support Geyer's whorl snail as SSSI. By 2001.	EN	S	SS/PL
	2 Consider identifying as Wildlife Sites those sites supporting <i>Vertigo geyeri</i> , either as an interim measure before designation as SSSI or as a measure for sites which may not qualify for SSSI designation. By 2001.	CWT	S	SS/A
	3 Ensure that information on the distribution of Geyer's whorl snail in Cumbria is available to all relevant planning/authorisation processes. By 2000.	CBDN, LAs, EA	S	A
2 Maintain and improve habitat at known Geyer's whorl snail sites	1 Inform all relevant land owners and land users of the snail's presence and encourage maintenance of good management of the sites, facilitated by land management incentives. By 2001.	EN, CSGBI, MAFF	S	A/SS
	2 Develop and implement management plans at SSSIs to take into account the needs of Geyer's whorl snail. By 2001.	EN	S	SS
3 Maintain suitable hydrology in and around Geyer's whorl snail sites	1 Ensure that local water abstraction policies, when next reviewed, take into consideration the need to conserve the species.	EA	O	PL
	2 If relevant, produce and implement water level management plans at appropriate sites (i.e. non "Main River" sites). In place by 2002.	DCs, EN, EA	M	PL/SS

Broad Objective B **Gain a fuller understanding of the habitat requirements and distribution of Geyer's whorl snail in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Gain a fuller understanding of the habitat requirements of Geyer's whorl snail	1 Undertake studies in liaison with ongoing national studies, and draw conclusions. By 2003.	CSGBI , EN	M	RM
2 Determine current and future distribution and status of Geyer's whorl snail in Cumbria	1 Re-confirm status at currently known sites. Identify and survey potential new sites, by 2001, using appropriate data interrogation systems (e.g. GIS).	CSGBI , EN	S	RM
	2 Establish and implement monitoring methodology and programme. By 2001.	CSGBI , THM, EN	S	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CBDN = Cumbria Biological Data Network; CSGBI = Conchological Society of Great Britain and Ireland; DETR = Department of the Environment, Transport and the Regions; EA = Environment Agency; EN = English Nature; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; THM = Tullie House Museum.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

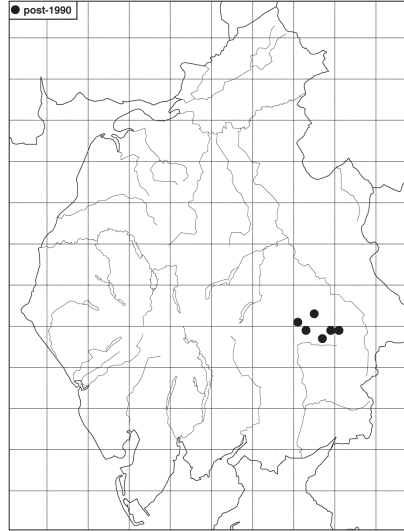
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Sandbowl Snail

[*Catinella arenaria*]

The sandbowl snail occurs in two habitat types in Britain. In Devon it is found in sand dune slacks, while in Cumbria it occurs in exposed mud in calcareous flushes and wet meadows.



Current status

The sandbowl snail's 5-8mm high shell has 3 whorls, is rather coarse and reddish amber in colour and is usually encrusted with mud. The flesh is black. The sandbowl snail lives in two distinct habitats: in sand dune slacks and in calcareous flushes or wet meadows where there is exposed mud. In Cumbria, it is found only in the latter habitats. The sandbowl snail shares many of its habitats with Geyer's whorl snail (for which see separate plan).

Its range extends from Ireland to Slovakia and Lapland to North Africa. It is a rare and declining species throughout its range due to losses of its habitat. In England it occurs in dune slacks in Devon and in six tetrads (2km squares) within 3 10km squares in Cumbria, between Orton and Kirkby Stephen.

The species is listed in Bratton (1991) as Endangered (RDBI). It is also listed in the IUCN Red List 1990. It is a Priority Species in *Biodiversity: The UK Steering Group Report* (1995).

Legal protection

The sandbowl snail is fully protected by the Wildlife and Countryside Act 1981 (as amended). It has been recommended for listing on Appendix II of the Bern Convention. Three Sites of Special Scientific Interest in Cumbria support sandbowl snail, one of which is also part of a candidate Special Area of Conservation.

Relevant ecology/management requirements

In Cumbria, habitats suitable for the sandbowl snail contain damp and flushed gently sloping or level sites with mosaics of open muddy, sandy or gravelly soil with mixtures of short sedges, grasses, rushes and most contain black bog-rush.

The sandbowl snail breeds in humid warm weather, after which most adults die. Few adults live through the winter. The population is subject to wild fluctuation. In droughts they disappear and are presumed to burrow in the sand or hide in fissures in the mud.

The species does not tolerate shade or lengthy submersion in water. It benefits from moderate levels of grazing, which prevents scrub encroachment and provides the exposed mud which they prefer on the fen meadow sites.

Current issues

- Application of fertiliser to a site would result in rapid growth of vegetation and therefore shading of the snails habitat.
- Inappropriate levels of grazing. A moderate level of grazing is beneficial to the species as it keeps the sward short and allows light to reach the ground, but intensive grazing is harmful because it results in trampling of the snails and excessive fertilisation from animal dung. Cessation of grazing would be detrimental, resulting in shading of the habitat.
- Water extraction, drainage, ditching or any other disturbance to the water table will adversely affect the integrity of the habitat and therefore, the species.

The above three issues are likely to be most important in Cumbria. Other potential threats could include pollution, forestry, quarrying and dumping.

Current action

- A preliminary survey of the sandbowl snail in Cumbria (and a more intensive study in Devon) has been undertaken, funded by English Nature and the Conchological Society of Great Britain and Ireland.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for sandbowl snail in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Ensure that viable populations are maintained at all known sites.
- Restore grazing and a high water table to Braunton Burrows by the year 2000.
- Carry out surveys to locate other sites for the species.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point and Lead Partner for the sandbowl snail is English Nature, whose nominated officer is based at the Peterborough office.

Local contacts

Species expert: Conchological Society of Great Britain and Ireland: Dr Barry Colville, Pool Foot, Clappersgate, Ambleside, LA22 9NE. Phone: 015394 34067.

General contact: Erica Donnison, English Nature, Kendal. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria action plans are of relevance to the sandbowl snail:

Phase I

- Geyer's whorl snail
- slender green feather-moss
- hay meadows and lowland pastures
- calcareous grassland
- purple moor grass and rush pastures

Phase II

- springs and flushes

References

Bratton (1991) *British Red Data Book: Invertebrates other than Insects*. JNCC. Peterborough.

Objectives, targets and proposed actions for sandbowl snail in Cumbria

Broad Objective A	Maintain current populations of sandbowl snail in Cumbria				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Ensure the planning and legislation system protect the sandbowl snail in Cumbria	1 Consider notification of all sites which support the sandbowl snail as SSSI. By 2001.	EN	S	SS	
	2 Use appropriate mechanisms to consider the sandbowl snail as a candidate to be listed in the EC Habitats Directive. By 2002.	EN, CSGBI	M	PL	
	3 Consider identifying as Wildlife Sites those sites supporting sandbowl snail, either as an interim measure before designation as SSSI or as a measure for sites which may not qualify for SSSI designation. By 2001.	CWT	S	SS	
	4 Seek to designate the areas around Tarn Sike, Sunbiggin Tarn and Potts Valley as one or two SACs under the EC Habitats Directive. By 2005.	EN, CSGBI, DETR	M	PL/SS	
	5 Ensure that information on the distribution of the sandbowl snail in Cumbria is available to all relevant planning/authorisation processes and to other relevant organisations (in an agreed format, e.g. GIS) by 2001.	EN, LAs, EA	S	A	
2 Maintain and improve habitat at known sandbowl snail sites	1 Inform all relevant land owners and land users of the snail's presence and encourage maintenance of good management of the sites, facilitated by land management incentives. By 2001.	EN, CSGBI, MAFF	S	A/SS	
	2 Develop and implement management plans on SSSIs to take into account the needs of sandbowl snail. By 2001.	EN	S	SS	
3 Maintain suitable hydrology in and around sandbowl snail sites	1 Ensure that local water abstraction policies take into consideration the need to conserve the species at their next review.	EA	O	PL	
	2 If relevant, produce and implement water level management plans at non "Main River" sites. In place by 2002.	DCs, EN	M	PL/SS	

Broad Objective B **Gain a fuller understanding of the habitat requirements and distribution of the sandbowl snail in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Gain a fuller understanding of the habitat requirements of sandbowl snail	1 Undertake studies in liaison with ongoing national studies, and draw conclusions by 2003.	CSGBI , EN	M	RM
2 Determine current and future distribution and status of the sandbowl snail in Cumbria	1 Re-confirm status at currently-known sites. Identify and survey potential new sites, by 2001 (using appropriate data interrogation systems, e.g. GIS).	CSGBI , EN	S	RM
	2 Establish and maintain monitoring methodology and programme, by 2001.	CSGBI , THM, EN	S	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CBDN = Cumbria Biological Data Network; CSGBI = Conchological Society of Great Britain and Ireland; EA = Environment Agency; EN= English Nature; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; THM = Tullie House Museum.

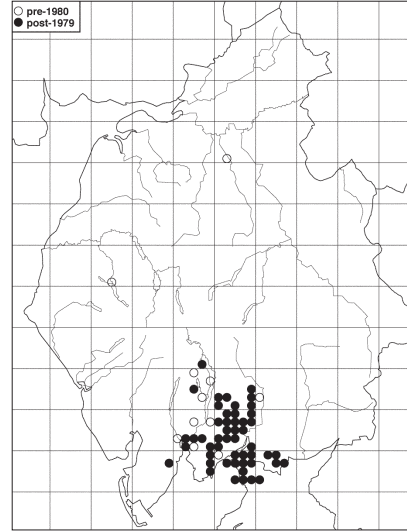
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



High Brown Fritillary

[*Argynnis adippe*]



The high brown fritillary has suffered a major decline in the last 50 years, such that in 1994 only 53 colonies existed in the UK. Many colonies are very small and possibly not viable in isolation. Cumbria is one of the main UK strongholds for this butterfly.

Current status

The high brown fritillary is a large butterfly that flies in sunny bracken slopes or coppiced limestone woodland with the necessary breeding requirements.

The species has declined in several European countries, though is still common in central and southern parts of Europe.

In Britain it has suffered a contraction in range of 94% over the past 50 years and is now extinct in most of the country. It has three main strongholds: the Morecambe Bay area; Exmoor; and Dartmoor. It also occurs in small populations in the Malvern Hills.

In Cumbria the species occurs in suitable habitat in the limestone hills around Morecambe Bay and in adjacent bracken-dominated pasture in South Lakeland.

The species is listed in the British Red Data Book as vulnerable, and is listed as a Priority Species in *Biodiversity: The UK Steering Group Report* (1995).

Legal protection

The high brown fritillary is fully protected by the Wildlife and Countryside Act 1981 (as amended). Ten Sites of Special Scientific Interest and two National Nature Reserves support high brown fritillaries in Cumbria. Five of these SSSIs lie within a candidate Special Area for Conservation.

Relevant ecology/management requirements

The high brown fritillary is a single-brooded species, which breeds in warm, sunny, sheltered areas which contain a sparse ground flora in which violets, the species' larval foodplant, are abundant. These conditions are offered by two main habitats; bracken stands, and coppiced woodland/managed

scrub in limestone grassland and limestone pavement. Bracken acts as a pseudo-woodland canopy with a spring flora including violets.

The species appears to be confined to these habitats because the larvae need warmth: dead bracken litter and exposed mossy rock surfaces provide an extremely warm micro-climate when larvae are developing in the spring.

The species probably exists in an area as a collection of local populations connected by occasional dispersal, in which there are local extinctions and colonisations. This is called a 'meta-population'.

Management of bracken stands is often required to ensure the correct structure of the litter is produced. A dead litter layer is required that is not so dense as to prevent violet growth in the spring, but dense enough to suppress grass growth. Neglected stands of bracken can quickly become dense and impenetrable, shading out both larval and adult foodplants. Suitable management can be achieved by low intensity grazing of bracken areas by large domestic stock, preferably cattle, which are heavy enough to break down the bracken by trampling. Some bracken stands may require different rates or types of management and the appropriate technique needs to be identified in order to produce optimal conditions.

Management of woodland and scrub on limestone for high brown fritillary is best achieved by the establishment and maintenance of coppice rotations in woodland sites, and by cutting back areas of scrub on pavement/grassland sites, to provide a continuous supply of freshly created bare ground for breeding butterflies.

Current issues

- Lack of appropriate management of bracken habitats. In order for bracken to provide the right breeding conditions it must be managed in an appropriate way. The agricultural management of bracken stands has steadily reduced, primarily due to the cessation of cattle grazing which is becoming increasingly uneconomic. Eradication of bracken stands by aerial spraying would have an obvious detrimental affect if carried out in areas in which high brown fritillaries breed.
 - Insufficient knowledge of the appropriate management of bracken stands.
 - Lack of appropriate management of woodlands. The cessation of coppicing at an established site will ultimately cause that population to fail. The lack of a widespread network of established coppice rotations in an area will reduce the ability of the species to move between sites and colonise new areas.
 - Lack of appropriate deer control in coppiced woodland sites will threaten the long-term viability of the site, since coppice re-growth is prevented by heavy deer browsing.
- ### Current action
- Since 1989, the High Brown Fritillary Action Group (HBFAG) has co-ordinated local action for the species. This is a partnership of agencies, nature conservation organisations, other key groups and landowners. The HBFAG Steering Group determines policy for the Group, and sends a representative for NW England to the UK BAP Steering Group.
 - Most breeding populations are known, following major surveys between 1990 and 1997, and many are under direct management for nature conservation by a range of organisations.
 - Most breeding populations are regularly monitored: 11 formal butterfly transects are walked annually on sites in South Cumbria and many more are regularly monitored.
 - Tullie House Museum collects and collates casual sightings of all butterflies in Cumbria.
 - Many bracken sites in South Cumbria that are in private ownership are being managed within the Lake District Environmentally Sensitive Area scheme, with advice from the Farming and Rural Conservation Agency and Lake District National Park Authority, and support from the High Brown Fritillary Action Group.
 - Butterfly Conservation maintain a site register.
 - A full UK species action plan was prepared by Butterfly Conservation in 1995, which contains the following UK objectives:
 - Maintain all existing populations including some large populations (>200 adults at peak flight period) in each stronghold.
 - Maintain all large populations at or above present levels.

- Encourage the expansion of the species by maintaining an extensive network of suitable habitats in all occupied regions.
- Encourage the restoration of suitable habitat within its former range and examine opportunities for reintroducing the species.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for high brown fritillary in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Halt the current decline and maintain at least 50 self-sustaining populations.
- Restore suitable habitat within its former range and encourage spread to 10 additional sites by 2005, using re-introductions if necessary.
- Ensure that a minimum number of colonies are protected within SSSIs.

UK Contact Point and Lead Partner

The UK Contact Point for high brown fritillary is English Nature, whose nominated officer is based at the Peterborough office.

The UK Lead Partner is Butterfly Conservation, whose nominated officer is based at the Wareham office.

Local contacts

High Brown fritillary Action Group: Rob Petley-Jones, English Nature, Juniper House, Murley Moss Business Park, Kendal, Cumbria, LA9 7RL. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria BAP species/habitat action plans are of relevance to high brown fritillary:

Phase I

- upland mixed ash woodland
- calcareous grassland
- limestone pavement
- juniper
- pearl-bordered fritillary

Phase II

- dormouse
- least minor moth

Objectives, targets and proposed actions for high brown fritillary in Cumbria

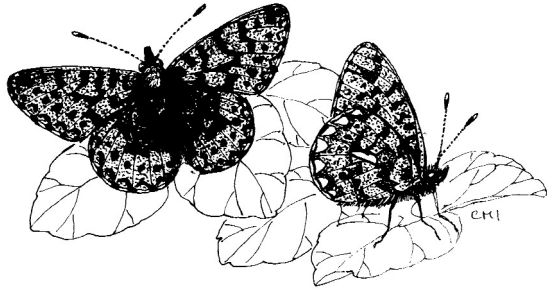
Broad Objective A	Maintain all existing populations of the high brown fritillary in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Ensure all known breeding sites are adequately protected	1 Notify all breeding sites as SSSI by 2005, where appropriate.	EN	M	SS
	2 Identify important sites for high brown fritillary in the County, outside of statutory sites, as Wildlife Sites, by 2001 (if data available).	CWT	M	SS
	3 Ensure that all relevant planning authorities, conservation, land management and advisory organisations are aware of current sites, through an up-to-date database of sites (in GIS/Recorder) by 2001.	EN, HBFAG, THM	S	A

Broad Objective A		Maintain all existing populations of the high brown fritillary in Cumbria				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type		
2 Ensure all known breeding sites are appropriately managed	1 Encourage the uptake of positive management agreements, especially through existing agri-environment schemes, in all sites not under sympathetic management by 2002.	MAFF, HBFAG, LDNPA, FC, EN	M	SS		
	2 Include the needs of high brown fritillary in the management plans / statements of appropriate SSSIs, Nature Reserves. At next review. 2000-2005.	CWT, EN, NT, LDNPA, FE, NWW	S/M	SS/SP		
	3 Provide advice on management and grants to owners and occupiers of Wildlife Sites with high-brown fritillaries, by 2008.	CWT, FWAG	L	A/SS		
3 Monitor the population and range of the high brown fritillary in Cumbria	1 Maintain current levels of annual population monitoring and report annually to lead partner.	HBFAG, BC, THM	O	RM		
	2 Monitor annually the performance of selected populations.	HBFAG	O	RM		
	3 Re-survey all appropriate sites within the current range but not known to hold the species. Each potential site to be surveyed once every three years.	HBFAG, BC	O	RM		
	4 Continue the Cumbria Butterfly Recording Scheme, involving amateur naturalists and the general public.	THM, HBFAG	O	RM/CP		
4 Refine knowledge of the requirements of the species at all stages of its life cycle, in order to determine the best habitats and most effective management techniques	1 Continue/commission research into the management of bracken for fritillaries, by 2001.	BC, HBFAG	S	RM		

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Restore suitable habitat within the current and former range of the species in Cumbria and examine opportunities for reintroduction	1 Develop a strategy for the restoration of suitable breeding conditions in habitats within the natural dispersal range of existing populations, by 2002.	HBFAG , BC, LDNPA, FC	M	RM/SS
	2 Develop a strategy for restoration of suitable breeding conditions in habitat outside current range and within the former range of the species. By 2002.	HBFAG , BC, MAFF, LDNPA, FC	M	RM/SS
	3 Encourage the uptake of positive management agreements, through existing agri-environment schemes on land identified as suitable for the restoration of breeding conditions. Initial target date of 2004.	MAFF , HBFAG	M	SS
	4 Assess the potential and desirability of reintroduction to former sites or of introduction to new sites within former range. By 2002.	HBFAG , EN, LDNPA, FC	M	RM
	5 If appropriate, develop and instigate plan for reintroduction, by 2005.	HBFAG , EN, LDNPA, FC	M	SS/SP
2 Raise awareness of the plight of the high brown (and other threatened fritillaries) and of the methods for encouraging the species	1 Using the BC/EN "Bracken for Butterflies" leaflet and other appropriate media, encourage landowners to manage habitats for fritillaries.	FWAG , MAFF , EN, CWT , HBFAG , CLA	O	A/SS
	2 Raise the profile of this species with the public through appropriate media, and consider using as a flagship for invertebrate conservation. By 2000.	CBP , BC	S	CP

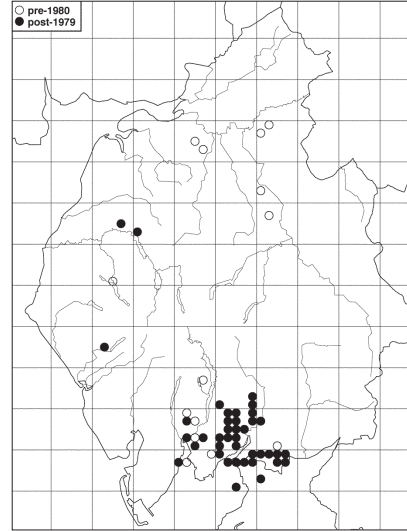
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
BC = Butterfly Conservation; CBP = Cumbria Biodiversity Partnership; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; DETR = Department of the Environment, Transport and the Regions; EN = English Nature; FC = Forestry Commission; FWAG = Farming and Wildlife Advisory Group; HBFAG = High Brown Fritillary Action Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; THM = Tullie House Museum.
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Pearl-Bordered Fritillary

[*Boloria euphrosyne*]



One factor in the decline in the population of pearl-bordered fritillary is the reduction in cattle grazing on the agriculturally marginal land which supports fritillary colonies in stands of bracken. Some form of management, such as cattle grazing, is required to maintain these stands in a condition suitable for the butterflies to breed.

Current status

The pearl-bordered fritillary is a medium-sized butterfly that flies in sunny bracken slopes or coppiced limestone woodland with the necessary breeding conditions.

The species has declined significantly in the north western parts of its European range in recent years.

In Britain it has declined very rapidly during the present century, most notably in woodland in the last 50 years, and is now extinct in large parts of its former range. The recent loss rate of colonies across the UK is estimated to be around 55% in the last 15 years.

In Cumbria, the species occurs in suitable habitat in the limestone hills around Morecambe Bay and in

adjacent bracken-rich pasture in South Lakeland. There has been at least one recorded colony extinction since 1993, in the north of the county, although there were unconfirmed reports of individuals seen in the area in 1998.

The species is Nationally Scarce in Britain and is listed as a priority species in *Biodiversity: The UK Steering Group Report* (1995).

Legal protection

The pearl-bordered fritillary is protected by the Wildlife and Countryside Act 1981 (as amended) in respect to sale only. Two National Nature Reserves and eleven Sites of Special Scientific Interest in Cumbria support pearl-bordered fritillary. Additionally, seven of these SSSIs lie within two candidate Special Areas of Conservation.

Relevant ecology/management requirements

The pearl-bordered fritillary is a single-brooded species, which breeds in three main habitats: woodland clearings as produced by active management; open deciduous woodland; and well-drained grassland with either scattered scrub or abundant bracken. These habitats support abundant populations of violets, which are the larvae's foodplant.

The larvae need warmth, and dead bracken litter and exposed mossy rock surfaces provide an extremely warm micro-climate when larvae are developing in the spring.

Management of bracken stands is required to ensure the correct structure of the litter is produced. A dead litter layer is required that is not so dense as to prevent violet growth in the spring, but dense enough to suppress grass growth. Neglected stands of bracken can quickly become dense and impenetrable, and shade out violets. Suitable management is best achieved by low intensity grazing of bracken areas by large domestic stock, preferably cattle, which are heavy enough to break down bracken by trampling. Some bracken stands may require different rates or types of management and the appropriate technique needs to be identified in order to produce optimal conditions.

Management of woodland habitats is best achieved by the establishment and maintenance of coppice rotations, which provide freshly opened bare ground for breeding butterflies.

Management in grassland sites is best achieved by cutting back areas of scrub, to maintain the open nature of this habitat, as well as providing freshly opened bare ground for breeding butterflies.

Current issues

- Lack of appropriate management of bracken stands. In order for a bracken stand to provide the right breeding conditions it must be managed in an appropriate manner. The agricultural management of bracken stands has been steadily reduced, primarily due to the cessation of cattle grazing, which is becoming increasingly uneconomic. Eradication of bracken stands by

aerial spraying would have an obvious detrimental affect when carried out in areas in which fritillaries breed.

- Lack of appropriate management of woodlands. In woodlands on limestone, the species is dependent on regular management, for example by coppicing, where an established cycle can provide a succession of breeding areas. Cessation of coppicing at an established site will ultimately cause that population to fail.
- Lack of appropriate deer control in coppiced woodland sites will threaten the long-term viability of the site, since coppice re-growth is prevented by heavy deer browsing.
- In grassland sites/open woodland sites, a lack of scrub management will reduce and ultimately remove the potential for breeding. The same is true for scrub on wide ride edges in forestry sites.
- Fragmentation of sites (regardless of the type of habitat), leads to isolation of populations, and increases the likelihood of local extinction.

Current action

- Since 1997, the High-Brown Fritillary Action Group (HBFAG) has co-ordinated local action on both pearl-bordered and high brown fritillaries. This is a partnership of agencies, nature conservation organisations, and other key groups and landowners. The HBFAG Steering Group determines policy for the Group, and sends a representative for NW England to the UK BAP Steering Group.
- Most breeding populations are known, following major surveys between 1995 and 1997, and many are under direct management for nature conservation by a range of organisations.
- Most breeding populations are regularly monitored: 11 formal butterfly transects are walked annually on sites in south Cumbria, and many more are regularly monitored.
- Tullie House Museum collects and collates casual sightings of all butterflies in Cumbria.
- Many south Cumbrian bracken sites that are in private ownership are being managed within the Lake District Environmentally Sensitive Area scheme, with advice from the Farming and Rural Conservation Agency and the Lake District National Park Authority, and support from the High-Brown Fritillary Action Group.
- A former site in central Cumbria is currently being brought back into good condition, and

survey work is being established to monitor possible response from any remnant population.

- A full UK species action plan was prepared by Butterfly Conservation in 1995, which contains the following UK objectives:
- Halt the rapid decline of the species.
- Maintain viable networks of populations throughout its current range.
- Conduct research on the ecology and distribution of the species to enable its effective conservation.
- Encourage the restoration of the species to its 1950 range.
- Butterfly Conservation maintains a site register.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for pearl-bordered fritillary in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Obtain accurate data on distribution and abundance.
- Halt the current decline by the year 2005, through maintaining viable networks of populations in core areas of distribution.
- Encourage restoration of suitable habitats throughout the butterfly's former range, with the long-term aim of reintroducing the species to at least three sites per previously occupied county.

UK Contact Point and Lead Partner

The UK Contact Point for pearl-bordered fritillary is Scottish Natural Heritage, whose nominated officer is based at the Edinburgh office.

The UK Lead Partner is Butterfly Conservation, whose nominated officer is based at the Wareham office.

Local contacts

High Brown Fritillary Action Group: Rob Petley-Jones, English Nature, Juniper House, Murley Moss Business Park, Kendal, Cumbria LA9 7RL. Tel: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to pearl-bordered fritillary:

Phase I

- upland mixed ash woodland
- limestone pavement
- juniper
- high brown fritillary
- calcareous grassland

Phase II

- dormouse
- least minor moth

Objectives, targets and proposed actions for pearl-bordered fritillary in Cumbria

Broad Objective A	Maintain all existing populations of the pearl-bordered fritillary in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Ensure all known breeding sites are adequately protected	1 Notify all breeding sites as SSSI by 2005, where appropriate.	EN	M	SS
	2 Ensure that all relevant planning authorities, conservation, land management and advisory organisations are aware of current sites, through an up-to-date database of sites (in GIS/Recorder) by 2001.	EN, HBFAG	S	A/SS

Broad Objective A		Maintain all existing populations of the pearl-bordered fritillary in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
	3 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including sites supporting pearl-bordered fritillaries, by 2006.	CWT, LAs	M	SS	
2 Ensure all known breeding sites are appropriately managed	1 Encourage the uptake of positive management agreements, especially through existing agri-environment schemes, in all sites not under sympathetic management by 2002.	MAFF, HBFAG, LDNPA, FC, EN	M	SS	
	2 Provide advice on management and grants to owners and occupiers of Wildlife Sites with pearl-bordered fritillaries, by 2008.	CWT	L	A	
	3 Include the needs of pearl-bordered fritillary in the management plans / statements of appropriate SSSIs, Nature Reserves. At next review. 2000-2005.	CWT, EN, NT, LDNPA, FE, NWW	S/M	SS	
3 Monitor the population and range of the pearl-bordered fritillary in Cumbria	1 Maintain current levels of annual population monitoring and report annually to lead partner.	HBFAG, BC, THM	O	RM	
	2 Monitor annually the performance of selected populations.	HBFAG, BC	O	RM	
	3 Re-survey all appropriate sites within the current range but not known to hold the species. Each potential site to be surveyed once every three years.	HBFAG, BC	O	RM	
	4 Continue the Cumbria Butterfly Recording Scheme, involving amateur naturalists and the general public.	THM, HBFAG, BC	O	RM	
4 Refine knowledge of the requirements of the species at all stages of its life cycle, in order to determine the best habitats and most effective management techniques	1 Commission research to better understand the role of bracken in fritillary conservation, by 2001.	HBFAG	S	RM	

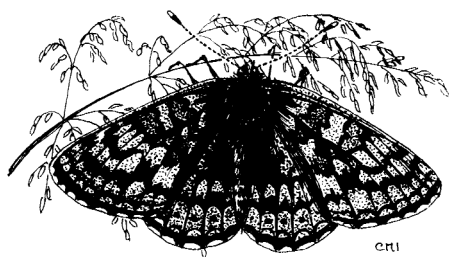
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Restore suitable habitat within the current and former range of the species in Cumbria and examine opportunities for reintroduction	1 Develop a strategy for the restoration of suitable breeding conditions in habitats within the natural dispersal range of existing populations, by 2002.	HBFAG , BC, LDNPA, FC	M	RM
	2 Develop a strategy for restoration of suitable breeding conditions in habitat outside current range and within the former range of the species. By 2002.	HBFAG , BC, LDNPA, FC	M	RM
	3 Encourage the uptake of positive management agreements, through existing agri-environment schemes, on land identified as suitable for the restoration of breeding conditions. Initial target date of 2004.	MAFF , HBFAG	M	SS/A
	4 Assess the potential and desirability of reintroduction to former sites or of introduction to new sites within former range. By 2002.	HBFAG , EN, LDNPA, FC	M	RM
	5 If appropriate, develop and instigate plan for reintroduction, by 2005.	HBFAG , EN, LDNPA, FC	M	SP
2 Raise awareness of the plight of the pearl-bordered (and other threatened fritillaries) and of the methods for encouraging the species	1 Using the BC/EN "Bracken for Butterflies" leaflet and other appropriate media, encourage landowners to manage habitats for fritillaries.	FWAG , MAFF , EN, CWT , HBFAG , CLA	O	CP/A
	2 Raise the profile of this species with the public through appropriate media, and consider its use as a flagship for invertebrate conservation. By 2000.	CBP , BC	S	CP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
BC = Butterfly Conservation; CBP = Cumbria Biodiversity Partnership; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; DETR = Department of the Environment, Transport and the Regions; EN = English Nature; FC = Forestry Commission; FWAG = Farming and Wildlife Advisory Group; HBFAG = High Brown Fritillary Action Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NWW=North West Water Ltd; THM = Tullie House Museum.

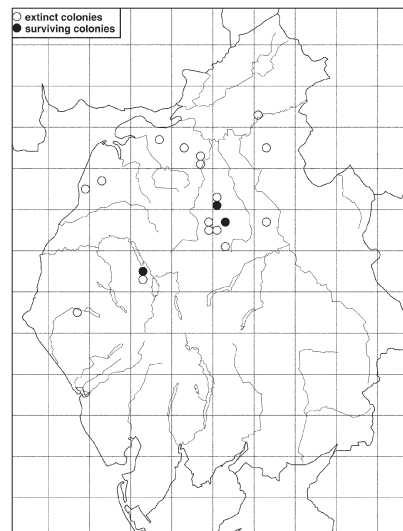
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Marsh Fritillary

[*Eurodryas aurinia*]



Parasitoid wasps form an integral part of marsh fritillary population dynamics. Two parasitoid wasp species are present in Britain and both are of significant conservation value in their own right, one being entirely restricted to the marsh fritillary.

Current status

The marsh fritillary is a very attractive medium-sized single-brooded butterfly. In Cumbria it is restricted to damp lightly or ungrazed acid to neutral unimproved grassland where the larval foodplant, devil's-bit scabious, is abundant.

The UK is a major stronghold for this species, which is declining across Europe. However, even in Britain, its range has declined by more than 60% over the last 150 years. Colonies are estimated to be disappearing at a rate of over 10% per decade and it has been lost from the entire eastern half of Britain.

The marsh fritillary is listed in the UK Biodiversity Steering Group Report as a Priority Species because of this rapid population decline.

In the last 15 years there has been a 50% loss of marsh fritillary colonies in Cumbria. Just three

colonies are extant, none of which are on nature reserves.

Legal protection

The marsh fritillary is fully protected by the Wildlife and Countryside Act 1981 (as amended), and is listed on Annex II of the Habitats and Species Directive 1992. It is also listed in Appendix II of the Bern Convention. The Cumbrian colonies lie within, or mostly within, Sites of Special Scientific Interest.

Relevant ecology/management requirements

UK colonies of the marsh fritillary occur in two types of grassland: damp neutral or acid grassland and, occasionally, in woodland clearings; and, in parts of southern England, on dry calcareous grasslands. Its larval host plant is devil's-bit scabious, though honeysuckle is occasionally eaten when it is present. In Cumbria, the damp grassland sites are usually

dominated by tussock-forming grasses, particularly purple moor-grass. Breeding areas are generally open and unshaded, but are often sheltered by scrub or adjacent woodland.

The flight period can last from the end of May to mid-July, with the males emerging first, often several days before females. Emergence peaks after four to eight days with males surviving or remaining on site an average 4-9 days and females 3-6 days. The females lay their eggs on larger devil's-bit scabious plants, typically those growing where the vegetation height is 8-20cm.

The young larvae spend most of their time feeding within a communal web. They overwinter in a more compact web, and emerge in early spring, basking in sunshine to raise their body temperature. They begin to disperse in their fifth instar, and after their sixth instar, pupate close to the ground beneath dead leaves or on plant stems.

The marsh fritillary is very susceptible to grazing pressure and most colonies occur where there is light, extensive cattle or horse grazing (especially by traditional breeds), or where grazing has been recently abandoned. Light summer grazing is probably needed on most sites to keep coarse vegetation in check, this being the best grazing time on very wet sites. Few sites are grazed by sheep, probably because they graze the devil's-bit scabious preferentially, making it unsuitable for egg-laying, and produce a low, even sward, rather than the tussocky structure preferred by the marsh fritillary.

Scrub management may be needed to maintain the balance between open areas and the need for shelter. Mowing is generally unsuitable, particularly regular mowing or haymaking.

Populations of marsh fritillaries fluctuate tremendously in size. The fluctuations appear to be dependent upon weather, food supply and the proportion of caterpillars parasitised by braconid wasps.

If habitats are small or of low quality, population fluctuations can cause isolated colonies to die out during low points. Sometimes colonies give the appearance that they are shifting around a network of sites. This is probably the result of local extinctions which are balanced by colonisations.

Although adult males and females are typically sedentary, dispersal occurs occasionally, and this "meta-population" structure may help to keep parasitism levels in check.

Large sites, or a network of sites (minimum 10 ha) are required to maintain colonies of the marsh fritillary, so that the process of dispersal and colonisation can compensate for the local extinctions.

Re-introductions of the marsh fritillary have been attempted many times in the UK, but most have failed. Translocations are now illegal without a licence under the Wildlife & Countryside Act.

Current issues

The main factors causing loss/decline nationally are:

- agricultural improvement (reseeding, use of compound fertilisers, drainage etc.).
- both under and over-grazing (including abandonment leading to seral succession to scrub/woodland).
- destruction of sites through development, afforestation etc.
- fragmentation of habitat, leading to small/isolated colonies, vulnerable to extinction through chance events, natural population fluctuations, and genetic decline. The main cause of this fragmentation is agricultural improvement.

Little information is available on the detailed reasons for losses of the Cumbrian colonies, but agricultural improvement is likely to have been the most important factor historically, whilst grazing regimes and habitat fragmentation are currently the primary factors.

Current action

- In 1993 the Cumbria Marsh Fritillary Action Group (MFAG) was formed. It currently consists of Butterfly Conservation, Carlisle Museum, Cumbria Wildlife Trust, English Nature (contact point), Environment Agency, Farming and Rural Conservation Agency, Forest Enterprise, Lake District National Park Authority and The National Trust.
- A detailed action plan has been drawn up (which forms the basis for this plan), together with annual work programmes, and a great deal of work carried out. Habitat management has been

undertaken at two sites, and monitoring at all three sites. Surveys have been undertaken of potential sites in the county. To date, five networks of existing and potential sites have been identified.

- During 1997 and 1998, attempts were made to (re)establish colonies on two sites using stock from the largest extant colony. In both cases establishment failed, probably due to a combination of inappropriate management, problems with captive rearing, and poor weather during the flight period.
- Butterfly Conservation maintain a site register.
- A UK Species Action Plan was prepared for the marsh fritillary by Butterfly Conservation in 1995. This was used as the basis for the plan published in the UK Biodiversity Steering Group Report.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for marsh fritillary in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Halt the decline and maintain the present range
- Maintain at least five large populations within each key area [of which Cumbria is one].

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point for marsh fritillary is Countryside Council for Wales, whose nominated officer is based at the Bangor office.

The UK Biodiversity Lead Partner for marsh fritillary is Butterfly Conservation, whose nominated officer is at the Wareham office.

Local contacts

Cumbria Marsh Fritillary Action Group: Frank Mawby at English Nature Solway office. Phone: 016973 51517

Associated plans in the Cumbria BAP

The following Cumbria habitat action plan is of relevance to marsh fritillary:

Phase I

- purple moor grass and rush pastures

Objectives, targets and proposed actions for marsh fritillary in Cumbria

Broad Objective A	Ensure no further losses of marsh fritillary colonies in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Ensure beneficial management of all occupied sites	1 Provide advice on management and grants to owners and occupiers of Wildlife Sites with marsh fritillaries, by 2008.	CWT	L	A/SS
	2 Ensure beneficial land management on SSSIs through management agreements/site management statements.	EN	O	SS

Broad Objective A		Ensure no further losses of marsh fritillary colonies in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Seek to ensure beneficial management of sites with marsh fritillaries (and those with the potential for restoration) through agri-environment, forestry and local conservation schemes.	MAFF, LDNPA, MFAG	O	SS
	4 Examine the benefits of designating as SSSI the non-SSSI sites, by 2001.	EN	S	SS
2 Establish two habitat networks around existing colonies	1 Identify sites for restoration in conjunction with landowners and prepare brief management plans by 2001.	MFAG	S	RM/SS
	2 Restore and maintain at least 20 ha. of habitat by 2005.	MFAG	M	SS
3 Ensure the spread of the marsh fritillary within these networks	1 Ensure the spread of the marsh fritillary within the two existing networks, using active reintroduction if necessary. By 2005.	MFAG	M	SP
4 Monitor all colonies annually using standard methodology	1 Monitor population size annually, by transects or timed counts of adults.	MFAG	O	RM
	2 Monitor larval webs annually, in late summer, and also early spring if possible.	MFAG	O	RM
	3 Investigate presence of parasites at extant sites by 2001.	MFAG	S	RM
	4 Investigate vigour, origin and relatedness of existing colonies using genetic techniques. By 2001.	Birmingham Uni., EN	S	RM
5 Ensure no loss of sites through development	1 Ensure that all relevant planning authorities are aware of current sites by 2001.	EN	S	A
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including sites supporting marsh fritillaries, by 2001 (if information available).	CWT, LAs	S	PL

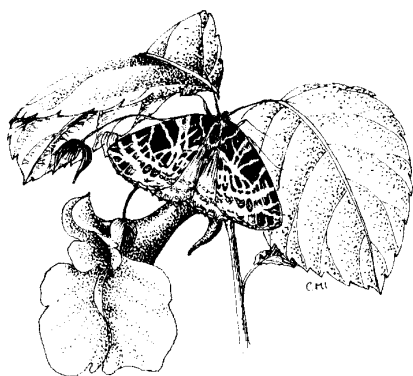
Broad Objective B		Establish five self-sustaining populations in the long term		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Establish colonies in at least three more habitat networks	1 Identify sites for restoration in conjunction with landowners and prepare brief management plans by 2001.	MFAG	S	RM
	2 Restore and maintain one habitat network of at least 20 ha., and (re) establish a marsh fritillary colony by 2005.	MAFF, LDNPA, EN	M	SS/SP
	3 Restore and maintain two more habitat networks of 20 ha., and (re)establish two marsh fritillary colonies by 2020.	MAFF, LDNPA, EN	L	SS/SP
Broad Objective C		Ensure effective co-ordination of resources for the conservation of the marsh fritillary		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Maintain the Marsh Fritillary Action Group to co-ordinate effort	1 Publicise the action taken to conserve the marsh fritillary, and seek funds to ensure the plan can be implemented.	MFAG	O	CP
	2 Report progress to the UK Steering Group.	BC	O	A
	3 Liaise with others in the region as necessary.	MFAG	O	A
2 Encourage research on the Cumbria colonies	1 Encourage research on poorly-understood aspects of the marsh fritillary's ecology & behaviour.	MFAG	O	RM
	2 Encourage research on restoration of suitable habitat.	MFAG	O	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
BC = Butterfly Conservation; CWT = Cumbria Wildlife Trust; EN = English Nature; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; MFAG = Marsh Fritillary Action Group.

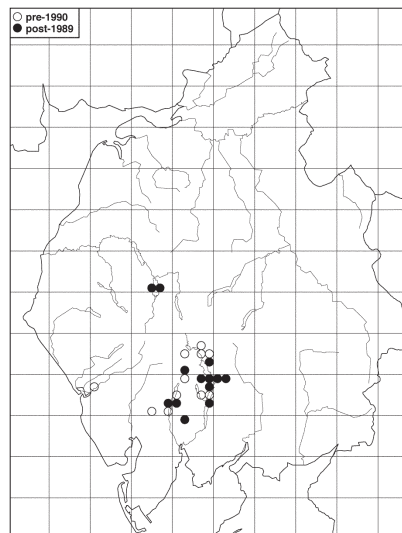
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Netted Carpet Moth

[*Eustroma reticulata*]



The netted carpet moth is entirely reliant on touch-me-not balsalm, on which the larvae feed. Native populations of touch-me-not balsalm are only found in Cumbria and North Wales. The moth is not found on introduced populations of balsalm found elsewhere in Britain.

Current status

The netted carpet moth is found in damp, woodland habitats where its sole larval foodplant, touch-me-not balsalm *Impatiens noli-tangere*, occurs.

In the UK this moth is restricted to a handful of Cumbrian locations, all in the Lake District, and possibly two small colonies in north Wales. In Europe it is found locally in alpine and northern regions.

Cumbrian colonies are grouped into seven core Lake District areas: Coniston; west Derwent Water; east Derwent Water; west Windermere; east Windermere; Ambleside; and Bridgend. Recently a new colony has been located at Muncaster, well away from the central Lakeland populations.

Since its discovery in the UK in 1856, seemingly at a site on the north-west shore of Windermere, the species appears to have fluctuated markedly in

numbers, probably as a consequence of changes in balsalm foodplant availability. Surveys since 1945 have found that many colonies are only temporary in nature whereas a few sites are relatively stable. “New” colonies continue to be discovered and known colonies also decline, sometimes to apparent extinction.

The species is listed in the Red Data Book at Category 2 - Vulnerable. Netted carpet moth is a Priority Species in *Biodiversity: The UK Steering Group Report*. Touch-me-not balsalm is itself recorded as Nationally Scarce.

Legal protection

The netted carpet moth has no legal protection. Four Sites of Special Scientific Interest support netted carpet moth in Cumbria.

Relevant ecology/management requirements

Netted carpet moth larvae feed only on touch-me-not balsam. Larvae are usually present from early August to early October when the pupae overwinter on the surface of moist ground. Pupae need to remain damp to survive. Adults emerge and fly from early July to mid August. Eggs are laid singly on balsam leaves. The degree of mobility of adult moths is unknown.

Touch-me-not balsam is the only native member of the Balsaminaceae. It is an annual, growing to 1 m tall and flowering from July to September. It favours damp, fertile, bare soil with some shade cover. Under these conditions the balsam can form extensive, monospecific stands. However, such favourable soil conditions do not generally last for long in one location. Some form of disturbance is required to produce the bare ground on which the seed can germinate, otherwise it is ousted by more vigorous perennial competitors. Cattle trampling, forestry operations and flooding episodes have all been found to produce suitable conditions in certain situations.

The plant produces two types of flowers: the normal type and those which do not open past the bud stage and are self-pollinated. The latter type occurs particularly under deep shade. Seed is shed up to 2m from explosive pods. They may be further spread by water, on animal feet or incidentally by man. The literature states that there is no seed bank though there is limited evidence to refute this assertion. Seed requires chilling to enable germination.

Current issues

Decline of foodplant colonies through:

- increased woodland shade
- lack of substrate disturbance leading to competition from perennial species
- drying out of ground due to drainage changes
- climatic impacts including drought and excessively high water levels
- incorrect timing of cutting of roadside foodplant, which prevents seed set and could destroy feeding caterpillars
- insensitive forestry operations

Although the actual issue varies according to site, probably the two most significant factors in foodplant decline are increased woodland shade and lack of substrate disturbance.

Current action

- The moth is the subject of an on-going Species Recovery Programme run jointly by English Nature, the National Trust and Dr Paul Hatcher (Reading University). Survey of touch-me-not balsam sites has been carried out in a co-ordinated way since 1990. All known locations of balsam are visited, recorded and searched for presence of larvae at the appropriate time of year. Annual monitoring of moth colonies at Derwent Water and Coniston Water has taken place since 1994, following the establishment of an initial baseline in 1990. Limited experimentation has also been carried out. This has involved manipulation of woodland shade levels and trials on seed germination. Analysis of soil chemistry has taken place using samples from a number of balsam localities.
- A Netted Carpet Moth Steering Group has been established to revise and take forward the UK Species Action Plan and had its first meeting in 1998. The group includes all those with an interest in the species, including representatives from Wales.
- Tullie House Museum maintains a database of moth records for Cumbria.
- Butterfly Conservation operates a Scarce Moth Network.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for netted carpet moth in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Identify the precise habitat requirements of the species by 1997.
- Ensure that all existing habitat is appropriately managed by the year 2000.
- Increase the moth's population and range to its recorded optimum by 2005.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point is English Nature, whose nominated officer is based at the Peterborough office.

The UK Biodiversity Lead Partners are, jointly, Butterfly Conservation, whose nominated officer is based at the Wareham office, and the National Trust, whose nominated officer is based at the Grasmere office.

Local contacts

John Hooson, The National Trust, The Hollens, Grasmere, Ambleside, Cumbria. Tel 015394 35599

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to netted carpet moth:

Phase I

- upland oak woodland
- upland mixed ash woodland
- wet woodland

Objectives, targets and proposed actions for netted carpet moth in Cumbria

Broad Objective A		Ensure the survival of viable netted carpet moth populations in each of the identified “core areas” in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Ensure that the location and requirements of the netted carpet moth are fully taken into account in the planning process	1 Ensure that all relevant planning authorities are aware of current sites by 2000.	EN	S	A	
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including sites supporting netted carpet moth, by 2006.	CWT, LAs	L	SS	
2 Monitor populations of both netted carpet moth and balsam	1 Continue detailed monitoring at selected sites on an annual basis.	NT, EN, Reading Univ.	O	RM	
	2 Re-survey all known moth and balsam sites in year 2000 and again in 2010.	NT, EN, Reading Univ., BC	O/L	RM	
	3 Investigate all reports of new balsam colonies for presence of moth.	NT, EN, Reading Univ, BC, LDNPA	O	RM	
	4 Produce a comprehensive sites database and digitise site information using LDNPA GIS, and circulate information to all bodies involved in the conservation of sites.	NT, LDNPA	S	RM	
	5 Continue to collect and collate moth records from amateur naturalists and the general public.	THM, CNU, BC	O	RM	

Broad Objective A **Ensure the survival of viable netted carpet moth populations in each of the identified “core areas” in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Improve understanding of moth and foodplant ecology	1 Continue investigations into population dynamics, germination and growth requirements of balsam, and the existence or otherwise of a seedbank.	NT, EN, Reading Univ.	O/M	RM
	2 Develop proposals for research into genetics of foodplant-moth population structure and dynamics. By 2002.	Reading Univ., BC	M	RM
4 Ensure sympathetic management of existing moth/balsam colonies	1 Liaise with all relevant landowners/managers to encourage appropriate management of sites, especially forestry operations, drainage impacts and factors producing ground disturbance. By 2001.	NT, LDNPA, FE, FC, MAFF, private owners	S	A/SS
	2 Ensure that verge cutting regimes are compatible with the requirements of the netted carpet moth.	CCC, NT	O	SS
	3 Ensure presence of netted carpet and appropriate management is incorporated in Site Management Statements for all relevant SSSIs, by 2001.	EN	S	SS
	4 Provide advice on management and grants to owners and occupiers of Wildlife Sites with netted carpet moths, by 2008.	CWT	L	A
5 Increase number of moth populations to a minimum of 5 colonies in each core area* by 2005	1 Identify opportunities and establish new balsam colonies in reasonable proximity to existing moth locations, by 2001.	EN, NT, LDNPA, MAFF	S	SP
	2 Where practical, restore suitable habitat conditions at previously occupied sites, by 2005.	NT, EN, LDNPA, MAFF	M	SP
	3 Attempt re-introduction of balsam foodplant to suitably restored sites, by 2006.	NT, EN, LDNPA, BC	L	SP

* see *Current Status for definition*

Broad Objective A **Ensure the survival of viable netted carpet moth populations in each of the identified “core areas” in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
6 Increase public knowledge of, and participation in, netted carpet moth conservation	1 Distribute netted carpet moth leaflet to a wider audience.	NT , FWAG, FA, CLA, CWT, BC	O/ M	CP
	2 Promote netted carpet moth story in press and other relevant publications.	CBP	O	CP

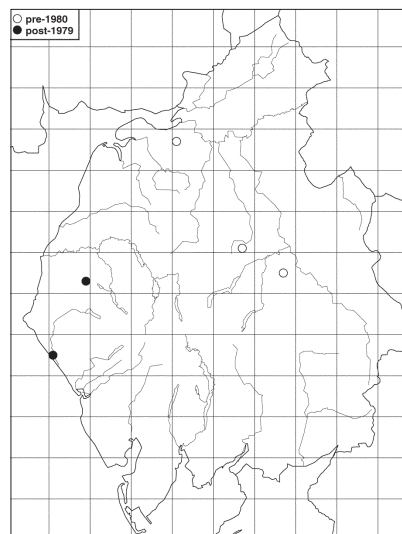
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BC = Butterfly Conservation; CBP = Cumbria Biodiversity Partnership; CCC = Cumbria County Council; CLA = Country Landowners Association; CNU = Cumbria Naturalists Union; CWT = Cumbria Wildlife Trust; EN = English Nature; FC = Forestry Commission; FE = Forest Enterprise; FWAG = Farming and Wildlife Advisory Group; NT = National Trust; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

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Variable Damselfly

[*Coenagrion pulchellum*]

Of all the damselflies and dragonflies in Cumbria, the variable damselfly is the most vulnerable.

Current status

The variable damselfly is a delicate, blue species, very similar in appearance and habits to the much more widespread azure damselfly. Identification of adults requires close inspection by experienced workers; larvae are very difficult to identify.

The species occurs widely throughout lowland Europe. In the UK it is absent from many areas, with strongholds in East Anglia, the Somerset Levels, south-west Scotland, and in Ireland. In Cumbria, it has only two small colonies, on the west coastal plain. Both sites were discovered post-1960. One of these populations was assessed in 1978 as only having some 100 individuals. It is possibly the Odonata species most 'at risk' in Cumbria.

A noticeable decline has occurred in many parts of the English range, due mainly to agricultural intensification. In Cumbria, at least two sites have been lost from the Eden valley during the present century. The causes of the local decline include habitat deterioration and, possibly, pollution. There is a possible third historical breeding site in north Cumbria, where the species has been recorded in the past.

Legal protection

The species has no legal protection in the UK.

One of the two Cumbrian variable damselfly sites is a Site of Special Scientific Interest.

Relevant ecology/management requirements

The species has fully aquatic larvae, which may develop in one year. Larvae live amongst submerged weed and are predatory on other aquatic invertebrates. The adults are on the wing from late May until early August (main emergence late May-late June). They seem to prefer sheltered, weedy sites. They also are predatory, feeding on smaller insects, which they capture in flight.

Well-vegetated, lowland lakes, pools and slow-flowing ditches, with water of neutral to moderately acid pH. Mesotrophic fen vegetation is characteristic of many of the sites at which the species occurs nationally.

Current issues

- Small populations may increase the probability of local extinctions. Remoteness from stronger populations means a very low natural re-colonisation potential.
- Possible pollution from field run-off. The species is known to be susceptible to agricultural pollution; therefore, run-off from surrounding fields is a potential problem.
- Lack of legal protection of the non-SSSI site.
- Drainage operations affecting the quality and quantity of water of the habitat.
- There is no pro-active management for this species at either of its sites. Natural habitat changes through time may lead to a site losing its suitability for the species.
- One site is managed by an angling club. High fish stocks may result in predation of damselfly larvae and associated nutrient enrichment is also a potential problem.

The most important factors likely to affect the two sites are possible pollution incidents, lack of management and lack of legal protection at the non-SSSI site.

Current action

- Recording activity: sites are visited, rather spasmodically, and records submitted to the national recording scheme and to Tullie House Biological Records Centre. Breeding is inferred from the continued presence of the species at the Cumbria sites.
- English Nature's Basin Mire Enhancement project aims to clarify the nature conservation objectives for basin mire SSSIs and implement the management necessary to achieve these objectives, including provision for variable damselfly, possibly through Heritage Lottery funding.

Context in relation to other plans:

UK Species Action Plans

The variable damselfly has no UK Biodiversity Action Plan.

UK Contact Point and Lead Partner

None.

Local contacts

David Clarke, Burnfoot, Cumwhitton, Carlisle CA4 9EX

Tel: 01228 534781 (day); Email

david.clarke19@virgin.net - Regional Recorder for national Dragonfly Recording Network.

Associated plans in the Cumbria BAP

The following action plans are of relevance to the variable damselfly:

Phase I

- white-faced dragonfly
- lowland raised mire
- basin mire
- mesotrophic standing waters
- rivers and streams
- purple moor grass and rush pastures

Phase II

- swamps and tall herb-fen

Objectives, targets and proposed actions for variable damselfly in Cumbria

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Broad Objective A		Ensure stable populations and no further loss of sites for this species in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Survey and monitor the population of variable damselfly in Cumbria	1 Confirm breeding presence and assess colony strength at each established site, at least once every two years. Make data available to appropriate organisations in a useful format (e.g. Recorder/GIS).	BDS, THM	O	RM	
	2 Develop a standardised monitoring methodology, and implement by 2000.	BDS, THM	S	RM	
	3 Identify and survey sites with the potential to support the species, by 2001.	BDS, EN, THM, CWT	S	RM	
2 Ensure all known sites for variable damselfly are adequately protected	1 Ensure that all relevant planning authorities are aware of current sites by 2000.	EN, BDS	S	A/SS	
	2 Identify as Wildlife Sites the most important areas for wildlife in the county outside of statutory sites, including sites supporting variable damselfly. By 2006.	CWT, LAs	L	SS	
3 Ensure that the management of existing sites includes provision for variable damselfly	1 Liaise with sites owners at least once per three years.	EN, BDS	O	A/SS	
	2 Site Management Statement for the SSSI site to include specific reference to the species, by 2000.	EN, BDS	S	SP	
	3 Provide advice on management and grants to owners and occupiers of Wildlife Sites with variable damselfly, by 2008.	CWT, BDS	L	A/SP	

Broad Objective B **Restore populations of variable damselfly to suitable previously occupied sites**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Investigate the desirability and feasibility of restoration of habitat and reintroduction at previously occupied sites	1 If desirable and feasible, determine suitable sites and methods for restoration/reintroduction. Historic sites should be considered. By 2001.	BDS, EN, CWT,	S	RM
	2 Initiate recommendations of restoration/reintroduction plan by 2002.	EN, CWT, BDS	M	SP

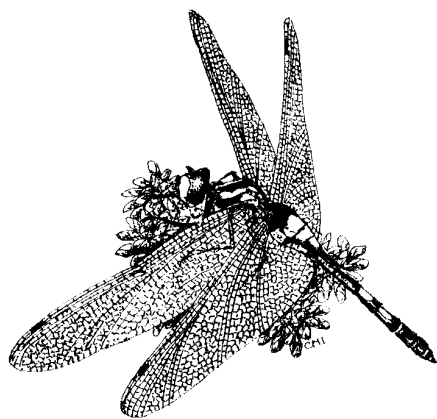
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BDS = British Dragonfly Society (David Clarke); CWT = Cumbria Wildlife Trust; EN = English Nature; THM = Tullie House Museum (Steve Hewitt).

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

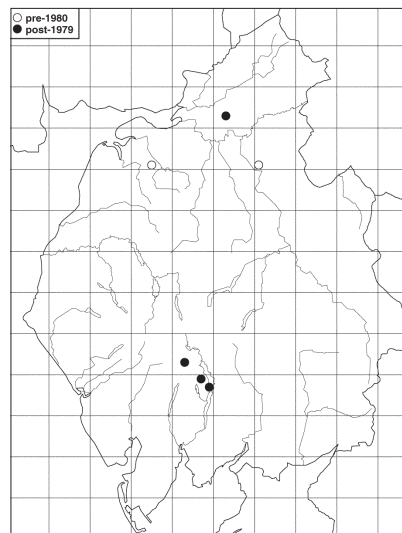
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White-faced Darter

[*Leucorrhinia dubia*]

Although the number of sites at which it occurs in England is very small, where it is found the white-faced darter can be relatively abundant.



Current status

The white-faced darter is a medium-sized dragonfly, restricted to peatlands with some woodland which have suitable natural bog-pools or flooded peat cuttings. In the UK it is mainly a lowland species. It is essentially non-migratory. The species is often quite numerous where it occurs. Both adult and larval stages are easily identified in the field.

The species occurs throughout northern and central Europe. In the UK it is restricted to less than ten sites in England, but occurs more widely in the Scottish Highlands.

In Cumbria, there is a single colony on a lowland raised mire near Carlisle, and another population (perhaps with more than one site) near Hawkshead. A third population, near Ambleside, has recently been discovered.

A general decline is reported for England over the past 40 years. In Cumbria, three colonies are known to have been lost since 1945, all probably before 1970.

The species is listed in the Red Data Book (Insects) as Nationally Scarce and is a Species of Conservation Concern in *Biodiversity: The UK Steering Group Report* (1995).

Legal protection

The species has no legal protection in the UK. Both Cumbrian white-faced darter sites are on Sites of Special Scientific Interest.

Relevant ecology/management requirements

The species has fully aquatic larvae which spend two, or occasionally three, years in the water. Larvae live amongst submerged Sphagnum moss

and are predatory on other aquatic invertebrates. There are indications that larvae cannot co-exist with fish.

Adults fly from late May to early August (main emergence being late May to late June). They require sheltered heathland/open woodland areas adjacent to sunlit breeding pools. Adults are predatory, feeding on smaller insects which they capture in flight

Larvae survive best in static water pools of a moderate depth (possibly at least 1m) and acidity, with some rafts of Sphagnum and other aquatic mosses. Some open water may be necessary to attract egg-laying adults.

Open heathland adjacent to the breeding pools is the typical habitat of adults. Scattered mature trees and scrub cover is tolerated, provided there is no shading of pools. Birch and/or Scot's pine are the typical trees of its natural habitat.

Current issues

- Natural development through time of smaller breeding pools by infill of vegetation and overgrowth by mosses.
- Drying out of breeding pools by reduction of water tables.
- Afforestation of breeding sites, leading to shading and/or drying out of habitat.
- Low potential for natural re-colonisation to isolated or abandoned sites.

Current action

- Sites are visited almost annually and records are submitted to the national recording scheme and to Tullie House Biological Records Centre. Breeding evidence is obtained wherever possible.

- The north Cumbria site has benefited from the creation of six new pools by English Nature in 1993; tree removal in main heathland area around pools has also been undertaken, most recently in 1998.
- In 1997 Forest Enterprise removed some trees adjacent to one of the Hawkshead sites, and is aware of the need to protect the species.

English Nature's Basin Mires Enhancement project, which covers the Hawkshead site and at least one former site, aims to clarify the nature conservation objectives for basin mire SSSIs and implement the management necessary to achieve these objectives. This will include provision for white-faced darter, possibly through Heritage Lottery funding.

Context in relation to other plans:

UK Species Action Plans

The white-faced darter has no UK BAP.

UK Contact Point and Lead Partner

None

Local contacts

Species expert: David Clarke, (Regional Recorder for national Dragonfly Recording Network)
Burnfoot, Cumwhitton, Carlisle CA4 9EX;
Tel. 01228 534781 (day).
E-mail: david.clarke19@virgin.net

Associated plans in the Cumbria BAP

The following species/habitat action plans are of relevance to the white-faced darter:

Phase I

- variable damselfly
- lowland raised mire
- basin mire

Objectives, targets and proposed actions for white-faced darter in Cumbria

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Broad Objective A		Ensure stable populations and no further loss of sites of white-faced darter in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Survey and monitor the populations of white-faced darter in Cumbria	1 Confirm breeding presence and assess colony strength at both known sites, at least once every 2 years.	BDS, THM	O	RM	
	2 Develop a standardised monitoring methodology and implement by 2000.	BDS, THM	S	RM	
	3 By 2001, conduct systematic survey of area around southern sites to establish extent of population in this area.	BDS, FE, EN	S	RM	
	4 Continue the current Dragonfly Recording Scheme in Cumbria.	BDS, THM	O	RM	
2 Ensure that the management of existing sites includes provision for white-faced darter	1 Liaise with site owners at least once every three years.	EN, FC	O	A	
	2 All relevant Site Management Plans and other plans to include, by 2000, measures for white-faced darter (including tree control, pool creation and maintenance; drainage control regimes).	EN, FE	S	SS	
3 Ensure all known sites for white-faced darter are adequately protected	1 Keep the extent of SSSI coverage under review and modify site boundaries where necessary to ensure all colonies are included.	EN	O	SS	
	2 Ensure that all relevant planning authorities are aware of current sites and provided with information in a suitable format (GIS/Recorder) by 2001.	EN, BDS, THM	S	A	

Broad Objective B		Restore populations of white-faced darter to previously occupied sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Restore habitat at previously occupied sites	1 Determine suitable sites and methods for restoration by 2000. Cumwhitton Moss, Foulshaw Moss and Oulton Moss should be considered.	EN, BDS, CWT	S	RM	
	2 Implement restoration plan by 2005.	EN, BDS, CWT	M	SS	
2 Re-introduce white-faced darter to suitable previously occupied sites	1 Determine suitable methods and sites for re-introduction by 2000.	BDS, EN, CWT	S	RM	
	2 Implement re-introduction by 2010.	EN, BDS, CWT, others?	L	SS	

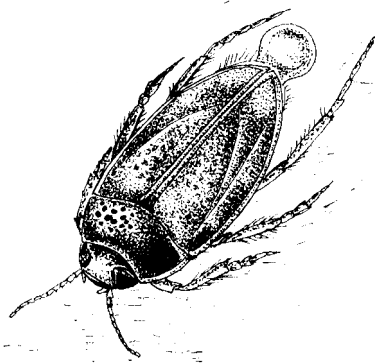
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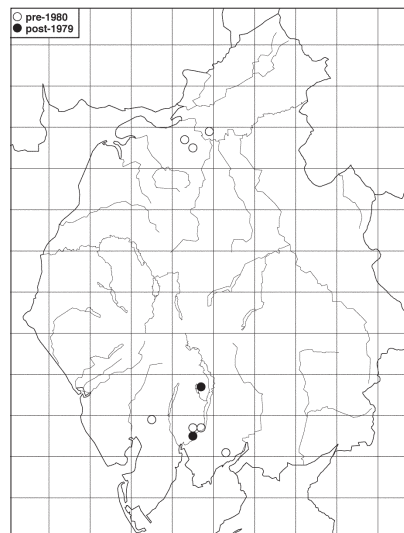
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A Water Beetle

[*Hydroporus rufifrons*]



Hydroporus rufifrons is found in small water bodies; these are often temporary in nature, or have fluctuating water levels. Populations are highly vulnerable to drainage and infilling of pools and nutrient enrichment from agricultural runoff; factors which are presumed to be responsible for the decline of the species in much of its former range.

Current status

Hydroporus rufifrons (having no common English name) is a small diving beetle, 4.0-5.3mm in length. The genus *Hydroporus* contains 28 species in the British Isles, of which *H. rufifrons* is one of the largest. Species of the genus are generally found in small, still waterbodies, fens and bog pools, where they may be the dominant large invertebrate predators.

In Europe *Hydroporus rufifrons* is found throughout northern and central Europe, extending eastwards to western Siberia (Nilsson, 1995). This beetle is now very rare in Denmark, western Germany and France.

In the British Isles *H. rufifrons* has always been of local occurrence, formerly being widespread in northern England, Wales, Scotland and East Anglia

(Balfour-Browne, 1940; Foster, 1984). Today the species is almost entirely restricted to parts of Wales, Scotland and the Lake District, with outlying records from Yorkshire, Lincolnshire and Northumberland. Despite old records from relict fen sites in eastern England, there is only a single post-1950 record from this area of the country. In the north and west the species is mainly found in small, often temporary, oxbow fens. In Cumbria modern records also originate from small fluctuating water bodies and bog pools.

Historically *Hydroporus rufifrons* has been recorded from 11 sites in Cumbria, eight in the Lake District, plus three records in the north of the county. Post-1980 resurveys of these northern sites failed to find this beetle however. Of the Lake District records only two are post-1980, including a new site recently discovered in the Rusland valley. The

continued presence of the species in former Cumbrian sites is in urgent need of confirmation. The southern Lake District represents one of the major concentrations of *Hydroporus rufifrons* in the UK, and these populations are of at least national significance. The species is currently listed as RDB2 in Britain (Foster, 1992) and is listed as a Priority Species in UK Biodiversity Group Tranche 2 Action Plans.

Legal protection

The species has no national legal protected status. *Hydroporus* is thought to exist in three Sites of Special Scientific Interest in Cumbria.

Relevant ecology/management requirements

Hydroporus rufifrons has one generation, breeding in spring, with overwintering adults and larvae in summer (Nilsson, 1986). Both adults and larvae are predatory, probably feeding largely on small fly larvae. The species can reach high adult densities in autumn, but be difficult to locate in the same sites in spring.

The species is found in temporary or seasonally fluctuating stagnant water bodies, many of which are in old river oxbow systems. The specific ecology of the species in Cumbria is poorly understood, but Cumbrian sites also include a range of small bog pools associated with lake basins, or areas of fen and bog. Based on its occurrence elsewhere in the UK, the species is probably absent from highly acid sites. A common feature of the majority of *H. rufifrons* sites, both in Cumbria and elsewhere, is the presence of tussocks of sedges or rushes. In addition sites usually have clear water, and lack significant eutrophication. The small water bodies in which the species is found are highly vulnerable to the combined effects of drainage and agricultural eutrophication, factors which are presumed to be responsible for the decline of the species in much of its former range.

On the basis of current evidence the species requires clear mesotrophic to slightly oligotrophic water bodies with water levels that fluctuate seasonally and tussocky vegetation. It appears to be particularly vulnerable to eutrophication, in the form of direct water input, or run-off from surrounding agricultural land.

Current issues

- Agricultural 'improvement' of riverside/lakeside grassland leading to drainage of fluctuating water bodies, and/or eutrophication from surrounding run-off.
- River management schemes preventing oxbow formation.
- Direct drainage of sites.

Current action

No current action undertaken in Cumbria.

Context in relation to other plans:

UK Species Action Plans

UK Biodiversity Group Tranche 2 Action Plans, Vol. IV (1999) contains a costed UK Plan for *Hydroporus rufifrons*, which sets the following objectives and targets:

- Ensure that viable populations are maintained within each of the areas currently occupied.
- Reintroduce two populations of this species in East Anglia, and one population in South Wales, by 2010, if not re-found in these former parts of its range.

UK Contact Point and Lead Partner

The UK Biodiversity Contact Point for *Hydroporus rufifrons* is English Nature, whose nominated officer is yet to be determined. The UK Lead Partner is yet to be determined.

Local contacts

David Atty, Beckhouse Mill, Embleton, Cockermouth, CA13 9TN. Tel. 017687 76586. Species expert: Dr D.T. Bilton, Department of Biological Sciences, University of Plymouth, Drake Circus, Plymouth PL4 8AA. Tel. (01752) 232902. Fax. (01752) 232970. Email. dbilton@plym.ac.uk

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to *Hydroporus rufifrons*:

Phase I

- rivers and streams
- mesotrophic standing waters
- purple moor grass and rush pastures

- lowland raised mire
- basin mire
- reedbed

Phase II

- swamps and tall herb fen
- medicinal leech

References

Balfour-Browne, W.A.F. 1940. *British Water Beetles*. Volume 1. Ray Society.

Foster, G.N. 1984. Atlas of British water beetles, preliminary edition, part 3. *Balfour-Browne Club Newsletter* **31**: 1-22.

Foster, G.N. 1992. British beetle conservation categories. *Balfour-Browne Club Newsletter* **50**: 23-25.

Nilsson, A.N. 1986. Larval morphology and phenology of four Fennoscandian species of *Hydroporus* Clairville (Coleoptera: Dytiscidae), with a preliminary key to known larvae. *Aquatic Insects* **8**: 141-153.

Nilsson, A.N. 1995. The aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. II. Dytiscidae. *Fauna Entomologica Scandinavica* **32**. E.J. Brill, Leiden.

Objectives, targets and proposed actions for *Hydroporus rufifrons* in Cumbria

Broad Objective A Determine the current status and distribution of *Hydroporus rufifrons* in Cumbria

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Confirm continued presence and extent of population in known sites	1 Survey known localities to enable definite listing of sites as supporting this rare species. By 2001.	DA, DTB	S	RM
2 Gain a better understanding of the habitat requirements of the species in Cumbria	1 Measure gross habitat characteristics of known sites; site type (e.g. oxbow, fringing fen, bog pool etc.), area (incl. estimate of site fluctuation), pH, conductivity, turbidity, vegetation characteristics, other aquatic Coleoptera. By 2001.	DA, DTB	S	RM
3 Survey potential sites to determine conservation status and distribution in Cumbria	1 Undertake desk-based survey using characteristics identified above. By 2001.	DA, DTB	S	RM
	2 Survey likely new sites in appropriate seasons by 2002.	DA, DTB	S	RM
4 Monitor the Cumbrian population	1 Monitor known sites annually (perhaps less frequently if many new sites found), from 2002.	DA, DTB	M/ O	RM

Broad Objective B		Maintain and enhance the population of <i>Hydroporus rufifrons</i> in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Implement necessary conservation measures to maintain current populations	1 Assess conservation issues for the species and collate management recommendations. By 2001.	EN, LDNPA, DA, DTB	S	SP	
	2 Assemble relevant agencies and individuals to assess survey results and determine necessary actions by 2001.	EN, DA, DTB, LDNPA	S	RM/A	
	3 Start implementation of actions from 2001.	Relevant partners, LDNPA, DA, DTB	S/O	SS/SP	

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

DA = David Atty; DTB = David T. Bilton

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



A

Caddisfly

[*Glossosoma intermedium*]

This caddisfly is possibly a relic species from the Ice Age, when it would have been much more common than it is today. Climate and other changes since then have left it restricted to three streams in the Lake District.

Current status

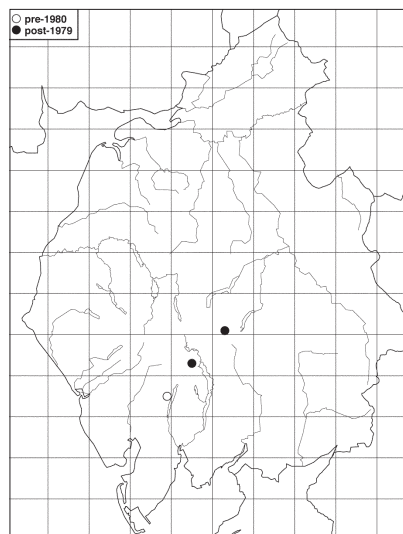
Glossosoma intermedium is a small to medium sized caddis, with no common English name. It is one of six British species in the family Glossosomatidae and one of the three species in the Genus *Glossosoma*. The larvae in this family are well known to freshwater naturalists throughout Britain because of their tortoise-shaped cases of sand grains, commonly found attached to large stones in streams and swift rivers.

Five of the six British glossosomatids are widespread and common and one of them, *Agapetus fuscipes*, is arguably Britain's most abundant caddis. The exception is *Glossosoma intermedium*, known in Britain, at present, from only three Lake District streams. The reason for this restricted distribution is not known.

Fischer (1960 & 1971) listed the distribution of the species as Scandinavia, across northern Russia and in the mountain regions of Eastern Europe. This suggests it is a northern species, possibly an Ice Age relic in Britain.

Larvae were collected in 1986 and 1987 as part of work towards the production of an identification key (Wallace *et al* 1990); it is not known if there have been any subsequent records. At that time it was re-found in two of its sites, Pull Beck near Hawkshead and the Hayeswater inflow above Ullswater, but not at Hoathwaite Beck, Coniston, the site from which the species was added to the British list in 1925.

Wallace (1991) gave the species only RDB3 status, because it seemed likely that more sites would be discovered. However, on the basis of known sites it



would certainly qualify for RDB2, perhaps even RDB1, as it has possibly lost one of its three sites. A systematic search for new sites seems imperative. The species is listed as a Species of Conservation Concern in *Biodiversity: The UK Steering Group Report*.

Legal protection

The species has no UK legal protection.

Relevant ecology/management requirements

The adults have a short flight period; Macan (1973) gives April to May (and possibly later). The larvae grow quickly, probably exploiting the spring flush of algae which live on the surface of stones. By June or July they are full-grown and prepare for pupation by sealing their cases to a rock and spinning a cocoon inside the case. They remain in the attached case as a pre-pupa until spring, then as a pupa until they emerge. They are inactive for nine to ten months. The other two *Glossosoma* species have much longer flight periods, have feeding larvae for much of the year, and perhaps have more than one, or overlapping, generations.

The three streams that support (or supported) the species are all small to medium sized (1-3 metres wide) and with a moderate slope so that the flow is fast but not torrential. It is not known if there are other particular characteristics of these streams, or if this is truly a relic species that has adapted to unique conditions in the few streams where it has been isolated. The Hayeswater inflow is short and the species seemed restricted to the lower regions where the flow was moderate; the present (and past) extent of the populations on the Pull Beck and the Hoathwaite Beck is not known.

In the absence of any other evidence, it seems that the species' main requirement is to maintain the water-courses of the streams unchanged as far as water quality and flow regime are concerned along their entire course at and above the location used by *G. intermedium*.

Current issues

- Pollution by pesticides.
- Enrichment by the construction of impounded dams.

- Enrichment from sewage or farm run-off.
- Siltation from drainage works.
- Alteration of flow regime from drainage works.
- Shading by afforestation.
- There is a caravan site near the mouth of the Hoathwaite Beck. Children love to make toy dams and these alter water flow, but more significantly, disturb the pupal cases on the larger stones; *glossosomatid* pupae of the common species have quite often been seen to be exposed above the water by such activities.

It is not yet clear which of these issues is most important at the sites in Cumbria; further survey will determine this.

Current action

- Little recent work specifically on *Glossosoma* has taken place in Cumbria. Surveys in 1986 and 1987 were carried out at the sites with historical records, although apparently no surveys have taken place since then.
- Outside of Cumbria, B. and I.D. Wallace have looked at many streams in Snowdonia and elsewhere in Wales, so far without success

Context in relation to other plans:

UK Species Action Plans

There is no UK Biodiversity Action Plan for *Glossosoma intermedium*.

UK Contact Point and Lead Partner

None.

Local contacts

Species expert: I.D. Wallace, Liverpool Museum and Art Gallery, William Brown Street, Liverpool, L3 8EN; Phone: 0151 478 4236.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plan is of relevance to *Glossosoma intermedium*:

Phase I

- rivers and streams

References

- Fischer, F.C.J. 1960 *Trichopterorum Catalogus Volume I*. Nederlandsche Entomologische Vereeniging, Amsterdam.
- Fischer, F.C.J. 1971 *Trichopterorum Catalogus Volume XII*. Nederlandsche Entomologische Vereeniging, Amsterdam.
- Macan, T.T. 1973. A key to the adults of the British Trichoptera. *Scientific Publications of the Freshwater Biological Association* No. **43**.
- Wallace, I.D. 1991. A review of the Trichoptera of Great Britain. *Research & Survey in nature conservation* No. **32**. Published by Nature Conservancy Council, Peterborough.
- Wallace, I.D., Wallace, B. & Philipson, G.N. 1990. A key to the case-bearing caddis larvae of Britain and Ireland. *Scientific Publications of the Freshwater Biological Association* No. **51**.

Objectives, targets and proposed actions for *Glossosoma intermedium* in Cumbria

Broad Objective A		Determine and monitor the current status and distribution of <i>Glossosoma intermedium</i> in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Confirm continued presence and extent of population in known sites	1 Survey Pull Beck, Hayeswater inflow and Hoathwaite Beck to enable definite listing of sites as supporting this rare species. By 2001.	IDW, NT	S	RM	
2 Gain a better understanding of the habitat requirements of the species	1 Measure gross habitat characteristics of known sites: stream width, depth and slope. By 2001.	IDW	S	RM	
3 Survey potential sites to determine conservation status and distribution in Cumbria	1 Undertake desk-based map survey using physical characteristics identified above. By 2002.	IDW	M	RM	
	2 Survey likely new sites by 2002.	IDW, NT	M	RM	
4 Monitor the Cumbria population of <i>G. intermedium</i>	1 Monitor known sites annually (perhaps less frequently if many new sites found), from 2002.	IDW, NT	M/ O	RM	

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure that the location and requirements of the species are fully taken into account in the planning process	1 Ensure that all relevant planning authorities are aware of current sites by 2001.	EN	S	A/SS
	2 Identify as Wildlife Sites sites supporting <i>Glossosoma intermedium</i> that fall outwith SSSIs. By 2002.	CWT	M	A/SS
2 Implement necessary conservation measures to maintain current populations	1 Assemble relevant agencies and individuals to assess survey results, assess prevalent issues, and determine suggested management requirements and necessary actions. By 2002.	IDW, EN, NWW, LDNPA, NT, EA	M	RM/SP
	2 Start implementation of actions from 2002.	EN, NT, EA, LDNPA, NWW	M/O	SP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

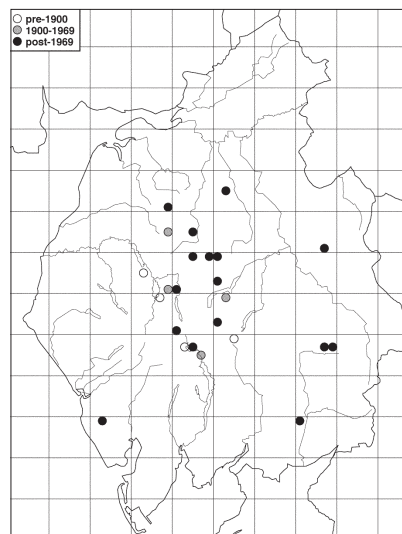
CWT = Cumbria Wildlife Trust; EA = Environment Agency; EN = English Nature; IDW = Ian Wallace, Liverpool Museum and Art Gallery; LDNPA = Lake District National Park Authority; NT = National Trust; NWW = North West Water.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Slender Green



Feather-moss

[*Hamatocaulis vernicosus*]

(formerly *Drepanocladus vernicosus*)

Cumbria is a UK stronghold for this nationally uncommon moss.

Current status

Slender green feather-moss is a species of base-rich fens and flushes, found from the Arctic to west, central and eastern Europe, central Asia and northern USA. In UK it is a Nationally Scarce plant, with most of its records from north Wales and Cumbria. It is unaccountably rare in Scotland but is perhaps overlooked there, and elsewhere. In Cumbria slender green feather-moss has been recorded from nineteen sites.

Nationally, the species has been lost from a number of sites where it had been recorded in the past and is thought to be in decline. The situation is confused however, by the recent finding that many historical records of this species are in fact the closely related and recently described *Drepanocladus cossonii*, the

exact situation as to which records refer to which species has yet to be clarified.

It is puzzling why the species is so scarce when its habitat in the Cumbrian uplands is apparently widespread; this suggests that either the plant is undoubtedly rare, or simply under-recorded.

However, its non-discovery in three recent years of survey in Westmorland does suggest that it is rare, although the plant has not been targeted during this survey.

Legal protection

The slender green feather-moss is fully protected by the Wildlife and Countryside Act 1981 Part I (as amended), and is listed on Annex II of the EC Habitats Directive 1992 and Appendix I of the Bern

Convention. The status of this moss within Sites of Special Scientific Interest within Cumbria is currently being investigated.

Relevant ecology/management requirements

Slender green feather-moss in Cumbria is a species of moderately base-rich upland springs, flushes and bogs. In other parts of the UK, it occurs also in lowland sites including small-sedge fens and spring-influenced sites, although in Cumbria it is not thought to occur in the lowlands.

It is important to maintain a moderate level of grazing on sites in order to prevent growth of rank vegetation.

Current issues

The following factors are likely to operate to a degree across the known sites, although further work is needed to confirm the most prevalent issues in Cumbria:

- Particularly high intensities of grazing are thought to be detrimental. Note however that a moderate level of grazing is beneficial, by allowing light into the sward.
- Drainage of sites for agricultural improvement.
- Destruction of the habitat by infilling wet hollows with farm refuse.
- Acidification of ground water due to the presence of conifer plantations is likely to be a factor in some areas.
- Possible deleterious effects on the species and its habitat by all-terrain vehicles.

Current action

- A national survey of this species is currently being carried out.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for slender green feather-moss in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Clarify the current status of slender green feather-moss in the UK. No further conservation action should be undertaken until this is done.
- Retain current levels of protection for slender green feather-moss until its status is clarified.

UK Contact Point and Lead Partner

The UK Contact Point and Lead Partner for slender green feather-moss is Countryside Council for Wales, whose nominated officer is at the Bangor office.

Local contacts

General contact: Ian Slater, English Nature, Juniper House, Murley Moss, Kendal, LA9 7RL. Phone: 01539 792800.

Species experts: Keith Raistrick, 1 Drewton Avenue, Cross Cop, Heysham, Lancs, LA3 1NU.

Tel. 01524 423325;

Dr Roderick Corner, Hawthorn Hill, 36 Wordsworth Street, Penrith, Cumbria, CA11 7QZ. Phone: 01768 863660.

Associated plans in the Cumbria BAP

The following Cumbria BAP action plans are of relevance to slender green feather-moss:

Phase I

- sandbowl snail
- Geyer's whorl snail

Phase II

- springs and flushes

Objectives, targets and proposed actions for slender green feather-moss in Cumbria

Broad Objective A		Determine current status and distribution of the species in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Confirm continued presence and extent of the population at known sites	1 Review current knowledge and carry out any additional survey of sites and localities known to have supported the species in the past. By 2001.	KR, RWMC, Partners	S	RM	
2 Gain a better understanding of the habitat requirements of the species in Cumbria in order to search for new sites	1 Measure habitat characteristics of known sites in order to characterise a potential site's suitability for the species. By 2002.	KR, RWMC, Partners	M	RM	
	2 Identify potential sites using site characteristics gained from above study, by 2002.	KR, RWMC, LDNPA,	M	RM	
	3 Survey potential sites by 2002.	KR, RWMC, Partners	M	RM	
Broad Objective B		Maintain and enhance current populations of slender green feather-moss			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Identify prevalent issues which impact upon the species in Cumbria	1 Based on results of field surveys and from other sources of information, assess prevalent issues and determine suggested management requirements. By 2002.	EN, KR, RWMC	M	RM/SP	
2 Determine required conservation action	1 Using above, and in consultation with appropriate landowners, organisations, agencies and individuals, develop and agree upon Action Plan. By 2003.	EN, LDNPA, NT	M	SP	

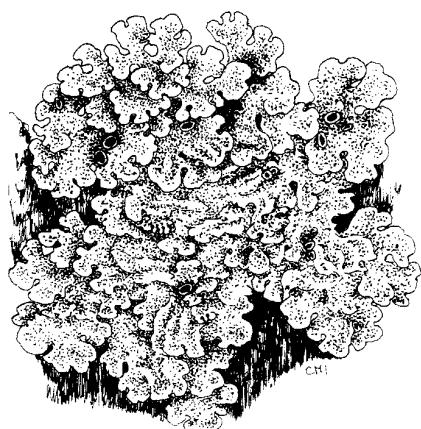
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

EN = English Nature; KR = Keith Raistrick; LDNPA = Lake District National Park Authority; NT = National Trust; RWMC = Dr Roderick Corner.

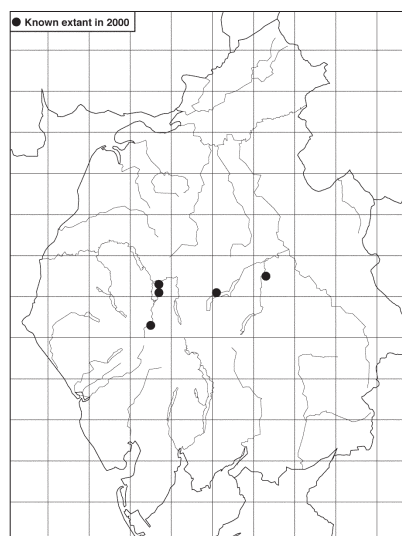
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



A

Lichen



[*Lobaria amplissima*]

Lobaria amplissima is one of a group of lichens which is highly sensitive to sulphur dioxide pollution. It is only able to grow in situations where SO₂ levels are very low and is largely confined to the north-west of Britain, away from the main industrial and population centres.

Current status

Lobaria amplissima is a large and spreading foliose (leaf-like) lichen characteristic of ancient woodlands and parklands in north-western Britain. The genus *Lobaria* contains some of the largest lichens in Britain. They are seriously threatened in many areas, owing to their extreme sensitivity to sulphur dioxide pollution, acid rain and to changes in woodland management.

Lobaria amplissima is locally frequent in north-west Scotland but it is becoming scarcer in southern and north-west England. It is declining in all seven of its localities in Cumbria, which are the only known locations for the species in northern England. The best known localities are on two sessile oak trees in woodland in the Borrowdale Valley near Keswick and on an ancient ash tree close to Ullswater.

Legal protection

The species receives general protection under the Wildlife and Countryside Act 1981 (as amended). *Lobaria amplissima* occurs within two Sites of Special Scientific Interest in Cumbria.

Relevant ecology/management requirements

The species is a characteristic member of a community of lichens known as the *Lobarion pulmonariae* ancient forest community which is associated with ancient woodlands with a long ecological continuity of pasture woodland or forest conditions and especially those with high humidity, old trees and low levels of pollution (Church *et al.* 1996).

The lichen occurs mainly on the trunks and branches of ash, elm, sycamore and oak trees and occasionally on rocks.

It appears to have a very poor ability to colonise new trees, but has been successfully transplanted in Cumbria from felled trees.

Current issues

The current issues relating to the conservation of *Lobaria amplissima* principally comprise protecting existing populations from loss and damage through inappropriate tree felling and tree surgery, pollution, and a lack of knowledge of the species' ecology and conservation requirements:

- Inappropriate tree felling and tree surgery can lead to the direct loss of entire populations of *Lobaria amplissima* and so it is important that woodland owners and managers are aware of the exact locations of the lichen in order to avoid inadvertent loss or damage.
- Acid deposition derived from pollution originating from elsewhere in Britain and Europe can lead to the death of lichen plants and make tree bark substrate toxic to colonising plants.
- A better understanding of the ecology of *Lobaria amplissima* would assist in identifying appropriate conservation management.
- Populations are vulnerable to natural catastrophes as they are generally restricted to single trees at known sites.

Current action

- The populations of *Lobaria amplissima* within Sites of Special Scientific Interest have been identified and the owners of the woodland are aware of their locations. Management of these woodlands is carried out under woodland management plans which take into account the known needs of the lichen. Some baseline monitoring of the populations of the lichen in these sites has also been carried out.

Context in relation to other plans:

UK Species Action Plans

There is no UK Biodiversity Action Plan for *Lobaria amplissima*.

UK Contact Point and Lead Partner

None.

Local contacts

General Contact: John Hooson, National Trust, The Hollins, Grasmere, Cumbria. Phone: 015394 35599.

Species expert: Ivan Day, Wreay Farm, Shap, Penrith, CA10 3LB. Phone: 017683 61982.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to *Lobaria amplissima*:

Phase I

- upland oak woodland
- upland mixed ash woodland

Phase II

- parkland, wood pasture and veteran trees

References

Church, J. M. et al. (1996), *Red Data Books of Britain and Ireland: Lichens, Volume 1*: Britain. JNCC.

Broad Objective A		Determine the current status and distribution of <i>Lobaria amplissima</i> in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Confirm continued presence and extent of populations at known sites	1 Survey known sites and carry out baseline, or where appropriate, repeat monitoring at each.	EN, NT	M	RM	
	2 Produce a report on the current status of all known populations by 2002.	EN	M	RM	
2 Identify any new sites for the lichen in Cumbria	1 Carry out survey of any former and appropriate new sites by 2002.	EN, NT	M	RM	
Broad Objective B		Maintain and enhance populations of <i>Lobaria amplissima</i> in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Determine habitat requirements of the lichen in Cumbria	1 Gather together current information of species requirements by 2001.	EN, NT	S	RM	
	2 Carry out measurements of known site characteristics by 2002.	EN, NT	M	RM	
	3 Produce report summarising information by 2002.	EN, NT	M	RM	
2 Ensure that appropriate management is carried out at all sites to maintain existing populations	1 Circulate information on the location and management requirements of the species to all relevant organisations by 2002.	EN	M	A/SS	
	2 Provide advice to landowners on appropriate management, including grants such as Woodland Grant Scheme.	EN, FC	M	A	
	3 For each known site, draw up a series of recommendations for site management including a timetable for implementation based on existing knowledge by 2002.	EN	M	SS	
3 Seek to enhance populations at known sites	1 Draw up a report on the feasibility of extending populations of the lichen to new trees in existing sites by 2002 and implement any recommendations.	EN, NT	M	RM	

Broad Objective C	Increase public awareness of the impacts of air pollution on biodiversity				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Produce publicity material	1 Produce for a general audience an A4 glossy folded leaflet on the lichen and air pollution by 2002.	EN, NT, EA	M	CP	
	2 Launch leaflet with a lichens and air pollution event in Borrowdale with media.	EN, NT, EA	M	CP	

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

EA=Environment Agency; EN = English Nature; FC = Forestry Commission; LAs = Local Authorities; NT = National Trust.

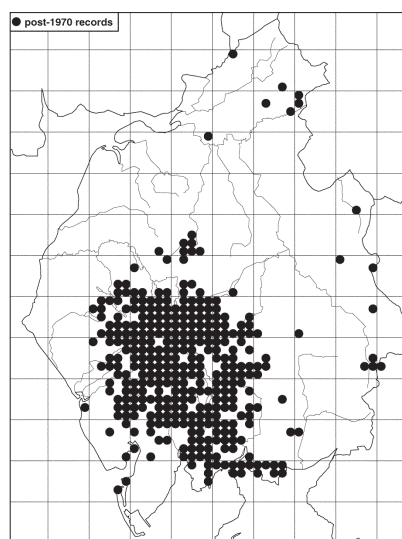
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Juniper

[*Juniperus communis*]



Many of the Juniper stands seen in Cumbria today may originate from periods in the 17th to 19th centuries, when there were declines in upland farming associated with booms in local mining industries. During these periods reduced upland grazing allowed juniper to colonise areas of hillside.

Current status

Juniper is one of three native species of conifer in Britain. It is divided into at least two sub-species, both of which occur in Cumbria. Sub-species *communis* ranges from a spreading shrub to erect tree, while sub-species *nana* is a procumbent matted shrub, largely restricted to high level crags, except in north-west Scotland. Juniper has two centres of distribution in Britain: the Highlands of Scotland, parts of Northern Ireland, northern England and North Wales; and on the chalk of southern England.

Juniper is widespread in the Lake District and south Cumbria. However, it is virtually unknown elsewhere in the County. In Cumbria juniper occurs on a variety of acidic igneous and metamorphic rocks as well as on the limestones around Morecambe Bay. In both situations juniper can form either dense stands or comprise areas of scattered bushes, which can be relatively extensive.

Records suggest that juniper suffered a 60% decline in its extent in Britain up to 1960. Figures from a recent study in Northumbria show an overall population decline of 30% between 1973 and 1994 with 16% of colonies lost altogether (Barrett 1997). The reasons behind this population decline appear to be poor regeneration associated with changes in land-use practice in the uplands, in particular the higher levels and continuous nature of sheep grazing currently practised. Grazing by rabbits is also likely to be a factor. Today it is likely that many stands are moribund and the long life-span of individual bushes (up to 200 years in northern England) accounts for the persistence of the species at many sites.

Legal protection

Juniperus communis formations on calcareous heaths or grasslands is listed on Annex I of the EU Habitats Directive 1992. In Cumbria, 12 Sites of Special Scientific Interest support juniper, seven of which fall within a candidate Special Area of Conservation for the above habitat. At least one National Nature Reserve supports juniper:

Relevant ecology/management requirements

Stands of juniper may represent a climatic climax vegetation on the higher fells where they may have occupied a transitional zone between the upper edge of woodland and various kinds of montane vegetation. In the Lake District, *Juniperus communis* sub-species *nana* occurs above the treeline as a component of the montane heath habitats that occur there. Lower down, juniper is likely to represent a stage in the succession to woodland which has been arrested by grazing.

Juniper is a light demanding plant, which rapidly declines and dies under a dense woodland cover.

The survival of juniper at lower levels is likely to have been affected by man harvesting the shrub for firewood and for use as bases for haystacks. In Teesdale, bushes were hand-cut and dragged out by pony and chain which may have provided suitable regeneration niches for seedlings, provided grazing levels were sufficiently low (Barrett, 1997).

Fluctuating levels of activity in the small mines of the Lake District and Pennines between 1600 and 1900 produced corresponding variations in the level of farming activity. These fluctuations may also have favoured the spread of juniper during this time by providing the periods of relaxed grazing which appear to be necessary to allow seedlings to establish and mature (Rodwell, 1991).

Today most existing juniper stands have an even age structure, so whole stands are likely to die out within a fairly short period of time as the individual bushes reach the end of their lifespan. These ageing populations also exhibit reduced seed viability.

With the decline of traditional harvesting of juniper and the maintenance of increasingly high grazing levels by sheep (but also rabbits) it is likely the survival of juniper stands may depend on their being fenced off from the surrounding grazing units. The establishment of new plants also appears to require bare ground, which could be provided by heavy stocking by cattle or ponies for a very short period of time or physical scarification by machinery depending on the nature of the site.

Current issues

- Excessive grazing by sheep and rabbits (and, possibly, deer), which prevents the establishment of young bushes and opens up and fragments stands.
- Reduced reproductive capacity of ageing populations.
- Decline in traditional management.

Current action

- English Nature has been studying the reproductive requirements of juniper in Upper Teesdale National Nature Reserve and has recently developed a Wildlife Enhancement Scheme which aims to maintain and extend the area and improve the quality of juniper habitats in the North Pennines.
- English Nature and the Lake District National Park Authority have included juniper in their joint mountain massif project for Helvellyn.
- Some Lake District Environmentally Sensitive Area scheme and the Countryside Stewardship scheme agreements include objectives for the enhancement of the juniper.
- The Forestry Commission in Cumbria owns and leases a number of sites which support stands of juniper. The Forest Enterprise Endangered Habitat Plan covering Limestone Pavement on Forestry Commission land also benefits stands of juniper through the removal of shading trees. Large areas of limestone pavement and limestone grassland are to be restored by conifer removal on a number of sites with juniper in south Cumbria.
- County Wildlife Sites may be designated due to the presence of stands of juniper. There is currently a programme of survey and identification of sites, which is due to be completed by 2005.
- A number of organisations across the County provide farm conservation advice and/or carry out practical management for nature conservation, which could benefit stands of juniper. These include the Arnsdale and Silverdale Countryside Management Service, Farming and Wildlife Advisory Group, East Cumbria Countryside Project and Cumbria Farm Link.

Context in relation to other plans:

UK Species Action Plans

There is a UK Biodiversity Action Plan for juniper in UK Biodiversity Group Tranche 2 Action Plans, Vol. III (1999), which sets the following UK objectives and targets:

- Maintain the present range and overall population size of juniper.
- Restore appropriate management to permit regeneration at all sites under direct conservation management, where the present condition of the population gives cause for concern.
- Maintain, or re-establish, populations at sites not under direct conservation management.
- Restore representative tree-line juniper populations.

UK Contact Point and Lead Partner

The UK Lead Partner for juniper is Plantlife, whose nominated officer is based at their London headquarters.

Local contacts

The Plants Focus Group of the Cumbria Biodiversity Partnership.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to juniper:

Phase I

- calcareous grassland
- limestone pavement
- upland heathland
- upland oak woodland

Phase II

- sub-montane and lowland natural rock-ledge, outcrop and scree
- montane heath and grassland
- montane rock ledge, outcrop and scree

References

Barrett, J., (1997), Regenerating Juniper. *Enact*, Vol. 5 Spring 1997. English Nature.
Rodwell, J. (1991), *British plant communities. Volume I Woodlands*. Cambridge.

Objectives, targets and proposed actions for juniper in Cumbria

Broad Objective A	Maintain the present range and population size of juniper in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Maintain current populations	1 Keep the extent of SSSI coverage under review and notify sites as necessary.	EN	O	PL
	2 Designate as Special Areas of Conservation all stands of juniper on heaths and calcareous grasslands which meet selection criteria as soon as is practicable.	DETR, EN	O	PL
	3 Carry out a review of the need to manage further key sites as National Nature Reserves by 2002.	EN	M	RM/SS
	4 Identify as Wildlife Sites important stands of juniper outside statutory sites, by 2005.	CWT	M	SS

Broad Objective B		Restore or enhance the viability of juniper in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Restore appropriate management to permit regeneration of all sites within SSSIs (where appropriate) and any site under direct conservation management by 2010. Expand stands where appropriate	1 Assess the condition of all juniper stands within SSSI using standard criteria by 2004.	EN	M	RM	
	2 Where possible, secure the uptake of positive management agreements with owners and occupiers of all SSSIs with stands of juniper by 2005, including the promotion of uptake of Woodland Grant Scheme.	EN MAFF, FC	M	SS	
	3 Establish at least two sites (one upland, one lowland) to demonstrate good management practice linking with land management schemes by 2000.	EN, MAFF	S	SS	
2 Restore appropriate management to permit regeneration of all stands over 5ha in extent outside SSSI or sites under direct conservation management by 2015. Expand stands where appropriate	1 Collate available information on the extent and condition of stands of juniper into a database and circulate widely in an agreed format (GIS/Recorder) by 2005 and consider the need for further survey.	EN	M	RM	
	2 Draw up management plans for each site over 5 ha setting out proposals for conservation management by 2006.	EN, NT, MAFF, FC LDNPA	M	SS	
	3 Ensure juniper is considered in the setting up of new agri-environment and Woodland Grant Scheme agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management.	MAFF, FC	O	PL/ SS	
	4 Provide advice on management and grants to owners and occupiers of Wildlife Sites with juniper stands, by 2008.	CWT	L	A/ SS	
3 Promote awareness and understanding and best management practice for juniper	1 Produce guidelines for the condition assessment and management of juniper by end 2001.	EN LDNPA, NT	S	RM	
	2 Carry out two demonstration days on the condition assessment and management of juniper by end 2002.	EN, MAFF NT, LDNPA, FC	S	A	

Broad Objective B **Restore or enhance the viability of juniper in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
4 Monitor changes in extent and condition of stands of juniper in order to assess the effectiveness of conservation action	I Develop a strategy for monitoring the achievement of targets by 2001.	EN	M	RM

Broad Objective C **Increase the extent of juniper in Cumbria**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Expand existing populations or restore or introduce juniper by the following extents (including expanding representative tree-line juniper populations in the Cumbria Fells and Dales to three sites) by 2015	I Identify appropriate sites that are suitable for re-creation of stands of juniper; and draw up a strategy for reintroduction by 2003.	EN LDNPA, NT, NWW	M	RM

Natural Area targets:

Cumbria Fells and Dales:

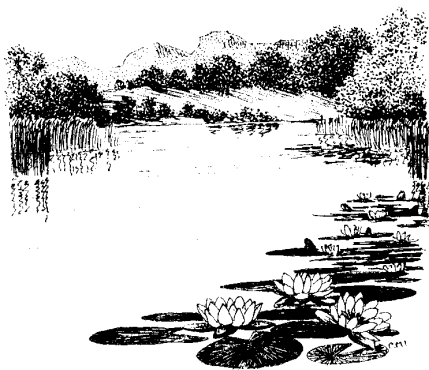
Cumbria High Fells	2 ha	North Pennines (Cumbria)	1 ha
South Cumbria Low Fells	1 ha	Yorkshire Dales (Cumbria)	1/2 ha
Morecambe Bay Limestones	1/2 ha	Border Uplands	1/2 ha
Howgill Fells	1 ha		

Key to Tables**Suggested organisational involvement:** Key Deliverers in bold type; Partners in plain type.

CA = Countryside Agency; CWT = Cumbria Wildlife Trust; DETR = Department of the Environment, Transport and the Regions; EA = Environment Agency; EN = English Nature; FC = Forestry Commission; LAs = Local Authorities; LDNP = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust; NWW=North West Water Ltd.; RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Mesotrophic Standing waters

Mesotrophic lakes are perhaps the most biologically diverse lake type found in Britain. Not only are they potentially very species-rich, but as a group, they support a higher proportion of nationally scarce and rare aquatic plants than any other lake type.

Current status

Lakes and tarns can be classified according to their nutrient status, especially phosphorus concentrations. Mesotrophic lakes and tarns have a naturally high concentration of nutrients. These water bodies support a much greater diversity of aquatic plants than more nutrient poor (oligotrophic) lakes and tarns. Every lake is unique in terms of its chemical and biological characteristics and, in Cumbria, some lakes show characteristics of both oligotrophic and mesotrophic conditions.

For the purposes of this plan, the mesotrophic lake habitat includes the wetlands associated with the transition from open water to terrestrial vegetation, the 'hydrosere'. This is an integral part of the nature conservation interest of lakes.

Mesotrophic lakes are relatively infrequent in the UK and are largely confined to the margins of upland areas in the north and west. Much of the UK resource of this habitat is located in Cumbria. Examples of lakes that are covered by this plan include: Bassenthwaite Lake, Elterwater, Loweswater,

Talkin Tarn, Brotherswater, Grasmere, Derwent Water, Haweswater, Thurstonfield Lough, Ullswater and Windermere. Many of these lakes are affected by adverse impacts, notably nutrient pollution and eutrophication. Indeed, the trophic status of a lake may move, depending upon inputs; Esthwaite Water, in the past classified as a mesotrophic lake, is currently eutrophic due to nutrient pollution.

There are 12 mesotrophic standing waters designated as Sites of Special Scientific Interest in Cumbria. Of these, two are candidate Special Areas of Conservation, one is a Wetland of International Importance under the Ramsar Convention and one a National Nature Reserve. Mesotrophic standing waters belong to the *oligotrophic to mesotrophic standing waters of plains to subalpine levels of the Continental and Alpine Region and mountain areas of other regions, with vegetation belonging to Littorelletea uniflorae and/or Isoeto-Nanojuncetea* habitat type listed in Annex I of the EC Habitats Directive. In addition, Bassenthwaite Lake and Windermere are both designated as sensitive areas under the EC Urban Waste Water Treatment Directive.

Characteristic wildlife

Mesotrophic lakes potentially have the highest macrophyte diversity of any lake type and a higher proportion of nationally scarce and rare aquatic plants. Within mesotrophic lakes there can be a number of different aquatic plant communities, depending on substrate, depth and exposure to wind-induced turbulence. Stony and exposed shorelines have shoreweed, water lobelia and quillwort. In sheltered bays with a more stable water column there can be, in addition, Nuttall's pondweed or Canadian pondweed, water-milfoil and a variety of broadleaved and fineleaved pondweed species. Areas of fine sediments around outflows and inflows can be dominated by stoneworts.

Macro-invertebrates (especially dragonflies, water beetles, stoneflies and mayflies) are well represented in mesotrophic lakes. These lakes can support both coarse fish such as pike or perch and salmonid fish species such as brown trout or Atlantic salmon, as well as being a feeding ground for lampreys and eels. Some mesotrophic lakes in Cumbria also support populations of Arctic charr and other rare fish such as vendace and schelly. Mesotrophic lakes are also important for breeding and wintering waterfowl, including mallard, widgeon, tufted duck, goldeneye and coot.

Key species

The following rare or threatened species are associated with mesotrophic standing waters in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

water vole	<i>Arvicola terrestris</i>	P
European otter	<i>Lutra lutra</i>	P
Daubenton's bat	<i>Myotis daubentonii</i>	C
reed bunting	<i>Emberiza schoeniclus</i>	P
natterjack toad	<i>Bufo calamita</i>	P
great crested newt	<i>Triturus cristatus</i>	P
vendace	<i>Coregonus albula</i>	P
schelly	<i>Coregonus lavaretus</i>	C
Arctic charr	<i>Salvelinus alpinus</i>	C
a reed beetle	<i>Donacia aquatica</i>	P
a water beetle	<i>Donacia impressa</i>	
a water beetle	<i>Macroplea appendiculata</i>	

a water beetle	<i>Notaris aethiops</i>	
variable damselfly	<i>Coenagrion pulchellum</i>	
downy emerald dragonfly	<i>Cordulia aenea</i>	
a mayfly	<i>Ameletus inopinatus</i>	
a mayfly	<i>Siphonurus lacustris</i>	
a caddisfly	<i>Cyrnus insolutus</i>	
a caddisfly	<i>Eretisma baltica</i>	
a caddisfly	<i>Setodes argentipunctellus</i>	
glutinous snail	<i>Myxas glutinosa</i>	P
Lilljeborg's whorl snail	<i>Vertigo lilljeborgi</i>	C
a stonefly	<i>Capnia bifrons</i>	
medicinal leech	<i>Hirudo medicinalis</i>	P
a moss	<i>Bryum cyclophyllum</i>	
lesser bearded stonewort	<i>Chara curta</i>	P
floating water-plantain	<i>Luronium natans</i>	P
slender naiad	<i>Najas flexilis</i>	P
pillwort	<i>Pilularia globulifera</i>	P
creeping spearwort	<i>Ranunculus reptans</i>	

Current issues

● **Nutrient enrichment.** Mesotrophic lakes are particularly vulnerable to increases in nutrient levels (eutrophication), which may lead to changes in the abundance and species composition of algae and other plants, and a loss of the conservation value of the lake.

Eutrophication is the most important issue affecting mesotrophic lakes in Cumbria. Severe eutrophication may also result in the deeper waters becoming depleted of oxygen, a condition which is detrimental to salmonid fish and vendace. Sources of excessive nutrient inputs can include sewage effluent, nutrient rich water running off adjacent agricultural or forested land, accidental spillages (for example, slurry), and fish farms. It is extremely difficult to reverse eutrophication in lakes, especially when phosphorus has built up in lake sediments, acting as a long-term nutrient 'reservoir' enriching the lake, particularly shallow lakes. Environment Agency is presently developing a strategy to address eutrophication problems.

● **Pollution from road run-off,** particularly after road-salting in winter, is a widespread threat, potentially affecting many Cumbrian mesotrophic lakes.

● **Pollution from industrial and other sources.**

Derwent Water is potentially threatened by re-mobilisation of heavy metals from the sediments, if the lake becomes more eutrophic. These metals are a legacy of historical mining in the area.

- **Groundwater contamination.** Contamination or nutrient enrichment of groundwater may affect some mesotrophic lakes, although more work is needed to investigate this.
 - **Water abstraction.** Excessively low water levels can affect the ecology of the lake, either directly (for example by threatening plants on the lake margins), or indirectly (for example by causing low flows in rivers feeding lakes and increasing the time taken to flush polluted water out of the lake).
 - **Changes in adjacent land use** (for example, ploughing of land, land drainage, intense grazing, afforestation). Such changes can increase the risk of soil erosion, with a consequent increase in waterborne sediments which may affect nutrient status. The increased turbidity caused by these sediments may also reduce the amount of light available to aquatic plants.
 - **Fishery management.** Introductions of fish to lakes can alter the natural integrity of mesotrophic lakes in a variety of ways. They can affect populations of native species through competition and can alter the structure of food webs within the lake, this in turn affecting other plants and animals.
 - **Accidental or deliberate introduction of alien plant species.** Introductions can impact on the native flora, particularly with invasive species such as New Zealand pigmyweed/Australian swamp stonecrop that are able to grow in a wide range of habitats and conditions. There are four Cumbrian records of this species, including Bassenthwaite Lake and Derwent Water.
 - **Recreation.** Water-borne traffic can suppress growth of aquatic plant communities (either by direct physical damage to the plants or by causing increased turbidity), and may favour increased growth of algae through mobilisation of nutrients in lakebed sediments. Recreation can also disturb wintering and breeding bird populations.
 - **Damage to marginal vegetation.** Natural lake hydrosere are often substantially modified or eliminated by agriculture and lakeside developments.
- further nature conservation. These are set out in the Land Drainage Act 1991 and the Environment Act 1995. The Environment Agency also has statutory responsibilities for pollution control.
- **Management.** Individual management plans exist for several of the larger lakes, for example Bassenthwaite Lake and Windermere. Specific issues on individual lakes are also highlighted in the appropriate Local Environment Agency Plan (LEAP). The Environment Agency is currently preparing a business plan to provide a strategic overview of still waters within Cumbria, including mesotrophic lakes. Nationally, the Environment Agency has published a proposed management strategy for the control of eutrophication in England and Wales. The newly-established Still Waters Partnership, comprising EA, LDNPA, EN, NT, NWW, FBA and CEH, aims to protect or enhance the Lake District's internationally important resource of still waters by promoting sustainable management and use of these waters and their catchments.
 - **Current knowledge of the sites.** There is a large body of survey data and other research for most Cumbrian mesotrophic lakes, and in some cases data extend back for many years. This includes data from surveys of water chemistry, algae and macrophytes.
 - **Ongoing and planned investigations.** A wide range of monitoring and other studies is in place or planned by EN, EA, LDNPA, NWW and CEH. EA is currently developing classification schemes for lakes, based on chemical, biological and hydrological parameters. Several of the Cumbrian mesotrophic lakes have been included in the development of these schemes.
 - **Nutrient control.** In Cumbria, phosphorus reduction measures are in place at some sewage treatment works discharging into the catchments of Bassenthwaite Lake, Esthwaite Water and Windermere. Investigations into the nutrient dynamics of Esthwaite Water and Bassenthwaite Lake are continuing to assess the relative input of nutrients from different sources and to determine the significance of internal recycling in these relatively shallow lakes.
 - **Publicity.** The UK Steering Group for mesotrophic lakes is preparing an interim report, which will include reference to the 'flagship' sites within the UK, which include Bassenthwaite Lake.

Current action

- **Regulatory framework.** In carrying out their functions, the Environment Agency, water companies, Internal Drainage Bodies and local authorities have certain statutory duties to

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for mesotrophic lakes in *Biodiversity: the UK Steering Group Report* (1995), to which the UK Steering Group for mesotrophic lakes has proposed minor modifications. The modified plan sets out the following national objectives and targets:

- * Maintain the characteristic ecology of mesotrophic lakes.
- * Identify and implement effective remedial action to address impacts which damage, or threaten to damage, current mesotrophic lakes.
- * Identify and implement effective action, where appropriate, to restore the characteristic ecology of former mesotrophic lakes.

National Lead Agency

The national lead agency for mesotrophic lakes is the Scottish Environment Protection Agency, whose nominated officers is based at SEPA East Region in Edinburgh.

Local contacts

Allan Stewart represents English Nature (01539 792800) on the UK Steering Group for mesotrophic lakes.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to mesotrophic standing waters:

Phase I

- vendace
- water vole
- rivers and streams
- reedbed
- wet woodland

Phase II

- schelly
- Atlantic salmon
- medicinal leech
- pillwort
- oligotrophic standing waters
- standing waters on marl

References

Palmer M. (1989) A botanical classification of standing waters in Great Britain and a method for the use of macrophyte flora in assessing changes in water quality. *Research & Survey in Nature Conservation* **19**. Nature Conservancy Council, Peterborough.

Objectives, targets and proposed actions for mesotrophic standing waters in Cumbria

Broad Objective A		Maintain the characteristic ecology of mesotrophic lakes in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Confirm current status and extent of resource	1 Complete inventory of mesotrophic lakes in Cumbria by end of 2000.	LDSWP, CWT	S	RM
	2 Identify the lakes where more information is required to confirm current status, and agree a plan to gather this information by end of 2000.	LDSWP, CWT	S	RM

Broad Objective A		Maintain the characteristic ecology of mesotrophic lakes in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
2 Maintain favourable condition of mesotrophic lake SSSIs and cSACs	1 Complete conservation objectives for mesotrophic lake SSSIs by 2001.	EN	S	PL	
	2 Ensure that all SSSI mesotrophic lakes have a site management plan implemented by 2005, taking full account of all impacts.	LDSWP	M	PL/SS	
	3 Continue to offer long-term management agreements to protect mesotrophic lake SSSIs where appropriate.	EN	O	SS	
	4 Review existing consents affecting the mesotrophic lake candidate SACs by 2002.	EA, EN	M	SS	
3 Ensure planning and environmental legislative mechanisms protect the existing status of mesotrophic lakes	1 Establish water quality objectives and associated nutrient standards appropriate for mesotrophic lakes in Cumbria by 2005 and aim to meet targets by 2010.	LDSWP, DCs	M/L	PL/SS	
	2 Ensure new abstractions and discharges do not cause further deterioration of mesotrophic lakes.	EA, NWW	O	SS	
	3 Incorporate policies in Development Plans which seek to ensure that developments and land drainage operations do not result in further deterioration of mesotrophic lakes.	LAs, EA, EN	O	SS	
	4 Where relevant for mesotrophic lakes, all new forest design plans and woodland grant schemes to include provisions to prevent adverse impacts on mesotrophic lakes in the catchment.	FC, FE	O	SS	
	5 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including mesotrophic standing waters, by 2006.	CWT, LAs	L	SS	
	6 Promote the use of best practice management techniques for mesotrophic lakes and their catchments.	LDSWP, CWT, LAs, MAFF, ECCP	O	CP/A	

Broad Objective B Identify and implement effective remedial action to address impacts on current mesotrophic lakes in Cumbria and to restore, where appropriate, former mesotrophic lakes

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Identify current threats and agree plan of action for rehabilitation of impacted mesotrophic lakes	1 Identify current threats and agree a priority list of mesotrophic lakes requiring restoration measures. By 2004.	LD SWP, CWT	M	RM/PL
	2 Identify the lakes requiring further investigation by 2004.	LD SWP, CWT	M	RM
	3 Implement restoration measures for above lakes by 2005.	LD SWP, CWT, Eden Rivers Trust	M/L	SS
2 Reduce the threat posed by alien plant species	1 Consider options for control of <i>Crassula helmsii</i> by 2002.	LD SWP	M	SP
3 Reduce the threat of damage by fisheries activities	1 Review appropriate fisheries management policy for those SSSI lakes affected by fisheries related impacts, and implement species management plans to prevent the further spread of problem species by 2005.	EA, EN, NT	M	RM/SP

Broad Objective C Increase awareness and understanding of the conservation of lakes and their wildlife value

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Disseminate information on mesotrophic lakes	1 Circulate UK BAP Steering Group leaflet on mesotrophic lakes.	EN, EA	S/O	CP
	2 Prepare and publish the story of the improvement of the aquatic environment of Windermere, by 2001.	LD SWP	S	CP

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CEH = Centre for Ecology and Hydrology; CWT = Cumbria Wildlife Trust; DCs=District Councils; EA = Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; FE = Forest Enterprise; LDNPA = Lake District National Park Authority; LAs = Local Authorities; LDSWP=Lake District Still Waters Partnership; NT = National Trust; NWW = North West Water Limited.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Rivers and Streams

River channels and banks have been highly modified by man throughout England. However, in Cumbria a high proportion of rivers have semi-natural features, and many river corridors retain a significant degree of naturalness. This makes Cumbrian rivers of considerable national importance.

Current status

Rivers and streams are dynamic systems which, in their natural state, continually modify their form. They have a diverse range of features, such as riffles, shingle banks and pools, which each support a diverse range of plant and animal species. These channel features are complemented by bank features, such as earth or rock cliffs, stands of reeds, woodland or herb-rich grasslands. The nature of individual rivers changes along their length, with small, fast-flowing upland streams developing into broad, slow moving, meandering rivers in their lower reaches. The water chemistry of rivers also varies considerably and is often dictated by the geology underlying the catchment. River water chemistry also changes along the length of the river as both the underlying geology changes and as the nature of natural and man-made inputs change. The nutrient status and physical structure of the river are the main determinants of river habitat quality. The key feature of rivers and streams is the role of fluvial processes (such as sediment transport, deposition and flooding) in influencing river habitats and maintaining diversity. Conservation of rivers

and streams should aim to allow these processes to shape river and floodplain habitats.

Although there are few examples of pristine river systems in England, a high proportion of Cumbrian rivers are considered semi-natural, with characteristic bed, channel and bank features. There are also many river corridors in Cumbria which retain a significant degree of naturalness, with a diverse range of adjacent habitats. Examples include the Brathay between Elterwater and Lake Windermere, River Irthing upstream of Brampton, River Eden through Eden Gorge, the River Duddon, River Lune at Killington, Rawthey above Sedbergh and the Dee above Dent.

Man's activities can be seen to varying degrees on many Cumbrian rivers. Flood defence works, canalisation and removal of riparian habitats have restricted some rivers, reducing the natural processes of erosion and deposition with a resulting reduction in natural new habitat creation/formation. Despite the modifications many of these rivers still support a number of important biodiversity species such as otter.

Riparian habitats such as woodland, grassland, tall herb and fen, marsh and wet woodland are important features within Cumbrian river corridors. The presence of these habitats within the corridor significantly contributes to the nature conservation interest of rivers. Where man's influence has reduced or replaced these habitats eg. intensive grazing, there is generally a corresponding reduction in conservation interest.

624 km of Cumbria's rivers have been designated as Sites of Special Scientific Interest. This is around half the total length of river SSSI designated nationally. The four river SSSI in Cumbria are also candidate Special Areas of Conservation designated under the EU Habitats Directive.

Characteristic wildlife

Most rivers in Cumbria exhibit a range of river types, from their source to sea. This is because of the diversity of topography and geology in Cumbria. However, the extent of the above features varies between rivers. The mountain streams are relatively impoverished in vascular plants but are rich in low growing bryophytes anchored to rocks and boulders. Within these streams there are macro-invertebrates amongst the stones and cobbles, providing food for dippers and salmonids. In the Lake District, many of these mountain streams have highly dynamic channels caused by severe flash floods after rainstorms. Conversely, they may also dry up in summer droughts. Pennine mountain streams have perhaps more stable flow regimes, as the extensive peatlands on the Pennines and the limestone and sandstone geology buffer against extremes of runoff.

At lower altitudes the streams and rivers have more stable flow regimes and, importantly, their gravel and stony beds are more stable. Also, in backwaters and quieter stretches, sediments can settle to form silt beds. Usually the first sign of a more stable flow regime is the appearance of the moss *Fontinalis* on submerged rocks and stones. There may also be aquatic plants such as water crowfoots and water-milfoil. Streams running off limestone or other, mineral-rich rocks may have a more diverse aquatic flora with, for example, curled pondweed, opposite-leaved pondweed, watercress and water mint.

In these small streams much of the animal life of the river lives under the relatively stable bed of stones and gravels. Here, there will be macro-invertebrates, the roots and anchoring points of aquatic plants, smaller fish and, in gravels, the spawning beds of fish like salmonids and lampreys. Apart from young salmon and trout, other fish species found in Cumbrian streams include bullhead, minnows, eels and stone loaches. In calcium-rich streams, such as on the Kent and upper Eden catchments, white-clawed crayfish are also found. These smaller streams are used by dippers, grey wagtails, kingfishers and, in places, otters and water voles. A few of the oligotrophic streams and rivers in Cumbria still have populations of the rare freshwater pearl mussel.

Further downstream there is much greater development of channel width and depth. On floodplains, the river may meander, with extensive development of silt deposition and in-channel features such as islands and shingle bars. Lowland and floodplain rivers may retain many of the habitats and species found in the higher reaches, particularly fish and birds. However, in addition, the aquatic plant flora can be much more diverse, with pondweeds, emergent species, such as flowering rush, and extensive beds of water crowfoot. Backwaters and cut-off channels may have an aquatic flora similar to ponds with, for example, water plantain, unbranched bur-reed, iris and lesser pond-sedge. Juvenile lampreys live in the silt beds of quieter reaches whilst the adults make use of the gravel beds for spawning. Birds include common sandpipers, goosanders and, wherever there are earth banks, sand martins.

The floodplain wetlands of the Irthing and a few other rivers in Cumbria include riparian habitats of sedge-swamp, reedswamp and alder or willow woodland. The latter can include bay, crack and purple willows as well as grey and goat willow.

On some rivers, such as the Eden, Derwent and the Lune, there are extensive gravel banks adjacent to the channel. These are an important habitat for specialised invertebrates, particularly certain rare species of ground beetle. The invertebrate populations on these habitats are also an important food source for riverside birds.

Key species

The following rare or threatened species are associated with rivers and streams in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

water vole	<i>Arvicola terrestris</i>	P
European otter	<i>Lutra lutra</i>	P
Daubenton's bat	<i>Myotis daubentonii</i>	C
Natterer's bat	<i>Myotis nattereri</i>	C
noctule	<i>Nyctalus noctula</i>	C
common pipistrelle	<i>Pipistrellus pipistrellus</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
yellow wagtail	<i>Motacilla flava</i>	C
allis shad	<i>Alosa alosa</i>	P
twait shad	<i>Alosa fallax</i>	P
bullhead	<i>Cottus gobio</i>	C
river lamprey	<i>Lampetra fluviatilis</i>	C
brook lamprey	<i>Lampetra planeri</i>	C
sea lamprey	<i>Petromyzon marinus</i>	C
Atlantic salmon	<i>Salmo salar</i>	C
grayling	<i>Thymallus thymallus</i>	C
giant lacewing	<i>Osmylus fulvicephalus</i>	
a lacewing	<i>Sisyra dalii</i>	
a mayfly	<i>Siphonurus lacustris</i>	
a caddisfly	<i>Eretsis baltica</i>	
a caddisfly	<i>Glossosoma intermedium</i>	C
a caddisfly	<i>Hydroptila tigrina</i>	
a caddisfly	<i>Ithytrichia clavata</i>	C
a stiletto fly	<i>Spiriverpa (=Thereva) lunulata</i>	P
a stiletto fly	<i>Chorisima/Psilocephala rustica</i>	P
a crane fly	<i>Gonomyia (Idiocera) punctata</i>	
a hoverfly	<i>Parasyrphus nigritarsis</i>	C
a rove beetle	<i>Carpelimus schneideri</i>	
a ground beetle	<i>Dyschirius angustatus</i>	P
a water beetle	<i>Hydraena pulchella</i>	
a water beetle	<i>Hydraena pygmaea</i>	
a water beetle	<i>Hydroporus rufifrons</i>	P
a rove beetle	<i>Thinobius newberyi</i>	P
a syncarid crustacean	<i>Antrobathynella stammeri</i>	
white-clawed crayfish	<i>Austropotamobius pallipes</i>	P
banded demoiselle	<i>Calopteryx splendens</i>	
beautiful demoiselle	<i>Calopteryx virgo</i>	
netted carpet moth	<i>Eustroma reticulata</i>	P
a bug	<i>Saldula fucicola</i>	
freshwater pearl mussel	<i>Margaritifera margaritifera</i>	P
Lilljeborg's whorl snail	<i>Vertigo lilljeborgi</i>	C

river jelly lichen	<i>Collema dichotomum</i>	P
a liverwort	<i>Lophocolea fragrans</i>	
a liverwort	<i>Porella pinnata</i>	
a liverwort	<i>Radula voluta</i>	C
a moss	<i>Fissidens exiguus</i>	P
a moss	<i>Orthotrichum sprucei</i>	P
floating water-plantain	<i>Luronium natans</i>	P

Best management practice

Best practice has developed from the acknowledgement that river management has to be addressed in a more holistic manner; not a site by site basis, taking account of catchment influences on the river.

Recognition of the role of fluvial processes in creating sustainable river habitats and the link between the river and floodplain is growing. In addition, the importance of the natural functions of floodplains, for example flood and sediment storage, are being recognised. Consequently, opportunities for river restoration and rehabilitation must not be overlooked both in terms of engineering and wildlife benefits. They not only offer the opportunity to reverse past damage but may also reduce costly levels of maintenance. EA sponsored a PhD study (author: Harriet Orr) on fluvial processes in the Lune, which is now available. It identified physical factors and land-use factors which determine how the catchment functions, and gives valuable management information.

Current issues

Channel and bankside management

- Intensive grazing up to the river's edge leads to the loss of natural riparian habitat and results in bank instability and increased erosion/ sedimentation and widening of channels
- Inappropriate or insensitive bankside maintenance can lead to a direct loss of wildlife habitat and have damaging impacts on the river geomorphology, e.g. transferring energy downstream to the next erodible bank where more damage is caused.
- In-channel works such as gravel removal can affect fish spawning and nursery sites and invertebrate habitat, with loss of natural channel features. Removal (or addition) of large quantities of sediment also has adverse effects on the river geomorphology leading to increased erosion.

- Culverting of watercourses which effectively results in the loss of all wildlife interest.
- Spread of invasive and non-native plant species such as Japanese knotweed, Himalayan balsam, giant hogweed and other pernicious weeds.

Pollution

- Nutrient enrichment of rivers can lead to excessive algal and plant growth, changes in the plant and animal community and can deplete dissolved oxygen levels locally. These nutrients arise from a variety of sources, both specific and diffuse. Specific point sources include effluents from sewage treatment works and storm discharges, whilst diffuse sources would include agricultural run-off arising from catchment-wide high input (fertiliser and slurry) farming practices. Groundwater sources feeding into rivers and streams may become polluted by leakage from wastewater facilities and farm runoff.
- Toxic pollution can be detrimental to all aquatic life. This arises from a number of sources including industrial discharges, mining (operational and abandoned) and atmospheric fallout (acid rain etc).
- Contamination by synthetic pyrethroid sheep dips can devastate river invertebrate populations.

Catchment Land Use

- Alteration of the flow regime of a river, such as the regulated flow downstream of a reservoir, can have significant impact. Such rivers have their spate characteristics modified and cease to naturally evolve geomorphologically.
- Intensification of agriculture arising from past land drainage improvements have reduced habitat diversity within river flood plains. Wet grassland and wet woodlands have been replaced by improved pasture. Loss of such habitats and the improved drainage also results in faster movement of water into rivers, increasing the potential for flooding and low summer flows.
- Development within the catchment such as roads, car parks and housing may reduce the potential of what was a permeable medium to absorb rain water, thereby increasing run off from the catchment and resulting in higher flood discharges.
- Development on flood plains reduce their natural flood capacity, resulting in higher flood discharges downstream.

- Intensive fish farming/rearing, leading to potential problems of water quality and quantity and the possible escape of non-native species or genetic strains.

Disturbance

- High and increasing use of rivers as areas for recreation, leading to problems of bank erosion, litter and disturbance to wildlife.

Alteration of Hydrology

- Water abstraction from ground water and surface water sources can reduce flows and are particularly significant during periods of drought. This can affect the ability of the river to support wildlife, particularly species requiring high levels of dissolved oxygen and low temperatures.
- Reduction of groundwater and surface water levels, due to agricultural drainage (occasionally pumped), modifying flood plain wetlands and reducing their extent.

Current action

Legislation

- The soon-to-be-adopted Water Framework Directive is the most significant piece of European water legislation for over 20 years. It aims to present a coherent legislative framework for the protection and improvement of the water environment, taking an holistic approach to water management, including whole river basin management. It applies to all waters (including both ground- and surface-waters), utilises ecological and chemical standards and aims to involve the public as well as Agencies and organisations in the management of river basins. Its implications for current management/ regulatory systems remain to be determined.

Channel and bankside management

- English Nature and the Environment Agency have produced conservation strategies and consenting protocols for the Eden and tributaries, Derwent and tributaries, and Ehen SSSIs
- The Environment Agency is supporting Farming and Wildlife Advisory Group and, through them, promoting the importance of farming practice on the health of our rivers. The Sustainable Rivers Project has centred on the Ehen and now on the Ellen in Cumbria. It aims to enhance and restore parts of the landscape and river, through advice

and financial support (from available grants) for managing land in a way which is sensitive to the environment, while remaining realistic and productive.

- The Eden Rivers Trust is providing advice and grants to achieve sustainable management of the Eden and its tributaries as a fishery and a wildlife resource.
- English Nature is providing management agreements and grants for habitat improvements on the Rivers Eden and Derwent. This is in partnership with river trusts and, on the Derwent, with the Lake District National Park Authority.
- The Calder Conservancy Committee is a partnership between British Nuclear Fuels Ltd, Environment Agency, angling and riparian interests. It has been set up following a fish kill in 1997 caused by a British Nuclear Fuels Ltd sourced pollution. The committee is managing a British Nuclear Fuels Ltd funded study into the apparent declines of migratory fish runs.
- The West Cumberland Rivers Foundation is investigating habitat conditions on selected west Cumbrian rivers, notably the River Irt.
- The Lune Habitat Group undertakes work to restore and enhance bankside habitats. They have identified 120 km of bankside for enhancement work in the Lune system.
- The Environment Agency is funding a project into the feasibility of re-naturalising certain rivers in south Cumbria. Ways will be examined of improving the habitat on two pilot rivers, the Winster and Rusland Pool. The crux of the project is to demonstrate the impact that such proposals may have on flooding susceptibility.
- The Environment Agency has been working on, and is about to implement, a national policy regarding culverts. The Environment Agency is generally opposed to the culverting of watercourses because of the adverse ecological, flood defence and other effects likely to arise. The policy has a presumption against culverting unless there is no reasonably practicable alternative or if the detrimental effects would be so minor that they would not justify a more costly alternative.
- A LIFE Nature Project "Safeguarding Natura 2000 Rivers in the UK" is jointly proposed by the UK conservation and environmental protection agencies. If the application to the EU is successful this will be a 4½ year project to develop

management schemes for selected river cSACs, including the River Eden. There will also be a number of topic based projects looking at fisheries management, techniques for silt management, habitat restoration and enhancing species. The latter includes freshwater pearl mussel and white-clawed crayfish, both found in Cumbrian rivers.

- Invasive weed control programmes with the aim of eradicating giant hogweed on the Eden and Kent catchments are undertaken annually by the Environment Agency.
- The National Trust has commissioned a scoping study into river management and restoration options for a number of rivers in its ownership.

Pollution

- The Environment Agency undertakes an ongoing programme of water quality monitoring which underpins its statutory pollution control duties. This includes strategic surveys of river invertebrates and chemical water quality, reactive surveys in response to pollution incidents and more specialised surveys to investigate or target particular water quality problems.
- The Environment Agency has raised awareness of the synthetic pyrethroid sheep dip problem within the County. It has instigated a series of targeted catchment campaigns to monitor the problem and produced risk assessments of all dipping facilities within these vulnerable catchments (Derwent, Lowther, Caldew and Kent). Further improvements to the situation should come with the implementation of the Groundwater Regulations 1998 and a code of practice for dipping operations has been produced. In 1999 a survey was conducted for sheep dip pollution in the Lune catchment; no Cumbrian sites were found to be polluted.
- The Environment Agency and Cumbria County Council have collaborated to create a trial artificial wetland on the river Keekle to treat minewater discharge from a coal spoil tip.

Catchment land use

- Local Environment Agency Plans (LEAPs) produced by the Environment Agency (formerly called Catchment Management Plans). Five plans cover Cumbria and these will be complete by 2000. LEAPs cover all aspects of the Agency's work and detail the present status, uses and issues in each catchment in the county, and set

targets for improvements and enhancements over a five year period.

- Ministry of Agriculture, Fisheries and Food agri-environment schemes contribute to the protection and enhancement of rivers. Countryside Stewardship agreements are offered in targeted areas, under the Waterside Landscape option. Environmentally Sensitive Areas agreements, although in Cumbria not targeted specifically at rivers, have benefits to them by promoting low input agriculture to land bordering watercourses and stock exclusion to meet specific biodiversity objectives.
- Local Authorities are including river corridor protection policies in their Local Plans.
- A review of consents is being undertaken by the Environment Agency within the Ehen, Eden and tributaries and Derwent and tributaries cSACs, under the Habitats Regulations 1994.
- The Moorland Objective 5b scheme for the North Pennines includes a number of prescriptions which may indirectly benefit rivers on the Cumbrian side of the Pennines. This includes winter housing of sheep and drain blocking.

Alteration of hydrology

- North West Water Ltd and the EA have collaborated on the Gelt to construct a fish pass, giving migratory fish re-access to the New Water tributary of the Gelt. The Gelt is also an AMP3 low flow project and flows in the New Water tributary are to be improved as a consequence of this.
- The Environment Agency is funding a project to provide River Flow Objectives for the River Ehen. This is a detailed investigation into the likely effects of different flow regimes on the river's water quality, ecology and fishery. It will allow informed decisions to be made in relation to water abstraction within the catchment. On the River Liza upstream of Ennerdale Water; a pipe bridge is being removed to aid migration of salmonids.
- There is ongoing work between the Environment Agency and North West Water Ltd on ecological mitigation works in the Lowther catchment. This has resulted in the submission of a re-designed intake and screening regime on Cawdale Beck.
- Augmentation water from the Haweswater Shap Aqueduct goes into the Lune via Crookdale then Borrow Beck, to support water abstraction from

Forge Weir (Lancs.). The facility is only used occasionally, and an ecological survey of its impact was commissioned by NWW.

- The Environment Agency has instigated a drought-related project to identify information requirements to effectively address future drought order applications on those catchments identified by North West Water Ltd as the most likely candidates.
- The Environment Agency are involved with North West Water Ltd and District Councils in the design and promotion of Sustainable Urban Drainage Systems. These can provide enhancement by creating habitats, controlling discharge rates to watercourses to prevent flooding and providing opportunity for limited biological treatment to improve water quality from urban area run-off. A pilot project is being created on a new housing development in South Lakeland District.
- Policies in Local Plans include those for the prevention of development in river floodplains.

Interpretation and awareness

- East Cumbria Countryside Project is planning an extensive interpretation strategy based on the river Eden and its adjacent landscape. The programme will facilitate, in close collaboration with the other agencies and resident communities, an environmental experience for quiet recreation, which embraces and raises awareness of conservation.

Context in relation to other plans:

UK Habitat Action Plans

Biodiversity: The UK Steering Group Report (1995) contains a habitat statement for rivers and streams, which gives the following conservation direction: Maintain and improve the quality, state and structure of all UK rivers and streams and their associated floodplains. Restore degraded rivers and streams taking account of water quality and quantity, structure and hydraulic connection with the floodplain.

National Lead Agency

None.

Local contacts

Environment Agency - Steve Garner. Phone: 01768 866666

English Nature - Allan Stewart. Phone: 01539 792800

Associated plans in the Cumbria BAP

The following Cumbria species and habitat action plans are of relevance to rivers and streams:

Phase I

- water vole
- bats
- barn owl
- great crested newt
- vendace
- *Hydroporus rufifrons* (a water beetle)

- marsh fritillary
- *Glossosoma intermedium* (a caddis fly)
- netted carpet moth
- wet woodland
- reedbed
- mesotrophic standing waters

Phase II

- schelly
- Atlantic salmon
- white-clawed crayfish
- freshwater pearl mussel
- invertebrates of exposed river shingle
- river jelly lichen
- coastal and flood plain grazing marsh
- valley mires
- oligotrophic lakes

Objectives, targets and proposed actions for rivers and streams in Cumbria

Broad Objective A		Maintain the quality of existing natural channels, flood plain features and dependent wildlife			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Ensure appropriate representation of rivers and streams, their wildlife and natural features in statutory and non-statutory sites eg SSSIs, Wildlife Sites, RIGS	1 Complete designation of sites of National importance as SSSI by 2002.	EN	M	SS	
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites. Agree criteria for rivers and streams and implement by 2010.	CWT, LAs	M	SS	
	3 Review & designate sites of county importance for geological and geomorphological interest by 2002.	RIGS group	M	SS	
2 Ensure that planning and legislation systems protect rivers and streams	1 Seek to ensure that Local Authority Development Plans contain policies that do not allow development that would significantly damage river corridors and associated flood plains.	LAs, EA EN, CWT	M	SS	

Broad Objective A		Maintain the quality of existing natural channels, flood plain features and dependent wildlife		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	2 No new Agency works undertaken, or third party applications (land drainage consents) consented which significantly damage river corridors and associated floodplains.	EA	O	SS
Broad Objective B		Protect, maintain and wherever appropriate improve river and stream water quality		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Maintain and enhance the water quality of Cumbria's rivers to defined standards	1 Seek to ensure that all river ecosystem quality standards are maintained.	EA	O	SS
	2 Seek to ensure that all rivers and streams in Cumbria meet EU Directives in terms of designation and / or water quality.	EA	O	SS
	3 Seek to ensure that all discharges and trade effluent meet consent standards.	EA, Dischargers	O	SS
	4 Develop appropriate biological quality objectives for Cumbria's rivers.	EA	M	RM/PL
	5 Review the discharge consents potentially impacting upon the cSAC rivers by 2004.	EA, EN	S/M	SS
	6 Undertake catchment surveys / campaigns on appropriate rivers re sheep dip pollution.	EA	O	RM
	7 Implement APM3 agreements for water quality improvements, including phosphate stripping at Penrith, Cockermouth and Cleator Moor STWs by 2005.	NWW	M	SS

Broad Objective C		Protect, maintain and wherever appropriate improve river and stream flows			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Ensure future drought events are managed effectively, whilst not compromising river dependent wildlife and ecology	1 Complete Area drought management plan enabling a strategic approach to future drought episodes by 2000.	EA, NWW	S	PL	
	2 Ensure effective leakage control, demand management and other ways of minimising wastage of water supplies.	NWW, EA, OFWAT	O	SS	
2 Ensure that current and future water abstractions do not compromise river dependent wildlife and ecology	1 Review the abstraction licences potentially impacting upon cSAC rivers by 2004.	EA, EN	M	SS	
	2 Investigate river flow objectives for the River Ehen by 2000.	EA	S	PL/SS	
	3 Produce abstraction management strategies for all river catchments in Cumbria by 2005.	EA	M	PL/SS	
Broad Objective D		Enhance degraded river channels, flood plain features and dependent wildlife			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Progress towards the sustainable management of Cumbria's rivers, which benefit river dependent wildlife and ecology	1 Continue with the sustainable rivers project until 2001.	EA, FWAG	S/M	SS	
	2 Target Countryside Stewardship to enhance riparian corridors.	MAFF	O	SS	
	3 Influence MAFF in the revision of ESA prescriptions to maximise the positive benefit to river corridors in ESA prescriptions.	EN, LDNPA	O	PL	
	4 Implement riparian habitat improvements. Target is to restore riparian habitats on at least 15km of river each year for next ten years.	ERT, CRF, EN, EA, NT, AAs, LDNPA, FWAG, FC, MAFF, ECCP	O	SS	

Broad Objective D		Enhance degraded river channels, flood plain features and dependent wildlife			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
2 Increase local habitat diversity within flood plains	1 Identify suitable sites for 2-3 large new wet woodlands (each >25ha) by 2005.	FC, EA, EN, CWT, NWW, NT, LDNPA, CB, ECCP.	M	RM/SS	
	2 Identify areas where restoration and creation of lowland wet grassland and reedbed could be targeted in Cumbria by 2000, and draw up strategy for implementation by 2002.	RSPB, EA, EN, CWT, FWAG	S/M	RM/SS	
	3 Complete at least one river/floodplain restoration project by 2010.	EA, NT, CWT, EN, LDNPA, ERT	L	SS	
Broad Objective E		Promote a wider awareness, understanding and appreciation of rivers and streams, their conservation needs and their sustainable use			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Improve our knowledge of rivers and streams, to inform their sustainable planning, management and use	1 Develop and implement a GIS system to hold information about rivers in the County, compatible with partner organisations by 2001.	EA, EN	O	RM	
	2 Implement joint working agreement between Cumbria Biological Data Network members regarding the sharing of ecological information relevant to rivers and streams by 2000.	CBDN members	S	RM	
2 Promote sustainable river management in the County	1 Establish a forum of agencies and organisations, the aim of which is to establish best practice and, ultimately, co-ordinate effort towards achieving a more unified management of rivers and their catchments within the County. Establish by 2001.	EA, EN, FWAG, LDNPA, MAFF, ERT, CRF, NT, RSPB, CWT	M	A	

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

AAs=Angling Associations; BNFL = British Nuclear Fuels Ltd; CB = Cumbria Broadleaves; CBDN = Cumbria Biological Data Network; CCC = Cumbria County Council; CRF = Cumberland Rivers Foundation; CWT = Cumbria Wildlife Trust; EA = Environment Agency; ECCP = East Cumbria Countryside Project; EN = English Nature; ERT = Eden Rivers Trust; FC = Forestry Commission; FE = Forest Enterprise ; FWAG = Farming and Wildlife Advisory Group; LDNP = Lake District National Park; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust; NWW = North West Water; RIGS group = Regionally Important Geological Sites group; RSPB = Royal Society for the Protection of Birds; STW = sewage treatment works.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Cities, Towns and Villages

A number of species more-or-less exclusively nest or roost on or in buildings, including swifts, swallows, house martins and several species of bat.

Current status

Around 2.6% of Cumbria is classed as “built up”, representing around 18,000ha. The built up land is mainly associated with urban development around coastal ports, old mining areas and distribution centres such as Carlisle and Kendal. In addition there are small towns and villages scattered throughout the county.

Wildlife in cities, towns and villages is extremely important. It is where the majority of people encounter wildlife, either around their home, or while travelling around where they live. Most of the population lives in settlements of one kind or another. The many scattered towns, villages and smaller settlements are all included in the term the “built environment” that is used throughout this Action Plan.

Areas of importance for wildlife in the built environment can be divided into four categories:

- remnants of semi-natural systems such as woodland, wetland and meadow.
- areas naturally colonised by plants, such as disused land including industrial sites and railway lines, as well as quarries and landfill sites.

- managed green spaces including gardens, town parks, amenity grasslands, churchyards and cemeteries, and golf courses.
- built structures which provide shelter and nesting sites for wildlife.

Biodiversity needs to be nurtured in the built environment where the majority of people live and work and where its close proximity to people contributes to a sense of quality of life. People's quality of life benefits from daily contact with wildlife and natural green spaces; trees help to reduce levels of air-borne pollution, parks and other public green spaces provide escape from vehicles and a safe and stimulating environment for children's play, and gardens and allotments provide people with intimate contact with greenery and wildlife.

Wildlife conservation projects help to bring local communities together, as well as encouraging positive improvement of local urban environments. Indeed, formal planning guidance recognises the important contribution nature can make to social and economic well-being in built environments.

Characteristic wildlife

Semi-natural systems

Semi-natural habitats such as woodlands, rivers and wetlands are often present within urban areas, either as isolated fragments, or forming corridors through developed land. These habitats support a wealth of wildlife and are dealt with in detail under their respective individual Habitat Action Plans.

Plants naturally colonise vacant land, which may have had a previous housing or industrial use. Examples of industrial sites in Cumbria include the slag banks associated with the iron and steel industry, spoil heaps from coal and lead mining. These areas can be particularly rich in species, with natural succession developing according to the wide range of variation on these sites of soil pH, toxicity, fertility, drainage, slope and aspect. Some colonising species are highly specialised to the prevailing conditions, such as metal tolerant grasses, mosses and lichens. Vacant land often contains water bodies, which add tremendously to their wildlife interest and are particularly important for amphibians, including great crested newt.

Managed green space

Managed green space in the built environment includes such areas as school grounds, town parks and public open spaces, cemeteries and churchyards, village greens, gardens and the landscaping in business parks. In many of these areas there is an unfulfilled potential to provide wildlife habitat, with frequently mown grass predominating. However, notable examples exist of more wildlife friendly maintenance regimes, where wildlife ponds, woodlands and wildflower meadows have been created. Many churchyards and cemeteries support ancient trees and rich lichen communities on the stonework, as well as areas of herb-rich grassland. Gardens also provide a huge wildlife resource, especially where features such as ponds, wild flower areas, hedges, walls, long grass and wood piles are present. Wildlife benefits enormously from the sources of food provided in gardens.

Built structures

The built environment has its own characteristic wildlife. Some species, such as barn owl, swift, swallow, house martin and various species of bat rely almost entirely on buildings for their breeding

sites. Buildings are also used as communal roost sites by birds such as starlings and pied wagtails. Exposed surfaces on roofs and walls are an important substrate for mosses and lichens. Insects and reptiles will bask on a wall or roof facing the sun.

Key species

The following rare or threatened species are associated with cities, towns and villages in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

Brandt's bat	<i>Myotis brandtii</i>	C
Daubenton's bat	<i>Myotis daubentonii</i>	C
Natterer's bat	<i>Myotis nattereri</i>	C
soprano pipistrelle	<i>Pipistrellus pipistrellus</i>	P
common pipistrelle	<i>Pipistrellus pipistrellus</i>	P
song thrush	<i>Turdus philomelos</i>	P
great crested newt	<i>Triturus cristatus</i>	P
grass snake	<i>Natrix natrix</i>	C
small blue butterfly	<i>Cupido minimus</i>	C
dark bush-cricket	<i>Pholidoptera griseoaptera</i>	
mountain whorl snail	<i>Vertigo alpestris</i>	
wall whorl snail	<i>Vertigo pusilla</i>	
pink meadowcap	<i>Hygrocybe calyptraeformis</i>	P
vervain	<i>Verbena officinalis</i>	

Current issues

- Lack of knowledge of the wildlife value of habitats in the built environment, or information not being readily available to decision makers.
- Targeting of development to areas of land which have been previously developed at some time ("brownfield" sites), which often support important wildlife habitat. Current Government guidance contains the target for 60% of new housing to be built on 'brownfield sites', but also states that the wildlife value of such sites should be assessed before they are earmarked for development.
- Development encroachment onto areas of wildlife importance including the green corridors remaining in the built environment, threatening the movement of wildlife between patches of wildlife habitat. The extent of encroachment of development onto green spaces with community

amenity value is a potential issue, which is currently being assessed.

- Lack of sympathetic management for wildlife including over-management (such as too frequent cutting or over-tidiness), incorrect management (including the planting of non-native trees and shrubs where native species would be more appropriate), insufficient management, or complete neglect.
- Problems may sometimes arise from seeds of the noxious weed ragwort spreading to agricultural land which adjoins urban habitats, for example from railway verges. Ragwort is poisonous to grazing animals.
- Pollution of air, land and water due to concentrated human activity, for example air pollution from vehicle exhausts, and water/land pollution by emissions from factories/industrial installations.
- A lack of public awareness of wildlife issues affecting the built environment, including some people's intolerance of wildlife sharing human accommodation.
- Landscaping schemes in new developments rarely incorporate wildlife habitats within them. Most use non-native, rather than native, trees and shrubs and features such as ponds tend to be formal and unsympathetic to the needs of wildlife.
- Disturbance to, and in some cases blocking-off of bat roosts and swift, swallow and martin nests during routine building maintenance.
- A lack of awareness by businesses of wildlife and Local Agenda 21 issues.

Current action

Examples of current action in Cumbria include the following:

Planning and Development Control

Local Authority Development Plans (including Local Plans, Local Transport Plan, Structure Plan, Minerals and Waste Disposal Plan) are based on principles of sustainability and contain policies to protect important species and habitats, and, where development is essential, to minimise harmful effects to wildlife and to encourage habitat creation or restoration.

The Royal Town Planning Institute has produced a best practice guide on biodiversity for planners and those involved in development control.

Sympathetic management of churchyards and cemeteries for wildlife

The Living Churchyard Project, based at the National Agricultural Centre at Kenilworth in Warwickshire, aims to arouse interest in the value of churchyards, chapel yards and cemeteries for wildlife. A schools pack entitled "Hunting the Daisy" has recently been produced and a range of other informative leaflets and guides are available from the Church & Conservation Project.

Carlisle City Council has adopted The Charter for the Bereaved, which includes specific objectives for environment and wildlife. This is a bereavement service which encourages care for the environment and the use of nature and wildlife to enhance cemetery and crematorium grounds. Flower-rich meadows and other wildlife-rich habitats are maintained and a woodland burial scheme has proved successful.

Management, creation and restoration of wildlife habitats within the built environment

The West Cumbria Woodland Partnership aims to, among other things, create woodland on derelict industrial land and on the urban fringe around the West Cumbria Coastal Plain for environmental, social and economic benefits. The Partnership includes a wide range of local authorities, statutory and voluntary organisations.

Groundwork West Cumbria is an organisation which aims to bring about sustainable improvements to the local environment and to contribute to economic and social regeneration. Particular aims include the restoration of derelict and neglected land, raising awareness of the environment and environmental problems among the community, and seeking practical solutions.

The British Trust for Conservation Volunteers has established a tree nursery in Kendal.

Involvement of businesses in their local wildlife

Glaxo Wellcome, in partnership with Cumbria Wildlife Trust, has undertaken a biodiversity audit of its Ulverston site and is developing its own biodiversity action plan for the site. Glaxo Wellcome nationally are sponsoring conservation work on the medicinal leech, resulting in survey work being undertaken in Cumbria.

British Nuclear Fuels Ltd has, in conjunction with the Herpetological Conservation Trust, created a nature reserve at their Sellafield site to help with the conservation of natterjack toads.

Increasing public involvement with local wildlife

The work of many voluntary conservation organisations and natural history societies around Cumbria is supported by a dedicated network of volunteers who include public involvement in their work.

Cumbria Broadleaves, South Lakeland District Council and the British Trust for Conservation Volunteers operate a Tree Wardens scheme, providing training and support to plant and maintain trees.

Local Agenda 21 programmes are developing and implementing strategies which aim to help resolve environmental problems with social and economic pressures, ultimately to achieve ways of living which are sustainable and hence which do not result in a decrease in biodiversity. Local communities are the basis for Local Agenda 21 and the District Councils and County Council provide support for groups.

The Countryside Agency's Village Design Statement scheme aims to improve new development in villages as well as identifying existing features worthy of protection there, including areas for wildlife. Statements are being prepared by local communities in several villages in Cumbria, and can be adopted as Supplementary Planning Guidance by Local Planning Authorities.

Context in relation to other plans:

UK Habitat Action Plans

Biodiversity; the UK Steering Group Report (1995) contains a national Habitat Statement for urban habitats, which sets the following national Conservation Directions:

- Survey and evaluate the full range of urban habitats (including buildings) in terms of their importance in maintaining wildlife interest.
- Protect sites important for wildlife from changes in land use.
- Encourage the integration of green networks (incorporating a full range of wildlife habitats) in planning and developments within the urban environment.

- Implement strategies to enable the use of vacant and derelict land, either temporarily or permanently as wildlife habitats.
- Incorporate the conservation and enhancement of wildlife into the management of urban green space.
- Encourage community action to survey, plan for and manage wildlife habitats.
- Promote wild space in urban areas as an educational resource to inform communities about local wildlife in the context of the wider environment.

National Lead Agency

None.

Local contacts

Cumbria Wildlife Trust, Brockhole, Windermere, Cumbria, LA23 1LJ. Tel. 015394 48280. E-mail: cumbriawt@cix.compulink.co.uk

Other contacts

Church & Conservation Project, Arthur Rank Centre, National Agricultural Centre, Stoneleigh, Kenilworth, Warwickshire, CV8 2LZ.

Associated plans in the Cumbria BAP

The following Cumbria action plans are of relevance to cities, towns and villages:

Phase I

- bats
- barn owl
- song thrush
- great crested newt

Phase II

- parkland, wood pastures and veteran trees
- pink meadowcap fungus

References

Royal Town Planning Institute. 1999. *Planning for Biodiversity*. Royal Town Planning Institute. London.

Objectives, targets and proposed actions for cities, towns and villages in Cumbria

Broad Objective A		Ensure no net loss of wildlife habitats in the built environment in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Identify and protect a network of sites for wildlife in cities, towns and villages	1 Identify key areas for wildlife in the built environment as Wildlife Sites by 2006.	CWT, LAs	L	SS	
	2 Carry out/encourage the use of rigorous assessment of the impact of proposed development upon wildlife.	LAs, EN, CWT	O	SS	
Broad Objective B		Enhance the value of areas in the built environment as wildlife habitats, through appropriate management and dissemination of information and advice			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Promote the understanding of and enhancement of churchyards and cemeteries as wildlife habitats. Target: 50% of Cumbria's churchyards and cemeteries to have a wild flower meadow (supporting indicator species such as pignut) by 2005	1 Promote the Living Churchyard project as a mechanism for increasing awareness of and involvement in conservation in churchyards and cemeteries.	CWT, LA21 Groups, DCs, VAC, PCs	O	CP	
	2 Promote the Charter for the Bereaved as a means of ensuring cemeteries include wildlife conservation and environmental considerations as management objectives.	DCs, CWT, LA21 Groups	O	CP	
	3 Conduct district based Countywide surveys of the wildlife of churchyards and cemeteries to identify sites of priority for conservation advice and management. All districts to have been surveyed by 2005.	VAC, LA21 Groups, DCs, EN, CWT, BLS	O	RM	
2 Provide the managers of school grounds with the skills and advice to enable them to make enhancements to their grounds	1 Include advice for the management of school grounds for wildlife in Cumbria Wildlife Trusts "Schools Pack". By 2000.	CWT	S	CP	
	2 Use expertise of Local Agenda 21 groups to liaise with schools to enhance their grounds for wildlife. By 2001.	LA21 Groups and Officers, CWT	S	A	
	3 Identify and promote examples of good practice of management of school grounds for wildlife and their use in the curriculum. By 2001.	CCC, CWT	S	A	

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Provide community groups and individuals with support, advice and technical help to create, improve and manage wildlife habitats	1 Establish and maintain ways in which community groups and individuals can have easy access to advice on available grants, project management and practical habitat management. By 2005.	DCs, CCC, VAC, ECCP, SRI, CWT, Groundwork, BTCV	M	A
	2 Promote the Countryside Agency's Village Design Statement Scheme to local communities, to identify and seek to retain existing features of value (including wildlife areas) and to plan for the creation of new sites.	CA, LAs	O	CP/SS
4 Work with Local Authorities and others who own and manage amenity land to enhance the biodiversity of town parks and public open spaces	1 Produce policy document in partnership with Local Authorities to agree an approach to amenity land management which integrates biodiversity with economic and social factors. By 2002.	Groundwork, CWT, LAs, EN, BTCV, SRI	M	CP
	2 Agree pilot project in each of the Local Authority areas in Cumbria. Establish Steering Group by 2002. Monitor pilot projects over a five year period from 2002 and use good examples as demonstration sites to instruct and inspire others.	Groundwork, CWT, DCs, BTCV, SRI, EN	M	A
5 Ensure that approaches to land reclamation take account of ecological interest and maximise the potential for enhancing biodiversity	1. Integrate opportunities for biodiversity enhancement into Local Authorities' land reclamation programmes.	Groundwork, CCC, NWDA, CWT, LAs, BTCV, SRI, EN, ECCP	O	A
	2. Promote to Local Authorities the successes of West Cumbria Woodland Partnership's work in creating new woodland habitat on derelict areas of otherwise low wildlife habitat potential.	Groundwork, FC, ECCP	O	A

Broad Objective C

Enhance the potential of built structures to support biodiversity

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Foster greater awareness and understanding among householders, businesses, developers, architects and statutory undertakers of the benefits of and methods for encouraging biodiversity in and on buildings	1 Working with local Building Associations and local planners, develop a 'Best Practice Guide' or 'Tool Kit' on maintaining and encouraging biodiversity in and on buildings, distribute to all relevant audiences and include as part of the proposed "Best Practice" guide for Local Authorities. By 2003.	DCs, LDNPA, CCC, EN, Groundwork, NT, CWT, RSPB	M	CP/A
	2 Produce articles in relevant public and trade journals, magazines and newspapers.	EN, CWT, RSPB, NT	O	CP
	3 Incorporate criteria for creation/retention of features for wildlife on/in buildings and other built structures into competitions such as Cumbria Village of the Year and Cumbria in Bloom. By 2001.	VAC, DCs, LDNPA, EN, CWT	S	A/CP
	4 Produce and disseminate a leaflet for householders on how to protect and encourage swifts, swallows and martins in houses and other buildings. By 2002.	RSPB, DCs, LDNPA, NT	M	CP
2 Determine the current value as wildlife resources of buildings and other built structures in Cumbria	1 Assess which species inhabit buildings and other built structures by undertaking a public appeal for information, and include findings in "Best Practice" guide (see action C1.1). By 2003.	CWT, Groundwork, THM, CWT, RSPB, EN	M	RM/CP

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Encourage and enable householders to maintain and create wildlife habitats in their gardens and to garden in a "green" way	1 Investigate the likely effectiveness of using Cumbria Village of the Year as a mechanism to encourage good practice in wildlife gardening (or for other biodiversity objectives).	VAC, DCs, FOLD, PCs, CWT	M	CP
	2 Seek to influence competitions such as Cumbria in Bloom to include benefits to wildlife as a major criterion in judging. By 2001.	Horticultural Societies, PCs, WIs, VAC, CWT	S	CP
	3 Campaign to reduce the demand for wildlife-damaging products (peat, water-worn limestone, slug pellets/other chemicals) by providing information and advice on their alternatives to garden centres/retail outlets and gardeners through all appropriate media.	CWT, LPAG, COGF, FoE, Greenpeace	O	CP
	4 Encourage the establishment of individual householder and community composting. Each Cumbrian settlement of 1000 people or more to have a facility by 2005.	LA21 Groups and Officers, LA recycling officers, CWT	M	CP
	5 Establish and maintain at least one native tree/shrub/plant nursery that is commercially viable in each District of Cumbria. By 2002.	Commercial nurseries, LA21 Groups and Officers, BTCV, ECCP	M	SS
	6 Launch Garden Wildlife Survey and Action Pack on gardening for wildlife, by 2001. (see also Cumbria great crested newt BAP).	THM, CWT, LA21 Groups and officers	S	RM/ CP
	7 Within each District, seek to establish a network/database of wildlife gardens/gardeners so local information on good practice can be shared. By 2002.	LA21 Groups and officers	M	RM/ A

Broad Objective E

Develop partnerships between business and environmental sectors to implement agreed biodiversity objectives

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Encourage and facilitate businesses and other organisations to contribute towards biodiversity conservation	1 Encourage and facilitate businesses and organisations in Cumbria to adopt an Environmental Management System, leading to adoption of the ISO4000 or EMAS standard. Use the "Business and Biodiversity" leaflet as a means to do this.	EA, DCs, DETR, CCC.	O	A/ CP
	2 Develop existing links and forums to further the exchange of information between the private sector and environmental organisations.	DCs, Groundwork, Business Link, CCC, LDNPA, CWT	O	A/ CP

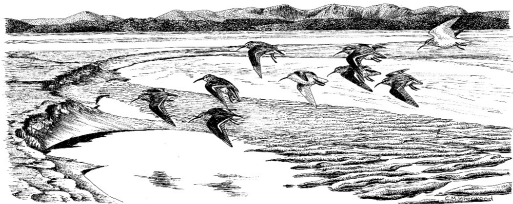
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BLS=British Lichen Society; CA=Countryside Agency; COGF = Cumbria Organic Growers and Farmers; CWT = Cumbria Wildlife Trust; CWTMG = Cumbria Wildlife Trust Mammal Group; EA = Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; FoE = Friends of the Earth; FOLD = Friends of the Lake District; LAs = Local Authorities; LDNPA = Lake District National Park Authority; LPAG = Limestone Pavement Action Group; NWDA = North West Development Agency; PCs = Parish Councils; RSPB = Royal Society for the Protection of Birds; RTPI = Royal Town Planning Institute; SRI = Solway Rural Initiative; THM = Tullie House Museum; VAC = Voluntary Action Cumbria; WIs = Women's Institutes.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Coastal Habitats

80% of Cumbria's coast is classified as being of international wildlife importance. Habitats of particular note are intertidal mud and sand flats, saltmarshes, which support internationally important numbers of passage and wintering waterfowl, and sand dune systems, which are a UK stronghold for natterjack toads and other rare animal and plant species.

Current status

This coastal plan is a summary for the whole of the Cumbrian coast, and in this approach differs from other habitat action plans within this document. A depth limit of 20m below chart datum has been taken as the seaward limit for the purposes of the plan. Detailed plans will be drawn up for individual habitats in the second phase of the Cumbria BAP. It may be appropriate to develop some of these plans (eg for subtidal habitats) in a regional, Eastern Irish Sea, context.

The Cumbria coast supports a wide range of coastal habitats. Much of the open coast is dominated by extensive sedimental shores, backed by shingle and interspersed with boulder and cobble scars formed by the erosion of glacial boulder clays. These glacial deposits form a low-lying cliff behind most of the coast. A notable exception are the impressive bedrock cliffs at St Bees Head. Extensive shallow subtidal areas fringe the coast. Much of this is sandy, interspersed with boulder and cobble scars. Tidal exposed areas off Maryport support richer

habitats. The Walney channel supports nationally important examples of tide-swept, wave-sheltered marine wildlife. In deeper water off St Bees Head the sediments are muddier with important fisheries for Dublin Bay prawn.

The estuaries and embayments are the largest features on the Cumbria coast, however, and are of international importance for their wildlife. Around 80% of the Cumbria coast is classified as Special Protection Areas and/or within candidate Special Areas of Conservation. Morecambe Bay and the Solway Firth are two of the largest intertidal areas in the UK. They support extensive saltmarsh habitats, intertidal boulder- and cobble scars and mud- and sand flats. The vegetated shingle and sand dune systems on the Cumbria coast are of national or international importance. The saltmarsh and sand dunes provide the UK stronghold for the natterjack toad and support many other scarce and rare species of plant and animal. The estuaries are of international importance for their passage and wintering waterfowl, forming critical links in international flyways. The Solway supports the

entire Svalbard breeding population of the barnacle goose during winter. Walney Island and the Duddon Estuary support internationally important breeding seabird colonies.

Man has claimed extensive areas from the sea around the Cumbria coast. In Morecambe Bay, for example, large areas of freshwater grazing marsh and saltmarsh have been enclosed with flood- and railway embankments, resulting in loss of coastal habitats and changes to the coastal processes.

Characteristic wildlife

The wildlife of the Cumbria coast includes the following UK BAP priority habitats:

- maritime cliff and slope
- coastal vegetated shingle structures
- coastal saltmarsh
- coastal sand dune (including dune grass, dune heath, dune scrub and strandline vegetation)
- estuaries
- saline lagoons
- sea grass beds
- mudflats
- honeycomb worm reefs
- Ross worm reefs (status in Cumbria unclear)
- sublittoral sands and gravels
- mud in deep water
- horse mussel beds (status off Allonby to be checked)

The coast also supports other wildlife and natural features of particular note:

- sites selected for one or more of eight EC Habitats Directive coastal Annex I habitats;
- geomorphological interests of the saltmarshes, shingle spits and Walney island;
- many nationally rare, nationally scarce or local plants;
- many Red Data Book and nationally scarce species of invertebrate;
- important breeding grounds of migratory fish eg smelt and passage routes for salmon;
- important nursery areas for many flatfish species and for species such as bass;
- nationally and internationally important numbers of many species of wintering and passage wildfowl and waders;
- internationally important breeding seabird colonies;
- breeding common seals.

Key species

The following rare or threatened species are associated with coastal habitats in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are *also* UK BAP Species of Conservation Concern, they are marked C.

common dolphin	<i>Delphinus delphis</i>	P
grey seal	<i>Halichoerus grypus</i>	C
common seal	<i>Phoca vitulina</i>	C
harbour porpoise	<i>Phocoena phocoena</i>	P
bottlenose dolphin	<i>Tursiops truncatus</i>	P
skylark	<i>Alauda arvensis</i>	P
linnet	<i>Carduelis cannabina</i>	P
hen harrier	<i>Circus cyaneus</i>	C
reed bunting	<i>Emberiza schoeniclus</i>	P
corn bunting	<i>Miliaria calandra</i>	P
yellow wagtail	<i>Motacilla flava</i>	C
grey partridge	<i>Perdix perdix</i>	P
golden plover	<i>Pluvialis apricaria</i>	C
little tern	<i>Sterna albifrons</i>	C
redshank	<i>Tringa totanus</i>	C
barn owl	<i>Tyto alba</i>	C
lapwing	<i>Vanellus vanellus</i>	C
natterjack toad	<i>Bufo calamita</i>	P
great crested newt	<i>Triturus cristatus</i>	P
leatherback turtle	<i>Dermochelys coriacea</i>	P
allis shad	<i>Alosa alosa</i>	P
thwaite shad	<i>Alosa fallax</i>	P
basking shark	<i>Cetorhinus maximus</i>	P
brown-banded carder bee	<i>Bombus humilis</i>	P
vernal colletes	<i>Colletes cunicularis</i>	C
northern colletes	<i>Colletes floralis</i>	P
a ground beetle	<i>Cicindela hybrida</i>	P
a ground beetle	<i>Dyschirius angustatus</i>	P
a water beetle	<i>Dytiscus circumflexus</i>	
a ground beetle	<i>Harpalus honestus</i>	
dark bush-cricket	<i>Pholidoptera griseoptera</i>	
speckled bush-cricket	<i>Leptophyes punctatissima</i>	
a woodlouse	<i>Armadillidium album</i>	
a woodlouse	<i>Halophiloscia couchi</i>	
a hydroid	<i>Obelia bidentata</i>	
a lacewing	<i>Chrysopa abbreviata</i>	
grey moth	<i>Hadena caesia</i>	
a sponge	<i>Amphilectus fucorum</i>	
a sponge	<i>Halichondria panicea</i>	
a sponge	<i>Haliconia oculata</i>	

an hemipteran	<i>Chlorita dumosa</i>	
honeycomb worm	<i>Sabellaria alveolata</i>	C
a waxcap	<i>Hygrocybe spadicea</i>	P
a puffball	<i>Tulostoma brumale</i>	
a moss	<i>Bryum warneum</i>	P
a moss	<i>Drepanocladus sendtneri</i>	
slender green	<i>Hamatocaulis vernicosus</i>	P
feather moss		
lesser bearded	<i>Chara curta</i>	P
stonewort		
wild asparagus	<i>Asparagus officinalis ssp.</i>	P
red hemp-nettle	<i>Galeopsis angustifolia</i>	P
slender club-rush	<i>Isolepis cernua</i>	
sea lavender	<i>Limonium (endemic taxa)</i>	P
slender niad	<i>Najas flexilis</i>	P
beaked tasselweed	<i>Ruppia maritima</i>	
vervain	<i>Verbena officinalis</i>	
spiked speedwell	<i>Veronica spicata</i>	C
narrow-leaved eel	<i>Zostera angustifolia</i>	
grass		
eel grass	<i>Zostera marina</i>	C

Current issues

- Effects of fisheries and shellfisheries on wildlife habitats and species, including birds.
- Risk of pollution from oil and gas development.
- Development of onshore and offshore windfarms.
- Damage to coast processes from previous and current coast protection/flood defences and other coastal structures.
- Loss of intertidal habitats as a result of 'coastal squeeze'. This can arise where rising sea levels occur in front of hard coastal defences, with no opportunity for the saltmarsh and other intertidal habitats to migrate landwards to compensate, leading to erosion of intertidal habitats. This is compounded by land claim and development within the intertidal zone and on floodplains.
- Recreational disturbance to coastal habitats and their wildlife, e.g. coastal footpaths, dog walking, jetskiing, vehicular access.
- The need for more effective and integrated coastal zone management.
- Inappropriate management of coastal habitats, e.g. undergrazing or overgrazing of saltmarshes, sand dunes and grasslands.
- Development on coastal habitats and hinterland leading to loss and increased 'squeeze' of coastal habitats, e.g. industrial and urban development, golf courses.
- Marine dredging and spoil disposal.
- Inappropriate method and timing of beach-cleaning by Local Authorities. This can remove habitats for invertebrate life and, as a result, a food source for birds.
- Habitat damage and fragmentation from agricultural intensification.
- Habitat damage from intensive bait digging and bait collection. This activity can also disturb foraging birds and may have adverse effects on prey availability.
- Pollution from sewage works, industrial effluents and other point source discharges.
- Pollution from agricultural run-off and river catchment and wider Irish Sea sources.

Current action

- Estuary partnerships and strategies are in place on Morecambe Bay, Duddon Estuary and the Solway Firth; other coastal partnerships include the Solway Rural Initiative, Drigg Forum and Ministry of Defence Eskmeals Conservation Group.
- PISCES (Partnership of Irish Sea Coast and Estuary Strategies) is raising the profile of coastal issues in NW England for consideration in regional planning.
- A North West Coastal Forum was formed in 2000, led by Government Office for the North West, with wide representation of regional interests.
- Shoreline Management Plans are nearly complete for the whole Cumbria coast. Led by local planning authorities and Environment Agency, they promote sustainable coast protection and coastal flood defences.
- Positive management of coastal habitats for wildlife is encouraged through entry into MAFF's Countryside Stewardship and Environmentally Sensitive Areas and English Nature's Coastal Wildlife Enhancement Scheme.
- The Solway Area of Outstanding Natural Beauty Management Plan is being implemented through the Solway Rural Initiative.
- Lake District National Park Management Plan coastal policies are being implemented through the Lake District National Park Authority. Provision of information and awareness-raising by LDNPA includes literature and events.
- Local Environment Agency Plans (LEAPs) are in place on the Cumbria coast.

- Regional Planning Guidance is being reviewed to take account of coastal issues.
- Morecambe Bay, Solway Firth and Drigg Coast have been submitted to Europe as candidate Special Areas of Conservation; Morecambe Bay, Duddon Estuary and the Upper Solway Flats and Marshes are Special Protection Areas.
- Schemes of Management are being developed for Morecambe Bay and Solway Firth European marine sites. These address the maintenance and restoration of habitats up to the mean high water mark. Management of habitats above high water mark and issues of habitat enhancement will fall to other mechanisms outlined in the BAP.
- Reviews of consents will be undertaken by the Environment Agency and other competent authorities for European marine sites under the 'Habitats Regulations' 1994.
- Fisheries Order proposals are being developed for mussel and cockle fisheries in Morecambe Bay and the Solway Firth.
- A countywide Coastal Pollution Emergency Plan is in place.
- The Cumbria Marine Litter Project, based at Copeland Borough Council, has monitored the amounts of marine litter on beaches in the Drigg area and is now promoting awareness of the problem and seeking solutions with local businesses and communities.
- Amateur naturalists make important contributions to our knowledge of Cumbria's coastal environment, including, among others, regular monitoring of wader and wildfowl numbers, floral surveys (including lichens), surveys of littoral and sublittoral fauna and flora (the latter from dives) and studies of marine molluscs.

Context in relation to other plans:

UK Habitat Action Plans

National action plans have been prepared for each of the BAP priority habitats and species listed in the *Characteristic Wildlife* and *Key Species* sections above. The objectives and targets set out by these UK plans will be detailed in the individual habitat action plans to be produced in Phase II.

Local contacts

Chris Lumb, English Nature, Juniper House, Murley Moss Business Park, Kendal LA9 7RL Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to the coast:

Phase I

- honeycomb worm reefs
- natterjack toad
- great crested newt

Phase II

- coastal and flood-plain grazing marsh
- maritime cliff and slope
- coastal vegetated shingle structure
- coastal saltmarsh
- coastal sand dune (inc. dune grass, heath, scrub and strandline)
- intertidal rocky shores and reefs
- intertidal mudflats and sandflats
- sea-grass beds
- saline lagoons
- farmland birds

Objectives, targets and proposed actions for Coastal Habitats in Cumbria

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Broad Objective A		Improve knowledge of the coast to inform its sustainable planning, management and use			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Understand the distribution of coastal habitats and key species on the Cumbria coast and identify their conservation requirements	I Use existing data or undertake new survey to map the key habitats and species on the Cumbria coast, and disseminate information on their distribution and conservation requirements. By 2005.	EN, CWT, LDNPA, EA, MCS, CSFC	M	RM	
Broad Objective B		Protect coastal habitats from inappropriate development			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Ensure appropriate representation of coastal systems, their wildlife and natural features in statutory and non-statutory sites, e.g. SSSIs, Wildlife Sites, RIGS, 'Marine Protected Areas'	I Review coastal and marine representation within statutory and Wildlife Sites (e.g. for honeycomb worm reefs) and take appropriate action. By 2005.	EN, CWT	M	SS	

Broad Objective C		Secure favourable management for coastal wildlife and natural features			
Operational Objective	Action Required	Suggested organisational involvement	Time- scale	Type	
1 Halt, and where practical and appropriate, reverse the disruption of coastal processes which underpin the functioning of the coastal system [Reduce the 'squeeze' of coastal habitats from sea level rise/increased storminess, for example, through managed realignment and replacing unavoidable losses]	1 Implement an agreed programme of monitoring and additional studies leading up to the 5 year review of Shoreline Management Plans (SMPs). By 2005.	DCs, EA, EN	M	RM	
	2 Prepare Coastal Habitat Management Plans (CHaMPs) for estuaries to assess the implications and requirements of the Habitats Regulations on Shoreline Management Plans. By 2010.	EN, DCs, EA	L	PL	
	3 Ensure that SMPs and policies for sustainable shoreline management are integrated into the land-use planning system, in particular development plans, e.g. to prevent further development in areas at risk of flooding. By 2005.	LAs, EA, EN	M	PL	
	4 Ensure safeguards are built into all coast protection and flood defense works, to protect nature conservation interests and coastal processes. By 2010.	EA, LAs, Utilities, Railtrack	L	SS	
2 Maintain coastal water quality and improve it where necessary	1 Assess coastal water quality status and the effects of recent changes, e.g. NWW's Sea Change programme: Morecambe Bay review in 1999.	EA, EN, NWW, MCS	S	SS	
	2 EN/EA to develop water quality objectives for the European marine sites. EA to undertake review of discharge consents under the Habitats Regulations. By 2005.	EN, EA	M	SS	
	3 Identify opportunities to further reduce marine contaminants, e.g. heavy metals, endocrine-disrupting chemicals, stemming from human activities. By 2005.	EA, NWW, EN	M	SS	
3 Ensure that key biological features are shown on coastal pollution sensitivity and response maps	1 Incorporate existing and new survey information into a review of coastal oil pollution sensitivity maps and clean-up schedules for Cumbria. By 2005.	EN, CCC, EA, CSFC	M	RM/SS	

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
4 Review existing management of European Marine Sites and identify and secure additional measures needed	1 Develop, promote and implement marine schemes of management for the Morecambe Bay/Duddon Estuary, Solway Firth and Drigg Coast European sites. By 2001.	EN , Relevant Authorities	S	SS
	2 Competent authorities to review their consents on European marine sites, under Habitats Regulations. By 2005.	All Competent Authorities	M	SS
5 Encourage positive management for nature conservation of other statutory and non-statutory coastal sites	1 Ensure that all other statutory and non-statutory sites have management plans in place and that management plans are reviewed to take account of the Cumbria BAPs.	EN, CWT, RSPB, NT, DCs, LDNPA, SRI, FWAG	Stat: M Non-stat: L	SS
	2 For all statutory and non-statutory sites identify target areas for positive management and secure funding from agri-environment, conservation or other schemes.	EN, CWT, FWAG, RSPB, NT, LAs, SRI,	L	SS
6 Seek to influence reform of the Common Fisheries Policy and local fisheries management towards an environmentally sustainable use of Cumbria's coastal and marine environment	1 Seek to influence relevant government agencies and other key players at appropriate levels and times to put in place the key measures needed to secure the biodiversity of the coastal and marine environment.	Cumbria Biodiversity Partnership EN, MCS	○	
	2 Take forward fisheries and environmental issues in ways that will promote environmentally sustainable management and contribute to biodiversity targets most effectively.	Estuary Partnerships, EA, EN, MCS	○	

Broad Objective D **Foster a wider awareness, understanding and appreciation of coastal wildlife and natural features and their conservation needs and sustainable use**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Promote and improve the sustainable use and integrated management of the coastal zone	1 Identify and pursue practical measures (especially those outside the remit or geographical range of existing estuary and coastal partnerships) at local, regional or national level, to achieve improved integrated coastal zone management in Cumbria.	EN , EA, CWT, RSPB, LAs	O	SS
2 Increase awareness and understanding of the coastal natural environment and support and encourage community participation and responsibility in its management	1 Disseminate and promote EN's coastal and marine Natural Area profiles and objectives. By 2001.	EN	S	CP
	2 Develop an environmental awareness programme for the Cumbria Coast that builds upon and strengthens the work being undertaken by local coast and estuary partnerships and initiatives, identifying and meeting the requirements of planners, managers and users of the coast.	EN , CWT, RSPB, NT, LAs SRI, SFCs, MCS, users/local communities	O	CP
	3 Promote the Adopt-a-Beach programme, to involve the public/local communities in the care of their local coastline.	MCS , CWT	O	CP
	4 Promote the Cumbria Marine Litter Project, to raise awareness of the sources of marine litter and how to reduce this pollution.	Copeland BC , LDNPA	O	CP

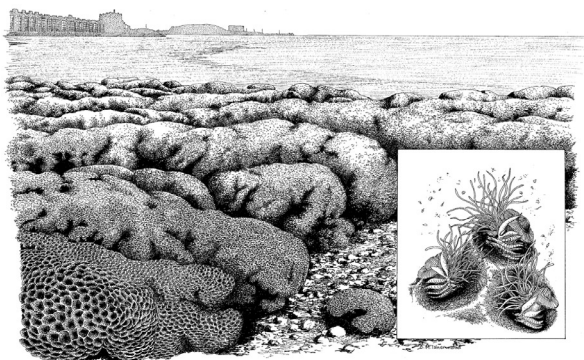
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

BC = Borough Council; CCC = Cumbria County Council; CSFC = Cumbria Sea Fisheries Committee; CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; EA = Environment Agency; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MCS = Marine Conservation Society; NT = National Trust; NWW = North West Water Ltd.; PISCES = Partnership of Irish Sea Coast and Estuary Strategies; RSPB = Royal Society for the Protection of Birds; SFCs = Sea Fisheries Committees; SRI = Solway Rural Initiative.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Honeycomb Worm Reefs

Cumbria is close to the northern limit of the geographical range of the honeycomb worm. Because of this, exceptionally cold winters can kill off many of the individual worms that make up the reefs in shallow coastal waters.

Current status

Honeycomb worm reefs are formed in coastal waters by the honeycomb worm (*Sabellaria alveolata*), a polychaete worm which constructs tubes in tightly packed masses with a distinctive honeycomb appearance. These reefs can be up to 30 or even 50cm thick and take the form of hummocks, sheets or more massive formations. Reefs are mainly found on the bottom third of the shore, but may reach mean high water of neap tides and extend into the shallow subtidal in places. They do not seem to penetrate far into low salinity areas. Reefs form on a variety of hard substrata, from pebbles to bedrock, in areas with a good supply of suspended sand grains from which the animals form their tubes. The larvae are strongly stimulated to settle by the presence of existing colonies or their dead remains. Honeycomb worm has a very variable recruitment and the cover in any one area may vary greatly over a number of years, although in the long term reefs tend mainly to be found on the same shores.

In Britain, honeycomb worm reefs are found only on shores with moderate water movement in the south and west, extending up as far as the Scottish

coast of the Solway Firth. The British Isles represents the northern extremity of the range in the north east Atlantic. Within Britain, the most numerous and extensive areas occur on the Cumbria coast, particularly between the Duddon Estuary and Dubmill Point on the Solway Firth. Honeycomb worm reefs occur within the following Natural Areas in Cumbria: Morecambe Bay, Cumbrian Coast and Solway Firth. Honeycomb worm reefs occur in five Sites of Special Scientific Interest, four of which lie within four candidate Special Areas of Conservation.

Characteristic wildlife

On the Cumbria coast the reefs show a variety of forms. On the more wave-exposed shores, such as at Selker Point and on Walney Island, the reefs often form a blanket or hummock structure 20-30cm tall covering extensive areas. Where there is more stability and less scouring, for example in Tarn Bay, the reefs form discrete domes, sometimes exceeding 50cm in height. At Dubmill Point the reefs form more discrete colonies encrusting larger, more stable boulders. At St Bees Head honeycomb worm colonies develop on vertical rock faces up to 2m off the ground, an indication of

the amount of sand that must be stirred up and transported by wave action. The reefs show a cyclical pattern of growth, erosion and re-growth. In their growing phase the apertures of the tubes are sharply defined. This is lost as the reefs senesce and are eroded. Honeycomb worms also form a minor component of many of the intertidal and shallow communities. The Ross worm (*Sabellaria spinulosa*), a subtidal relative of the honeycomb worm, has been recorded from Morecambe Bay and elsewhere on the Cumbria coast, but its current distribution and status is not known.

Individual worms have a lifespan of typically three to five years, and possibly up to nine years, but reefs themselves may last longer as a result of further settlement of worms onto existing colonies. Typically, in the first two years or so, after a heavy intertidal settlement, there are few associated species, but as the colonies age seaweeds including fucoid brown algae, sea lettuce and red algae, and animals including barnacles, mussels, winkles and dogwhelks, appear. Polychaete worms, crabs and blennies can be found within crevices. Older reefs may increase the biodiversity of what would otherwise be sand-abraded rocks and boulders. Sheet-like reefs may restrict drainage of the shore, creating shallow rockpools where there would otherwise be none.

Key species

The following rare or threatened species are associated with honeycomb worm reefs in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

honeycomb worm *Sabellaria alveolata* C

Best management practice

Ensuring that the coastal processes, including sediment supply and transport, can continue to function naturally is the single most important safeguard for honeycomb worm reefs. This should be addressed in the relevant Shoreline Management Plans and achieved through the appropriate design of specific coastal defence schemes.

Current issues

- Honeycomb worm reefs are at the northern end of their range in Britain and, particularly in Cumbria, are affected by extremely cold winters, after which they may die back for many years, especially at higher shore levels.
- By their nature, these reefs occur in areas which are naturally subject to large-scale changes in the amount of sand. They can tolerate burial for a period of days or even weeks, but prolonged burial will cause mortality.
- Honeycomb worm reefs are potentially vulnerable to accumulations or losses of sand as a result of shoreline development, including the construction and maintenance of coastal defences. The effects may be positive or negative, depending upon the nature of the changes.
- Trampling from public access, incidental damage from mussel fisheries and boulder-turning during 'peeler' crab collection or bait digging may cause local impact.
- There may be competition for space with common mussels on boulder scars. Heavy settlement of mussels on honeycomb worm reefs may destabilise reefs.
- Coastal oil pollution incidents and any subsequent mechanical clean-up of shorelines present a risk, but to date incidents have been infrequent and small.

Current action

- A report on the ecological requirements of the honeycomb worm was published recently as part of the UK Marine Special Areas of Conservation EU LIFE project (Holt *et al.* 1998).
- Cumbria Sea Fisheries Committee has done some initial mapping of honeycomb worm reefs as part of their coastal biological survey.
- English Nature provides available information on the location of honeycomb worm reefs to coastal engineers to help safeguard the reefs during coast protection works.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for the honeycomb worm in UK Biodiversity Group Tranche 2 Action Plans Vol. 5 (1999), which sets the following UK objectives and targets:

- Maintain the extent and quality of significant areas of *Sabellaria alveolata* [honeycomb worm] reef habitat.
- Within 15 years to have re-established *Sabellaria alveolata* reefs in five areas where they were formerly present.

National Lead Agency

Countryside Council for Wales

Local contacts

Chris Lumb, English Nature, Juniper House, Murley Moss Business Park, Kendal LA9 7RL. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to this plan:

Phase I

- coastal habitats

Phase II

- intertidal rocky shores and reefs

References

Holt, TJ, Rees, EI, Hawkins, SJ and Seed, R. 1998. *Biogenic Reefs (Volume IX). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs*. Scottish Association of Marine Science (UK Marine SACs Project).

Objectives, targets and proposed actions for Coastal Habitats in Cumbria

Broad Objective A	Ensure the favourable condition of all sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure the extent and status of honeycomb worm reefs is known	1 Map the extent of honeycomb worm reefs on the Cumbria coast and assess their status. By 2001.	EN, MCS, CWT, LDNPA	S	RM
	2 Disseminate the above information to key interests and organisations. By 2002.	EN	M	SS
	3 Develop and implement a programme to monitor the stage(s) of development of the honeycomb worm reefs at a small number of key sites. By 2005.	EN, MCS, CWT, LDNPA	M	RM
2 Ensure that honeycomb worm reefs are properly represented in statutory and non-statutory sites	1 Review the representation of honeycomb worm reefs within SSSIs, Wildlife Sites and Marine Protected Areas and take appropriate action. By 2001.	EN, CWT	S	SS

Broad Objective A		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Ensure that the wildlife value of honeycomb worm reefs is integrated into the management of the coast and coastal resources	1 Ensure that the distribution and conservation requirements of honeycomb worm reefs are taken account of in Shoreline Management Planning and Shoreline Management Plans.	LAs, EN	O	SS
	2 Ensure that any developments that are likely to affect reefs (particularly sea defences and breakwaters, which can affect sediment supply) are subject to environmental impact assessment.	LAs, EN, CWT	O	SS
	3 Ensure that honeycomb worm reefs are taken account of in the management of commercial fisheries and shellfisheries.	CSFC, NWNWSFC, EN, MCS	O	SS
4 Promote awareness of the beauty and ecological importance of honeycomb worm reefs	1 Use the environmental awareness programme for the Cumbria Coast identified within the Cumbria Coastal Habitats BAP (Action D2.2).	EN, CWT, RSPB, LAs, SRI, SFCs	O	CP
	2 Formulate and promote a code of conduct for responsible recreational angling, including bait digging, in consultation with sea angling associations and other relevant bodies. By 2001.	MCS	S	CP

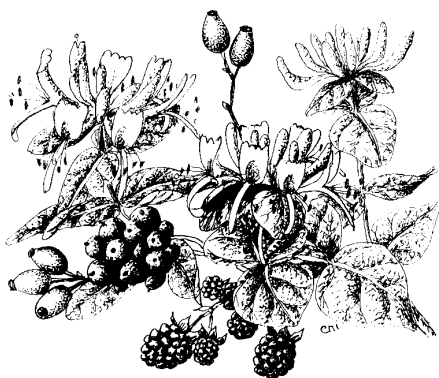
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CCC = Cumbria County Council; CSFC = Cumbria Sea Fisheries Committee; CWT = Cumbria Wildlife Trust; EA = Environment Agency; EN = English Nature; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MCS = Marine Conservation Society; NT = National Trust; NWNWSFC = North Western & North Wales Sea Fisheries Committee; RSPB = Royal Society for the Protection of Birds; SFCs = Sea Fisheries Committees; SRI = Solway Rural Initiative.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

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Ancient and/or Species-Rich Hedgerows

In Cumbria there are two very different traditional styles of hedge laying: Westmorland and Cumberland. In Cumberland all but the main stems are cut away, while in Westmorland many minor stems are retained.

Current status

As defined in the UK national Biodiversity Action Plan, ancient hedgerows are those that were in existence before the Enclosure Acts (1720 to 1840) and tend to be those which support the greatest diversity of plants and animals. Species-rich hedgerows in northern England (and hence Cumbria) may be taken as those which contain four or more native woody species on average in a 30 metre length and include recently planted examples. Hedges which contain fewer woody species but have a rich basal flora of herbaceous plants are also included. Many of the thin, straight hawthorn hedges which characterise later parliamentary enclosures, as well as most hedges which consist mainly of beech, or non-native trees, are excluded. Features associated with hedgerows, such as banks, ditches, trees or verges, are considered to form part of the hedgerow.

The EC Habitats Directive requires member states to encourage the management of hedges in their land use planning and development policies with a view to improving the ecological coherence of the Natura 2000 network. This is reflected in The Conservation (Natural Habitats, etc) Regulations,

1994, which recognises that such linear features are essential for the migration, dispersal and genetic exchange of wild species, and PPG9 (Nature Conservation, 1994).

Ancient and species-rich hedgerows are found throughout Cumbria, from the flat plains of the Solway coast to the tracks and byways of the lower fells. They also occur on a wide range of rock and soil types, giving a great deal of regional variation in hedgerow composition and form.

Estimates of the extent of hedgerows in Cumbria suggest that the current total hedgerow length in the county is between 16,500 and 22,500km. It is not known what percentage of these are ancient or species-rich but, nationally, figures of 40% are suggested. Estimates for hedgerow loss in Cumbria suggest that 25% of the total Cumbrian hedgerow length was lost between the 1940s and 1970s (NCC 1987) and that between 1976 and 1996 there has been a 3.4% loss (Metcalf unpublished). Figures for losses should be viewed in the light of recent new planting and restoration. For example, agri-environment schemes agreements with farmers and landowners in Cumbria made between 1994-98 account for approximately 100 km of new

hedge planting and for the restoration/management of approximately 500 km of hedgerows. The greatest concentrations of hedgerows are, as might be expected, in the lowland parts of the county, particularly the Solway Basin, West Cumbria Coastal Plain and the southern part of the Cumbria Fells and Dales Natural Areas.

Characteristic wildlife

Hedgerows are important habitats in their own right and, although linear, they constitute large areas of habitat, distributed over many areas of Britain, including Cumbria. The status of hedgerows as wildlife habitats in Cumbria has not been assessed; however, nationally, hedgerows are a primary habitat for at least 47 species of conservation concern, including 13 globally threatened or rapidly declining ones, more than for most other key habitats. Nationally, over 600 plant species, 1500 insects, 65 birds and 20 mammals have been recorded at some time living or feeding in hedgerows.

In Cumbria, typical native, woody hedge species include hawthorn, hazel, blackthorn, crab apple, dog rose, ash, oak, holly, wild cherry, bird cherry, bramble and guelder rose. The more diverse hedges frequently include a variety of typical woodland and woodland edge plants, such as honeysuckle, dog's mercury, red campion, wood anemone, violets, primrose and bluebell.

Hedgerows are important for invertebrates, including butterflies and moths, and farmland birds such as grey partridge, tree sparrow and song thrush. They are particularly important as foraging areas for barn owls. Bats hunt for insects along hedgerows, use them as commuting routes and roost in holes in old hedgerow trees.

Older and more diverse hedgerows are likely to be more valuable as wildlife habitats and provide an essential refuge for a great many woodland and farmland birds, plants and animals. Hedgerows adjacent to roads, green lanes, tracks and wooded ground tend to be particularly species-rich.

Hedgerows may also act as wildlife corridors for many species, including reptiles and amphibians, allowing dispersal and movement between other habitats.

Hedgerow trees, especially veteran trees, provide significant ecological variation in the landscape and are important habitats in their own right.

Key species

The following rare or threatened species are associated with ancient and/or species-rich hedgerows in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

dormouse	<i>Muscardinus avellanarius</i>	P
brown hare	<i>Lepus europaeus</i>	P
pipistrelle bat	<i>Pipistrellus pipistrellus</i>	P
red squirrel	<i>Sciurus vulgaris</i>	P
linnet	<i>Carduelis cannabina</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
spotted flycatcher	<i>Muscicapa striata</i>	P
tree sparrow	<i>Passer montanus</i>	P
grey partridge	<i>Perdix perdix</i>	P
bullfinch	<i>Pyrrhula pyrrhula</i>	P
song thrush	<i>Turdus philomelos</i>	P
barn owl	<i>Tyto alba</i>	C
great crested newt	<i>Triturus cristatus</i>	P
dark bush-cricket	<i>Pholidoptera griseoptera</i>	
speckled bush-cricket	<i>Leptophyes punctatissima</i>	
small eggar moth	<i>Eriogaster lanestris</i>	C
square spotted clay	<i>Xestia rhomboidea</i>	P
a phalloid fungus	<i>Battarraea phalloides</i>	P
bur chervil	<i>Anthriscus caucalis</i>	
knotted hedge-parsley	<i>Torilis nodosa</i>	
wood bitter-vetch	<i>Vicia orobus</i>	

Best management practice

There is no universally agreed best practice for ancient and/or species-rich hedgerows. However, it is generally agreed that the following are important considerations when managing any hedgerow for biodiversity:

- as a rough guide hedgerows should be trimmed on a 2-3 year rotation and laid every 10 to 30 years.
- hedgerows should be continuous (any break in the hedgerow should be gapped-up, not simply filled with a fence).
- a variety of hedgerow conditions (in different stages of management) is desirable in any landscape unit (e.g. farm).

- notwithstanding the above, hedgerows should be large (in volume), wide, dense, and vertically continuous from ground level to top (as well as horizontally continuous).
- trimming/cutting should be carried out at times of least disturbance to nesting birds and to avoid removal of food sources, and should not be carried out every year.
- hedgerows should provide a connected network, as far as is possible, in any landscape and should link other habitats.
- associated features (such as banks, ditches, trees) should be maintained to provide habitat diversity. While hedgerow trees should be maintained and replaced if lost, too many trees in a hedge may deter some species such as grey partridge, lapwing and yellowhammer.

Current issues

Much of the “loss” of hedgerow that has occurred is in fact due to hedgerows becoming overgrown to the point where they are no longer manageable as hedgerows (e.g. they become lines of trees) or they are over-trimmed and become scattered lines of shrubs.

The quality of Cumbrian hedgerows for wildlife has not been assessed but, typically in England, some management practices are not sympathetic to hedgerows (and hedgerow trees) as wildlife habitats. These include:

- Enlargement of fields and removal of hedgerows for agricultural and development purposes.
- Neglect (no trimming or laying) leading to hedgerows changing into lines of trees and the development of gaps. This reflects the fact that many field boundaries are no longer needed for modern farming, together with the lower level of employment on farms, higher labour costs and loss of traditional skills.
- Too frequent and badly timed cutting leading to poor habitat conditions, the development of gaps and probable species changes.
- Loss of hedgerow trees, especially veteran trees, through senescence and felling, without encouraging replacements.
- Use of herbicides, pesticides and fertilisers right up to the bases of hedgerows, leading to nutrient enrichment and a decline in species diversity. Occasionally, when wet weather prevents tractors from entering fields to spray slurry, spraying may be done over the hedge with unintentional ‘drift’ of slurry into the hedge.
- Ploughing up to the field edge which has severed the roots of hedgerow shrubs and trees.
- Increased stocking rates, particularly of sheep, leading to hedgerow damage and the need to fence fields. The presence of fences reduces the agricultural necessity for hedge maintenance and so hastens their decline.
- The outright removal of hedgerows and the abandonment of management are the two most important issues.

Current action

- The Environment Act 1995 introduced an enabling power to protect important hedgerows in Britain (Hedgerow Regulation 1997). Land managers are required to seek the permission of local authorities before hedgerows can be removed.
- MAFF provides incentives under the Countryside Stewardship Scheme (CSS) for the restoration and sympathetic management of hedgerows. Since 1992 30km of hedgerow have been planted and over 400km restored by laying, coppicing or gapping under CSS.
- In the Lake District ESA, 186 km of hedge has been laid, planted or coppiced under Conservation Plan grant since 1993. Monitoring of linear features over the period 1993-1996 suggested that less deterioration of hedges and more new planting took place on ESA agreement land than on non-agreement land. The Pennine Dales ESA offers similar incentives in parts of east Cumbria. The LDNPA also give grants for hedgerow work within the National Park.
- Guidance on hedgerow management is available from a wide range of organisations, including FWAG, ADAS and ECCP. The Forestry Commission has published guidance on the establishment of trees in hedgerows. Both the Forestry Commission and the LDNPA favour grant-aid to new woodlands adjacent to ancient hedgerows and other features which act as relict woodland habitats.
- Training in hedgerow management is offered in formal courses run by Lantra (leading to NVQs) and by other organisations such as FWAG, BTCV and Newton Rigg.
- An extensive hedgerow planting and laying programme has been carried out on the National

Trust's Lake District Estate over the past 15 years.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for ancient and/or species-rich hedgerows in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Halt the net loss of species-rich hedgerows through neglect and removal by the year 2000, and all loss of hedgerows which are both ancient and species-rich by 2005.
- Achieve the favourable management of 25% (c.47,500 km) of species-rich and ancient hedges by the year 2000, and of 50% (c. 95,000) by 2005.
- Maintain overall numbers of hedgerow trees within each county or district at least at current levels, through ensuring a balanced age structure.

National Lead Agency

The national lead agency for ancient and/or species-rich hedgerows is MAFF, whose nominated officer is based at the central London office.

Local contacts

Ian Wrigley and Paul Arkle at FWAG, Anderson Court, Sullart Street, Cockermouth. 01900 828684, e-mail cumbria@fwag.org.uk
Colin Barr at CEH Merlewood (Status and Research) 015395 32264

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to ancient and/or species-rich hedgerows:

Phase I

- calcareous grassland
- hay meadows and lowland pastures
- purple moor grass and rush pasture
- cities, towns and villages
- bats
- barn owl
- song thrush
- great crested newt

Phase II

- dormouse
- least minor moth

References

Nature Conservancy Council. (1987). Changes in the Cumbrian countryside. First report of the National Countryside Monitoring Scheme. NCC Peterborough.

Metcalf, J (unpublished) A survey of hedgerows in Cumbria. Student report to Institute of Terrestrial Ecology, Grange over Sands.

Objectives, targets and proposed actions for ancient and/or species-rich hedgerows in Cumbria

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Broad Objective A **Halt the loss of ancient and/or species-rich hedgerows in Cumbria by 2005**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Determine current extent, condition and distribution of ancient and/or species-rich hedgerows and monitor future trends	1 Carry out a systematic survey of ancient and/or species-rich hedgerows to identify priority areas for conservation action (including hedges that can be protected under current legislation and those that link otherwise isolated patches of wildlife habitat, especially those that form an integral part of, enhance, or link Natura 2000 and other designated sites of wildlife importance), by 2002. Produce project specification by end 2001.	CEH, CCC, MAFF, CWT, RSPB, CLA, NFU, NT, LDNPA, EN, NWW	S	RM
	2 Carry out sample surveys at 10 year intervals in regions throughout the county. Consider use of voluntary sector and produce project specification by 2001.	CEH, EN, CWT	S	RM
	3 Following nationally commissioned research on the effects of different hedge management regimes, consider the need to modify existing regimes in Cumbria in the light of these results.	MAFF	M	RM
2 Ensure that agri-environment schemes or other forms of grant aid are in place and appropriately funded and promoted by 2001	1 Ensure ancient and/or species-rich hedgerows are considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, EN	M/L	PL/SS
	2 Review and modify if necessary the promotion of ESA, Countryside Stewardship and other forms of grant aid for the management and restoration of ancient and/or species-rich hedgerows, for the planting of new hedgerows and for the establishment of hedgerow trees. By 2001.	FWAG, CLA, NFU, MAFF, LDNPA, ECCP, ADAS	S	CP

Broad Objective A		Halt the loss of ancient and/or species-rich hedgerows in Cumbria by 2005		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Ensure that legislation relating to hedgerows is fully implemented in Cumbria	1 Consider the practicality of establishing registers of ancient and of species-rich hedgerows, using the information gathered in A.I.1 above and presented in a useful format such as GIS. By 2001.	LAs	S	RM
	2 Disseminate the DETR leaflet on hedgerow legislation and protection to appropriate bodies and target groups. By 2001 and ongoing thereafter.	DETR, EN, LAs, CWT, MAFF, FWAG	S	A/C P
	3 Provide a training day for Local Authorities on their role in hedgerow protection. By 2001.	LAs	S	A
Broad Objective B		Achieve the favourable management of 50% of Cumbria's ancient and/or species-rich hedgerows by 2005		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Promote an awareness among the public, land managers and contractors of the importance of hedgerows and of the need for their management to maintain biodiversity	1 Encourage favourable management of ancient and/or species-rich hedges, especially favourable cutting practices, using among other mechanisms FWAG's hedgerow leaflets/technical information.	FWAG, CLA, NFU, MAFF, ADAS, LDNPA, ECCP	O	CP
	2 Consider the development of hedge management skills through training, especially for contractors.	FWAG, CA, MAFF, ADAS	O	A/C P
	3 Encourage the retention and favourable management of ancient and/or species-rich hedgerows that form an integral part of, enhance, or link Natura 2000 and other designated sites, through LA planning policies, EN Natural Area initiative and other county-wide strategies.	EN, LAs, FWAG, CLA, MAFF, ECCP	O	SS

Broad Objective C Maintain overall numbers of hedgerow trees, through ensuring a balanced age structure that includes veteran trees and traditional practices

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure no further loss of hedgerow trees through inappropriate tree surgery or felling	1 Draw up guidelines on the management of hedgerow trees and distribute as widely as possible to individuals and organisations with involvement in hedgerow management by 2001 and advertise its availability in farming and forestry literature.	FC , FWAG, NFU, CLA	S	A/ CP
	2 Arrange relevant training to coincide with the publication of the above guidelines. During 2001.	FWAG	S	A/ CP
	3 Encourage the effective use of existing legislation for the protection of hedgerow trees (Tree Preservation Orders and Hedgerow Regulations) by providing advice notes to Local Authorities by 2002.	FC , DCs, LDNPA, YDNPA	M	A
2 Ensure lost hedgerow trees are replaced with appropriate species	1 Ensure hedgerow trees within ancient and/or species-rich hedgerows are considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management.	MAFF	M/L	PL/ SS
	2 Provide a guidance note on the availability of grants for tree planting in hedgerows and make it widely available by advertising in farming and forestry literature by 2002.	FWAG , LDNPA, MAFF, FC, ADAS, ECCP	M	A/ CP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

ADAS = Agricultural Development and Advisory Service; CA = Countryside Agency; CCC = Cumbria County Council; CEH = Centre for Ecology and Hydrology; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; EN = English Nature; EA = Environment Agency; ECCP = East Cumbria Countryside Project; FC = Forestry Commission; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry for Agriculture, Fisheries and Food; NFU = National Farmers Union; NT = National Trust; NWW = North West Water; RSPB = Royal Society for the Protection of Birds; YDNPA = Yorkshire Dales National Park Authority.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Calcareous Grassland

Calcareous grasslands need to be grazed to maintain their biological diversity, in most cases as part of an agricultural grazing unit. However the grazing needs to be at an appropriate level, as too much or too little grazing can both be harmful to the grassland's biodiversity.

Current status

Calcareous grasslands are found on shallow, well-drained soils derived from a variety of lime or base-rich rock types. In general these comprise limestones (including the chalk of southern England), but there are smaller areas associated with other base-rich sedimentary rocks such as some shales and sandstones. Basic igneous rocks can also support calcareous grasslands including parts of the Borrowdale Volcanic Group in Cumbria.

In Cumbria, calcareous grasslands occur principally on the Carboniferous Limestones around Morecambe Bay, and the Orton Fells in the Cumbria Fells and Dales Natural Area and on the western flanks of the Pennines in the North Pennines Natural Area, with smaller outcrops occurring in a discontinuous and narrow ring around the Lake District. They also occur as very small stands associated with more base-rich outcrops of the Borrowdale Volcanic rocks in the Lake District, along the narrow outcrop of the Coniston Limestone that forms the southern boundary to the Borrowdale Volcanics and on

adjacent, more base-rich strata of Silurian shales. The Phase I habitat survey of Cumbria (Kelly and Perry, 1990) recorded approximately 2,200 ha of calcareous grassland in Cumbria.

There are four National Nature Reserves supporting calcareous grassland in Cumbria and 23 Sites of Special Scientific Interest are notified for their calcareous grassland interest. Calcareous grasslands are included within the *Festuco-Brometalia grassland and Juniperus communis formations on heaths or calcareous grasslands* identified in Annex I of the EC Habitats Directive. In Cumbria, eight SSSI fall within two candidate Special Areas of Conservation for these habitats.

Characteristic wildlife

The most extensive types of calcareous grassland in Cumbria are those dominated by blue-moor grass and include associates such as thyme, quaking grass, crested hair-grass, limestone bedstraw, salad burnet, bird's-foot trefoil, rock-rose and purging flax. Limestone grassland around Morecambe Bay supports extensive stands of juniper and other important components include limestone scrub and

limestone heath. The composition of these grasslands varies from the relatively warm and dry conditions of the southern limestones around Morecambe Bay to the cooler and wetter limestone areas further east on the Orton Fells and the Pennines. This community is restricted in Britain to the Carboniferous Limestone of the Morecambe Bay area, to the Craven District of North Yorkshire and to the borders of Cumbria, Durham and North Yorkshire.

The principal community of calcareous grassland associated with base-rich igneous and metamorphic rocks in the Lake District mountains is characterised by bent and fescue grasses with other plants such as thyme, purging flax, selfheal and ribwort plantain, mixed with more acid soil lovers such as tormentil and heath bedstraw.

The remaining community found in the County is the least extensive. These are found on deeper calcareous soils in lowland areas outside the range of blue moor-grass. Characteristic associates include downy oat-grass, salad burnet, bird's-foot trefoil, quaking grass, purging flax and small scabious.

Calcareous grasslands also support a variety of important animals and fungi including brown hare, skylark, butterflies (including high brown fritillary and Duke of Burgundy fritillary) and waxcap fungi.

Key species

The following rare or threatened species are associated with calcareous grasslands in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are *also* UK BAP Species of Conservation Concern, they are marked C.

brown hare	<i>Lepus europaeus</i>	P
great crested newt	<i>Triturus cristatus</i>	P
skylark	<i>Alauda arvensis</i>	P
corn bunting	<i>Miliaria calandra</i>	P
grey partridge	<i>Perdix perdix</i>	P
brown-banded carder bee	<i>Bombus humilis</i>	P
wall mason bee	<i>Osmia parietina</i>	P
high-brown fritillary	<i>Argynnis adippe</i>	P
northern brown argus	<i>Aricia artaxerxes</i>	P
pearl-bordered fritillary	<i>Boloria euphrosyne</i>	P

small blue	<i>Cupido minimus</i>	C
Scotch argus	<i>Erebia aethiops</i>	
Duke of Burgundy	<i>Hamearis lucina</i>	C
a hoverfly	<i>Dorus profuges</i>	
sandbowl snail	<i>Catinella arenaria</i>	P
Geyer's whorl snail	<i>Vertigo geyeri</i>	P
cistus forester	<i>Adscita geryon</i>	
least minor	<i>Photodes captiuncula</i>	P
barred toothed stripe	<i>Trichopteryx polycommata</i>	P
a bug	<i>Chlorita dumosa</i>	
pink meadowcap	<i>Hygrocybe calyptraeformis</i>	P
a waxcap fungus	<i>Hygrocybe spadicea</i>	P
a dog lichen	<i>Peltigera leucophlebia</i>	P
a liverwort	<i>Barbilophozia lycopodioides</i>	
a liverwort	<i>Plagiochila atlantica</i>	
a moss	<i>Antitrichia curtipendula</i>	
a moss	<i>Pleurochaete squarrosa</i>	
a moss	<i>Rhytidium rugosum</i>	
a lady's mantle	<i>Alchemilla minima</i>	P
leafless hawk's-beard	<i>Crepis praemorsa</i>	
lady's-slipper orchid	<i>Cypripedium calceolus</i>	*P
red hemp-nettle	<i>Galeopsis angustifolia</i>	P
juniper	<i>Juniperus communis</i>	P
perennial flax	<i>Linum perenne</i>	
alpine cat's-tail	<i>Phleum alpinum</i>	
dwarf milkwort	<i>Polygala amarella</i>	
knotted hedge-parsley	<i>Torilis nodosa</i>	
spiked speedwell	<i>Veronica spicata</i>	C
Teesdale violet	<i>Viola rupestris</i>	

*=locally extinct

Best management practice

Calcareous grassland requires appropriate management and, in particular, appropriate grazing regimes. These are required both to maintain the characteristic diversity of plants and animals present and to prevent succession to scrub and woodland. The nature of the conservation management will vary according to the specific objectives for any one site taking into account, for instance, the requirements of the plants, animals or fungi present. In some instances mosaics of grassland with scrub can be important for butterflies and juniper scrub is an especially important and characteristic feature of grasslands in Cumbria.

Current issues

The major issues associated with calcareous grasslands in Cumbria are related to habitat management but they also include mineral extraction, recreation and pollution:

- changes in grazing regime: overgrazing leads to a reduction in species diversity and the loss of species that are characteristic of taller grassland swards; undergrazing or a lack of grazing leads to scrub encroachment and a decline in species associated with open short calcareous turf. The type of stock is also important and a decline in cattle in the county is likely to result in a reduction in the diversity of some grasslands.
- the use of fertilisers, herbicides and other pesticides to increase productivity of the grasslands and reduce weeds results in a decline in, or loss of, species diversity, changes to other more widespread grassland types and the increasing fragmentation of the habitat.
- afforestation with conifers and to a lesser extent broadleaves has occurred on areas of calcareous grassland and while trees remain the grasslands continue to decline in species diversity. This has led, and will continue to lead, to their loss to species-poor habitats of non-native woodland.
- development activities, particularly mineral and rock extraction results in the loss and fragmentation of the habitat.
- recreational pressure and associated soil compaction can be a problem locally, particularly along the more open communities of cliff edges where rarer plant species are often located.
- calcareous grasslands are at risk from atmospheric nitrogen deposition leading to soil enrichment and losses to plant species diversity. Acid rain is less likely to affect calcareous grasslands as lime-rich soils are the least susceptible to this form of atmospheric pollution. However, the effect of sulphur deposition on the fauna, flora and fungi is not fully understood and so may be of concern.
- Climate change is likely to result in changes in species composition of grasslands, in particular the loss of 'northern' species at the edge of their range in the county and montane species. Conversely, there may be an increase in species with a southern distribution.

Current action

- Local Authority Structure and Local Plans include policies that contribute to the safeguarding of habitats and species within the County including calcareous grassland and some associated species.
- Agri-environment schemes such as the Lake District Environmentally Sensitive Area scheme and the Countryside Stewardship scheme provide financial incentives to manage calcareous grassland in a way that is sympathetic to its nature conservation interest.
- Some calcareous grasslands are managed for nature conservation objectives by organisations including English Nature and Cumbria Wildlife Trust.
- The Forest Enterprise Endangered Habitat Plan covering Limestone Pavement on Forestry Commission land also benefits calcareous grassland. Large areas of limestone pavement and grassland are to be restored by conifer removal on one SSSI and there is a commitment to remove conifers from other sites where they are having an adverse affect on the habitat.
- The habitat is included in County Wildlife Sites and there is a programme of survey and identification of sites which is due to be completed by 2005.
- A number of organisations across the County provide farm conservation advice and/or carry out practical management for nature conservation which will benefit calcareous grassland.

Context in relation to other plans:

UK Habitat Action Plans

There are UK Biodiversity Action Plans for lowland and upland calcareous grassland in the UK Biodiversity Group Tranche 2 Action Plans Vol. 2 (lowland calcareous grassland) and Vol. 6 (upland calcareous grassland). The UK Biodiversity Group Tranche 2 Action Plans Vol. 3 contains an action plan for juniper which is an important component of calcareous grasslands, particularly around Morecambe Bay (see juniper species action plan for details).

The lowland calcareous grassland BAP sets the following UK objectives and targets:

- Arrest the depletion of unimproved lowland calcareous grassland throughout the UK.

- Within SSSIs, initiate rehabilitation management for all significant stands of unimproved lowland calcareous grassland in unfavourable condition by 2005 with the aim of achieving favourable status wherever feasible by 2010.
- For stands at other localities, secure favourable condition of over 30% of the resource by 2005, and as near to 100% as is practicable by 2015.
- Attempt to re-establish 1000 ha of lowland calcareous grassland of wildlife value at carefully targeted sites by 2010.

The upland calcareous grassland BAP sets the following UK objectives and targets:

- Maintain the current distribution and extent of upland calcareous grassland. Achieve favourable condition for at least 75% of upland calcareous grasslands through sympathetic management and monitoring. Where possible, restore or re-create upland calcareous grasslands, especially through buffering and linking small, vulnerable or discontinuous sites.
- Achieve favourable condition for at least 15,000 ha of upland calcareous grassland (7000 ha in England, 7000 ha in Scotland, 500 ha in Wales and 500 ha in Northern Ireland) through sympathetic management by 2010.
- Undertake pilot attempts to restore or re-create at least 200 ha of new upland calcareous grassland by 2005, with a particular emphasis on reducing fragmentation through improving quality of degraded grassland.

National Lead Agency

Upland calcareous grassland: Countryside Council for Wales

Lowland calcareous grassland: English Nature

Local contacts

Agriculture Focus Group of the Cumbria Biodiversity Partnership.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to calcareous grasslands:

Phase I

- limestone pavement
- upland mixed ash woodland
- Geyer's whorl snail
- juniper
- high brown fritillary
- pearl-bordered fritillary
- sandbowl snail

Phase II

- scrub communities (other than juniper)

References

Kelly and Perry 1990, *Wildlife Habitat in Cumbria*.
Nature Conservancy Council.

Objectives, targets and proposed actions for calcareous grassland in Cumbria

Broad Objective A		Ensure no further loss of calcareous grassland in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Arrest the depletion of all types of unimproved calcareous grassland throughout its distribution in Cumbria	1 Keep the extent of SSSI coverage under review and notify sites as necessary to fill gaps in coverage.	EN	O	SS
	2 Designate as Special Areas of Conservation all calcareous grasslands which meet selection criteria as soon as is practicable.	DETR, EN	M	SS
	3 Carry out a review of the need to manage further key sites as National Nature Reserves by 2002.	EN	M	SS
	4 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of calcareous grassland, by 2006.	CWT, LAs	L	SS
Broad Objective B		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Within SSSIs, initiate rehabilitation management to achieve favourable condition status wherever feasible	1 Assess the condition of all calcareous grassland within SSSIs using standard criteria by 2002.	EN	M	RM
	2 Where necessary, secure the uptake of positive management agreements with owners and occupiers of all SSSIs with lowland calcareous grassland which is in unfavourable condition by 2005, with aim of achieving favourable status by 2010.	EN, MAFF	M	SS

Broad Objective B		Ensure the favourable condition of all sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
	3 Where necessary and possible, secure the uptake of positive management agreements with owners and occupiers of SSSIs so that at least 75% of upland calcareous grassland which is in unfavourable condition in SSSIs is under agreement by 2005, with aim of achieving favourable status by 2010.	EN, MAFF	M	SS	
	4 Where appropriate and desirable seek to restore calcareous grassland to all areas currently under conifer plantation, achieving removal of 130 ha of plantation by 2005.	FC, EN	M	SS	
	5 Establish at least two sites (one upland, one lowland) to demonstrate good management practice (taking into account calcareous grassland species for which local actions are required) linking with land management schemes by 2002.	EN, MAFF	M	SS/A	
2 Initiate rehabilitation management to achieve favourable condition status of non-SSSI calcareous grassland: <u>lowland</u> : 30% by 2005 and 100% by 2015 <u>upland</u> : 75% by 2010	1 Ensure calcareous grassland is considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, CWT	M/L	SS	
	2 Provide advice on management and grants to owners and occupiers of Wildlife Sites with calcareous grassland, by 2008.	CWT, FWAG	L	A	
3 Monitor changes in the extent and condition of calcareous grassland in order to assess the effectiveness of conservation action	1 Collate available information on the extent and condition of calcareous grassland into a database by 2002 and consider the need for further survey.	EN, CWT, LDNPA, MAFF	M	RM	
	2 Devise a strategy for monitoring the extent and condition of calcareous grassland and implement by 2002.	EN, LDNPA, CWT	M	RM	

Broad Objective B		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
4 Promote awareness and understanding and best management practise for calcareous grassland	1 Produce guidelines for the identification, condition assessment and management of calcareous grassland by end 2000.	EN	S	A/RM
	2 Carry out two demonstration days on the condition assessment and management of calcareous grassland by end 2002.	EN, MAFF, FWAG, ECCP, NT, LDNPA	M	A

Broad Objective C		Increase the extent of calcareous grassland		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Attempt to re-establish calcareous grassland of wildlife value, targeted on areas with existing stands by 2010: 25ha lowland in Cumbria Fells & Dales NA 10ha upland in either Cumbria Fells & Dales or North Pennines NA	1. Identify former limestone grassland sites that are suitable for re-creation, and draw up a strategy to meet the target by 2003.	EN, MAFF, NT, LDNPA	M	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CA = Countryside Agency; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; ECCP = East Cumbria Countryside Project; EN = English Nature; FRCA = Farming and Rural Conservation Agency; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NFU = National Farmers' Union; NT = National Trust.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Hay meadows and Lowland Pastures

Species-rich hay meadows and lowland pastures are dependant on the continuance of traditional agricultural practices. Most of the loss of this habitat has been the result of changes to modern, more productive agricultural systems, such as the use of modern fertilisers and, in the case of hay meadows, switches from single cut hay systems to multiple cut silage systems.

Current status

Hay meadows, as defined by this plan, are species-rich neutral grasslands that are cut for hay which is used as food for livestock in the winter months. In Cumbria these are broadly considered as falling into two categories: upland and lowland, each containing characteristic communities of plants. This plan also covers lowland pastures: neutral grasslands grazed through most of the year, which are not cut for hay.

Upland hay meadows comprise a type of grassland community that is restricted in Britain to upland valleys between 200 and 400m in the north of England with outliers in Scotland. The most important centres are the North Pennine valleys in Durham, the Yorkshire Dales and around Tebay, Orton and Ravenstonedale in Cumbria. In Cumbria, upland hay meadows also occur in suitable locations throughout the rest of the Cumbria Fells and Dales Natural Area.

Lowland hay meadows and pastures include both dry and seasonally flooded grassland and these are found in lowland areas such as the Eden Valley, West Cumbria Coastal Plain and the lowland parts of the Cumbria Fells and Dales Natural Areas.

Neutral grasslands have undergone a remarkable decline in the 20th century, almost entirely due to changing agricultural practice. It is estimated that by 1984 in lowland England and Wales, species-rich grassland had declined by 97% over the previous 50 years. Past cover data are not available for the upland meadows, but recent estimates indicate that there are less than 1,000 ha in the whole of northern England, with perhaps less than 500ha in Cumbria. Of this only a proportion is traditionally managed as hay meadows, the rest being along roadside verges, river banks, streamsides and in churchyards. In Cumbria around 10% of the total extent of the northern hay meadow grassland is along roadside verges.

Estimates for the extent of lowland hay meadows and pastures are not available but it seems likely

that the area remaining is smaller than that of upland hay meadows. Unimproved seasonally flooded grasslands are less widely distributed in Britain and are even scarcer in Cumbria than meadows.

There is one National Nature Reserve in Cumbria supporting lowland hay meadows and two supporting upland hay meadows. Nine Sites of Special Scientific Interest are notified for their lowland hay meadows and pastures and 17 for their upland hay meadows. Upland hay meadows are included within the mountain hay meadow type identified in Annex 1 of the EC Habitats Directive. In Cumbria, 12 SSSIs fall within a candidate Special Area of Conservation for this habitat. A number of sites supporting this habitat are owned or managed by conservation organisations.

Characteristic wildlife

Upland hay meadows are characterised by a dense growth of grasses and flowers. No single grass species is consistently dominant and the most striking feature of the vegetation is the variety and abundance of flowers, including wood crane's-bill, pignut, great burnet and lady's-mantles. They frequently include small areas of species-rich wetland and flush with plants such as globe flower, water avens and bird's-eye primrose.

Lowland meadows and pastures are characterised by species such as crested dog's-tail, black knapweed, rough hawkbit, ox-eye daisy, meadow vetchling and yellow rattle as well as less common plants such as greater butterfly orchid, pepper saxifrage and adder's-tongue fern.

Unimproved seasonally flooded grasslands support many of the plants already mentioned, but are characterised by great burnet and can include plants of damper ground such as cuckoo-flower and northern marsh orchid.

Hay meadows and pastures can be of importance for breeding birds such as redshank, curlew and yellow wagtail. Brown hares also use hay meadows and pastures. Hay meadows are especially important as feeding areas for insects including butterflies and bees, and for insect-feeding bats.

Key species

The following rare or threatened species are associated with hay meadows and lowland pastures in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

brown hare	<i>Lepus europaeus</i>	P
skylark	<i>Alda arvensis</i>	P
linnet	<i>Carduelis cannabina</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
yellow wagtail	<i>Motacilla flava</i>	C
tree sparrow	<i>Passer montanus</i>	P
grey partridge	<i>Perdix perdix</i>	P
black grouse	<i>Tetrao tetrix</i>	P
redshank	<i>Tringa totanus</i>	C
barn owl	<i>Tyto alba</i>	C
lapwing	<i>Vanellus vanellus</i>	C
great crested newt	<i>Triturus cristatus</i>	P
pink meadowcap	<i>Hygrocybe calyptraeformis</i>	P
northern hawk's-beard	<i>Crepis mollis</i>	
leafless hawk's-beard	<i>Crepis praemorsa</i>	
small white orchid	<i>Pseudorchis albida</i>	
wood bitter-vetch	<i>Vicia orobus</i>	

Best management practice

Hay meadow management varies considerably between, and even within, farms. However, it generally comprises the spreading of low levels of well-rotted farmyard manure, rather than artificial fertilisers, and excluding stock from fields from mid-May through to July or August, to allow the grassland to grow up and flower. Following the harvesting of the grass, the aftermath is grazed by sheep and (ideally) cattle, with light sheep grazing through the winter and early spring. Lime may be applied when required, if this is part of traditional practice, to prevent reversion to acid grassland. Roadside verges and churchyards require similar cutting regimes, but are not generally grazed, nor do they receive farmyard manure or lime.

Species-rich lowland pastures do not receive farmyard manure and are not shut up and cut for hay, but are generally grazed throughout the year.

Current issues

The major issues associated with hay meadows and lowland pastures in Cumbria relate to the use of artificial fertilisers, ploughing and reseeded of species-rich hay meadows and pastures, and improved field drainage which leads to a decline of wetland plants and animals on damper grasslands.

- the use of fertilisers to allow multiple cutting of the grass for silage or higher yields of hay (this practice increases the growth of a small number of grass species at the expense of the large diversity of flowers) results in a decline in or loss of species diversity, changes to other more widespread grassland types and the increasing fragmentation of the habitat.
- the use of herbicides and other pesticides to reduce weeds.
- ploughing and re-seeding with species-poor agricultural seed mixes.
- drainage dries out areas of damper grassland and results in the loss of characteristic wetland plants and invertebrates.
- grazing levels and the type of stock are important factors for maintaining plant species diversity. Cattle are the most appropriate animals for aftermath grazing and the reduction of their numbers in Cumbria is of concern. Heavy spring grazing by sheep also appears to reduce plant species diversity.
- the application of farmyard manure at high rates and/or manure that has not been allowed to stand for a time and rot.
- roadside verges are vulnerable to roadside activities such as compaction of soil by parked vehicles, laying of cables and pipelines, road widening or improvement works, inappropriate cutting regimes and dumping of materials for road works or storage of road salt in winter. Occasionally, when wet weather prevents tractors from entering fields to spray slurry, spraying may be done over the hedge with unintentional 'drift' of slurry onto the road verge.

Current action

- Local Authority Structure and Local Plans include policies that contribute to the safeguarding of habitats and species within the County including hay meadows and unimproved lowland pastures and some associated species.

- Cumbria County Council, in partnership with English Nature, Cumbria Wildlife Trust and the Lake District National Park has carried out a survey and evaluation of roadside verges in the County and now carries out cutting regimes that reflect the importance of roadside verges for their flora and fauna.
- Agri-environment schemes, such as the Lake District and Pennine Dales Environmentally Sensitive Area schemes and the Countryside Stewardship scheme, provide financial incentives to manage land in a way that is sympathetic to its nature conservation interest, and provide specific hay meadow options. The Lake District National Park Authority provides management agreements for the conservation management of some hay meadows.
- A small number of hay meadows and lowland pastures are managed for nature conservation objectives, by organisations including English Nature and Cumbria Wildlife Trust.
- A number of organisations fund research into hay meadow management, including The Ministry of Agriculture Fisheries and Food and English Nature.
- The habitat is included in County Wildlife Sites; there is a programme of survey and identification of these sites that is due to be completed by 2005.
- A number of organisations across the County provide farm conservation advice and/or carry out practical management for nature conservation which will benefit hay meadows and unimproved lowland pastures. These include the Arnsdale and Silverdale Countryside Management Service, Agriculture Development and Advisory Service, Farming and Wildlife Advisory Group, East Cumbria Countryside Project, Solway Rural Initiative, West Cumbria Groundwork Trust and Cumbria Farm Link.

Context in relation to other plans:

UK Habitat Action Plans

There are UK Biodiversity Action Plans for both upland and lowland meadows in the UK Biodiversity Group Tranche 2 Action Plans, Vol. II (1999), which set the following UK objectives and targets:

Upland hay meadows:

- Arrest the depletion of unimproved upland hay meadow throughout its UK distribution.
- Within SSSIs, initiate rehabilitation management for all significant stands of unimproved upland hay meadow in unfavourable condition by 2005, with the aim of achieving favourable status wherever feasible by 2010.
- For stands at other localities, secure favourable condition over 30% of the resource by 2005, and as near to 100% coverage as is practicable by 2015.
- Attempt to re-establish 50 ha of upland hay meadow of wildlife value at carefully targeted sites by 2010.

Lowland meadows:

- Arrest the depletion of unimproved lowland hay meadow throughout the UK.
- Within SSSIs and ASSIs, initiate rehabilitation management for all significant stands of unimproved lowland hay meadow in unfavourable condition by 2005, with the aim of achieving favourable status wherever feasible by 2010.
- For stands at other localities, secure favourable condition over 30% of the resource by 2005, and as near to 100% as is practicable by 2015.
- Attempt to re-establish 500 ha of lowland hay meadow of wildlife value at carefully targeted sites by 2010.

National Lead Agency

Upland hay meadows: Ministry of Agriculture Fisheries and Food.

Lowland meadows: Countryside Council for Wales.

Local contacts

Ian Slater, English Nature, Juniper House, Murley Moss Business Park, Kendal LA9 7RL. 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to the hay meadows and lowland pastures:

Phase I

- ancient and/or species-rich hedgerows
- purple moor-grass and rush pasture
- bats
- barn owl

Phase II

- farmland birds
- black grouse
- small white orchid
- pink meadowcap fungus
- springs and flushes

Objectives, targets and proposed actions for hay meadows and lowland pastures in Cumbria

Broad Objective A	Ensure no further loss of hay meadows and lowland pastures in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time- scale	Type
1 Arrest the depletion of unimproved hay meadows and lowland pastures throughout their distribution in Cumbria	1 Keep the extent of SSSI coverage under review and notify sites as necessary to fill gaps in coverage.	EN	○	SS
	2 Designate as Special Areas of Conservation all upland hay meadows which meet selection criteria as soon as is practicable.	EN, DETR	○	SS

Broad Objective A		Ensure no further loss of hay meadows and lowland pastures in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Assess the need to undertake vegetation survey and assessment of hay meadows and lowland pastures in areas with poor survey coverage by end 2000.	EN, LDNPA	S	RM
	4 Carry out a review of the need to manage further key sites as National Nature Reserves by end 2000.	EN	S	RM/SS
	5 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of hay-meadows and lowland pastures, by 2006.	CWT, LAs,	L	RM/SS
	6 Seek opportunities to present hay meadow and lowland pasture conservation to the general public through the media and by onsite interpretation where appropriate.	EN, CWT, NT, FWAG, MAFF, ECCP	O	CP
Broad Objective B		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Within SSSI, initiate rehabilitation management for all significant stands of unimproved hay meadows and lowland pastures in unfavourable condition by 2005, with the aim of achieving favourable status wherever feasible by 2010	1 Assess the condition of all hay meadow grassland within SSSI using standard criteria by 2002.	EN	M	RM
	2 Where necessary, secure the uptake of positive management agreements with owners and occupiers of all hay meadow SSSI by 2005.	EN, MAFF	M	SS
	3 Establish at least two sites (one upland, one lowland) to demonstrate good management practice (taking into account linking with land management schemes) by 2000.	EN, MAFF, NT	S	A

Broad Objective B		Ensure the favourable condition of all sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
2 For stands at other localities, secure favourable condition over 30% of the resource by 2005, and as near to 100% as practicable by 2015	1 Ensure hay meadows and lowland pastures are considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, EN	M/L	SS/A	
	2 Review and where necessary modify or develop agri-environment schemes to take account of local needs and target local concentrations of the habitat or those which support, or could contribute to, the conservation of Key Species by 2001.	MAFF, EN	S	SS/A	
	3 Provide advice on management and grants to owners and occupiers of Wildlife Sites with hay meadows and lowland pastures, by 2008.	CWT	L	A/SS	
	4 Within the constraints of road safety requirements ensure that roadside verges are managed to prevent further depletion of the biodiversity resource.	CCC, HA, EN, LDNPA, CWT	O	SS	
3 Monitor changes in the extent and condition of hay meadow grassland in order to assess the effectiveness of conservation action	1 Collate available information on the extent and condition of hay meadows and lowland pastures into a database by 2002 and consider the need for further survey.	EN, CWT, LDNPA, MAFF, NT	M	RM	
	2 Devise a strategy for monitoring the extent and condition of hay meadow grassland and implement by 2002.	EN, LDNPA, CWT	M	RM	
	3 Develop a strategy for monitoring the condition of roadside verge grasslands by end 2000, implement by end 2001 and repeat thereafter at intervals which links to the issue of verge management contracts.	CCC, CWT, EN, LDNPA, CEH	S/O	RM/SS	

Broad Objective B		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
4 Promote awareness and understanding and best management practice of hay meadows and lowland pastures	1 Produce guidelines for the identification, condition assessment and best practice management of hay meadows and lowland pastures (in particular the integration of conservation management into agricultural practice) by end 2000.	EN	S	A
	2 Carry out two demonstration days on the condition assessment and management of hay meadow grassland by end 2002.	EN, MAFF, FWAG, ECCP, NT, LDNPA, ADAS	M	A
	3 Produce leaflet interpreting roadside verge management approach, by end 2001.	CCC, CWT, HA	S	CP/A
Broad Objective C		Increase the extent of hay meadow grassland		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Attempt to re-establish upland and lowland hay meadows of wildlife value targeted at areas with existing concentrations of the habitat where possible by 2010 divided between Natural Areas as shown below	1 Develop and implement a strategy to restore and expand the cover of unimproved hay meadows and lowland pastures, taking into account the need to ameliorate the negative effects of isolation, fragmentation and small patch size by 2003.	EN, MAFF, NT, LDNPA	M	RM/SS
	2 Produce and disseminate guidelines for appropriate methods and approaches to establish new stands of hay meadows and lowland pastures of wildlife value by 2002.	FWAG, EN, MAFF, NT, LDNPA, ECCP	M	CP/A

Natural Area targets:

* shared with adjacent county.

Upland:		Lowland:	
Border Uplands	*7 ha	Solway Basin	2 ha
North Pennines	*15 ha	North Pennines	*8 ha
Yorkshire Dales	*15 ha	Yorkshire Dales	*8 ha
Cumbria Fells and Dales	10 ha	Eden Valley	2ha
		Cumbria Fells and Dales	8ha
		West Cumbria Coastal Plain	2 ha

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
ADAS = Agriculture Development and Advisory Service; CA = Countryside Agency; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; ECCP = East Cumbria Countryside Project; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NFU = National Farmers Union; NT = National Trust.
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Limestone Pavement

Limestone pavement was formed during the last Ice Age by glaciers moving over the areas of limestone rock and scouring their surface. Subsequent erosion of fissures in the rock by rain and groundwater formed the pattern of clints and grikes we see today.

Current status

Limestone pavements were formed when the landscape was subjected to intense glacial scouring during the last Ice Age, exposing the limestones in the platforms we see today. Since then, erosion has continued, with acids in rainwater and groundwater forming a complex pattern of fissures known as grikes, between massive blocks of limestone known as clints. The considerable diversity of appearance of limestone pavements found in different areas reflects not only the composition and structure of the bedrock but also the directions of the ice movements.

Limestone pavement is a globally rare habitat, a significant proportion of which lies within Cumbria. Surveys by Ward and Evans (1976) and English Nature (1995) recorded 1052 ha of pavement in Cumbria, some 36% of the total resource of this habitat in Britain. The remainder is mainly in Yorkshire, Lancashire, Scotland and Wales. In terms of losses, a recent assessment of the national picture (of which Cumbria is representative) showed that of the 537 pavements looked at, only 3% were undamaged, and that over 40% of the

British resource of limestone pavement has been wholly destroyed. Limestone pavement is, once lost or damaged, non-renewable.

Limestone pavement is very localised in its distribution. In Cumbria, limestone pavement is most extensive in a ring around Morecambe Bay and on the limestone fells between Shap and Kirkby Stephen, within the Cumbria Fells and Dales Natural Area. Smaller areas are found on the high western edge of the Pennines, within the North Pennines Natural Area and there are a few isolated areas on the northern edge of the Lake District.

All significant areas of limestone pavement are protected by Limestone Pavement Orders. There are 4 National Nature Reserves supporting limestone pavement in Cumbria. 12 Sites of Special Scientific Interest are notified for their limestone pavements. Limestone pavements are identified in Annex 1 of the EC Habitats Directive as a priority habitat and will form part of the Natura 2000 Network. In Cumbria, 10 SSSIs fall within 2 candidate Special Areas of Conservation for this habitat. Some 70% of Cumbrian pavements are protected by SSSI and SAC designations.

Characteristic wildlife

Limestone pavements usually exist as part of a mosaic of habitats which may include woodland, scrub, heathland, limestone grassland and other habitats. Having said this, limestone pavements may be split broadly into three types: open, wooded and scrubby. Open pavements consist of bare clints with vegetation confined to the grikes in between, although scattered trees may occur. Wooded pavement has a more or less continuous tree cover, with ground vegetation, including mosses over the surface of the clints. Scrubby pavement forms a continuum between open and wooded pavement types.

Flowering plants, mosses and lichens are often abundant, and differ according to aspect, altitude and the degree of shade afforded by nearby trees and shrubs. Limestone pavements often contain unusual combinations of plants, with species more usually associated with woodland and wood edges thriving in shaded grikes alongside plants of more open environments. Some of the most typical plants of grikes include herb Robert, dog's mercury, wall lettuce, brittle bladder-fern, male fern, wood sorrel, ivy and hart's-tongue fern. Limestone pavements provide a suitable habitat for a wide range of invertebrates, which thrive in the warm and sheltered microclimate that the pavements provide.

Key species

The following rare or threatened species are associated with limestone pavements in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

a wood ant	<i>Formica lugubris</i>	P
a mason bee	<i>Osmia parietina</i>	P
high brown fritillary	<i>Argynnis adippe</i>	P
northern brown argus	<i>Aricia artaxerxes</i>	P
pearl bordered fritillary	<i>Boloria euphrosyne</i>	P
a woodlouse	<i>Armadillidium pictum</i>	C
a midge	<i>Dasyhelea lithotelmatica</i>	C
a crystal snail	<i>Vitrea subrimata</i>	
cistus forester	<i>Adscita geryon</i>	
least minor	<i>Photedes captiuncula</i>	C

a lichen	<i>Syalissa symphorea</i>	
juniper	<i>Juniperus communis</i>	P
Lancastrian whitebeam	<i>Sorbus lancastrimensis</i>	*

*=Species endemic to United Kingdom

Best management practice

The particular management regime for any one site will need to take account of local circumstances.

General good management practice for all types of pavement

- avoid all fertiliser application on or around open pavement
- avoid the use of asulam herbicide for bracken control - this will kill rare ferns which live in the grikes
- avoid supplementary feeding of stock on limestone pavement
- graze appropriate stock at a suitable stocking level, according to the type of pavement
- control rabbit populations

Management for open pavement

- Restoration management: Rehabilitation of heavily grazed pavement may require a major reduction in stocking rate, or total removal of grazing animals, for a period of five to ten years.
- Maintaining open pavement: The optimum long term stocking level to maintain the conservation interest of open pavement is less than one ewe per hectare (or cattle equivalent based on 5 ewes=1 cow).

Management for wooded pavement

- Maintain coppice and other woodland management. Reintroduce where it had lapsed. Coppicing may enhance the conservation value; maintaining areas of high forest within a site will provide diversity.
- Juniper and yew should be retained and maintained. Non-native species such as some conifers, beech and self-sown sycamore should be removed.
- Deer control and fencing of coppice regrowth may be required in some areas.

Management for scrubby pavement

- Invasive species such as blackthorn, cotoneaster, gorse or bramble should be removed where they shade out other flora.

- If woodland cover is encroaching, coppice management should be considered.

Current issues

- Overall, management issues, especially grazing levels on open pavement, are of over-riding importance to the habitat in Cumbria, although direct removal/damage is still an issue.
- Illegal removal of stone for garden rockeries and municipal landscaping. Enforcement of the current legislation relating to limestone pavement removal is difficult, as an offender currently needs to be “caught in the act” to be prosecuted. Garden centres continue to sell ‘water-worn limestone’ as there is still a demand from the public; relative lack of public awareness of its ecological importance perpetuates the demand
- Destruction of pavement as an incidental result of legal limestone quarrying at sites adjacent to areas of pavement
- Inappropriate grazing is a problem characteristic of open sites in Cumbria, where high densities of stock can remove or deplete the characteristic flora within grikes. Problems may be exacerbated by a high rabbit population
- Cessation of management on wooded pavement, leading to lack of structural diversity
- In-filling of grikes to remove perceived threat of injury to grazing animals.

Current action

- Sites are owned and appropriately managed by a variety of conservation organisations.
- A campaign for the protection of limestone pavement nationally is based in the County, co-ordinated by Cumbria Wildlife Trust and has a number of other partners.
- Complete coverage of the habitat in the County by Limestone Pavement Orders (LPOs). LPOs are made by Local Authorities under Section 34 of the Wildlife and Countryside Act. Removal of pavement within an order area is a criminal offence.
- Cumbria County Council's Mineral and Waste Local Plan contains the policy (Policy 50): “Planning permission will not be granted for mineral and waste development which would adversely affect limestone pavement”.
- The Countryside Stewardship agri-environment scheme currently targets limestone pavements on

the Orton Fells and around Morecambe Bay, by providing financial incentives to landowners and farmers to, for example, control scrub and maintain sympathetic grazing regimes. The Lake District Environmentally Sensitive Area scheme covers some limestone pavements areas and offers similar benefits to Countryside Stewardship.

- Action by Forest Enterprise to remove conifers and other non-native trees previously planted on limestone pavement.
- Limestone pavement management booklet has been prepared to give guidance on optimal management of pavement.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for limestone pavement in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Ensure that there is no further loss to the extent and quality of limestone pavement areas.
- Maintain the balance between features of geological importance and a characteristic assemblage of native plant species.

National Lead Agency

The national lead agency for limestone pavement is Countryside Agency, whose nominated officer is based at their Cheltenham office.

Local contacts

For all aspects : Limestone Pavement Action Group - Sarah Wiseman (015394 48280) or Simon Webb (01539 792800)

For aspects of enforcement of planning law: Cumbria County Council (01539 773407)

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to limestone pavements:

Phase I

- upland mixed ash woodland
- calcareous grassland
- high brown fritillary
- pearl bordered fritillary
- juniper

- Phase II
- least minor moth
 - northern hawk's-beard

References

Limestone Pavement Action Group (1998) *Limestone Pavement: Our Fragile Heritage* (booklet).

Ward, S.D. and Evans, D.F. (1976) Conservation Assessment of British limestone pavements based on floristic criteria. *Biological Conservation* **9**, 217-233.

Webb, S. (1995) Conservation of limestone pavements. *Transactions of British Cave Research Association* **21**, 97-100.

Objectives, targets and proposed actions for limestone pavements in Cumbria

Broad Objective A	Ensure no further loss of limestone pavement in Cumbria				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Ensure that planning and legislation systems protect limestone pavement	1 Seek to ensure that no new planning permissions (or extensions to existing ones) are granted which result in the loss of or damage to limestone pavements.	LAs, LPAG	O	SS	
	2 Lobby DETR to improve legislative protection for pavements. Press case for a trade ban by 2003 and for more enforceable LPO legislation by 2005.	LPAG	M	PL	
	3 Enforce existing LPO legislation and build links with Police Wildlife Officers to assist with enforcement. By 2001.	EN, CCC, LDNPA, YDNPA	S/O	PL	
	4 Designate sites of national importance as SSSI by 2002.	EN	M	SS	
	5 Designate as SACs all limestone pavements which meet selection criteria, by 2004.	DETR, EN	M	SS	
	6 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of limestone pavement, by 2006.	CWT, LAs	L	SS	

Broad Objective B		Ensure the favourable condition of all sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Achieve appropriate management for both ecological and geological objectives of limestone pavement. 70% to be in appropriate management by 2005, and 90% by 2010	1 Seek to bring 100ha of previously unmanaged pavement woodlands into Woodland Grant Scheme by 2005.	FC, FWAG, CFL, ECCP	M	SS	
	2 Where appropriate and desirable, restore limestone pavement to areas currently under conifer plantation, achieving removal of a further 300 ha of conifer plantation from limestone pavement by 2005.	FE	M	SS	
	3 All SSSI limestone pavements to be in favourable management through, for example, Wildlife Enhancement Scheme or Reserve Enhancement Scheme agreements. By 2005.	EN	M	SS	
	4 Ensure limestone pavement is considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management.	MAFF, FWAG, CFL, ECCP	O	SS	
	5 Continue to apply “cross-compliance” policy to upland vegetation, including limestone pavement, to help ensure that no Cumbrian pavement is ecologically over-grazed.	MAFF	O	SS	
2 Foster increased awareness and understanding of the biological and geological importance of limestone pavement and how it can be protected and properly managed	1 Provide information and advice, via key organisations, to all appropriate landowners/managers on the importance and suitable management of limestone pavement (using, among other means, the Limestone Pavement Management booklet). By 2003.	LPAG, EN, MAFF, FWAG, ECCP, CLA, CWT	M	A/C P	
	2 Continue to reduce the demand for ‘water-worn limestone’ by providing interpretation at appropriate limestone pavement nature reserves and major gardens containing decorative water-worn limestone, and through all appropriate media. By 2003.	LPAG, EN, CWT, NT	M	CP	

Broad Objective B		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Inform all garden centres/retail outlets of the importance of limestone pavements by 2001, with a view to ending its sale by 2003.	LPAG	S/M	CP

Broad Objective C		Ensure the favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Monitor changes in the extent and quality of limestone pavement in Cumbria, so that an assessment can be made of the effectiveness of conservation action	1 Collate information on the quality and extent (including area in favourable management) of limestone pavement into an appropriate database, by 2001.	EN, CWT	S	RM
	2 Devise a strategy for monitoring the quality and extent of limestone pavement, by 2002.	EN, YDNPA, CWT	M	RM
	3 Implementation of the above strategy to be in place by 2002.	LPAG, EN, CWT	M	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CCC = Cumbria County Council; CFL = Cumbria Farm Link; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; ECCP = East Cumbria Countryside Project; DETR = Department of the Environment, Transport and the Regions; EN = English Nature; FC = Forestry Commission; FE = Forest Enterprise; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; LPAG = Limestone Pavement Action Group; LPO = Limestone Pavement Order; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Purple Moor-grass and Rush

Pasture

Nationally, purple moor-grass and rush pasture has become extremely scarce due to land drainage and agricultural improvement. Cumbria is one of the last strongholds for this habitat, which is host to a range of nationally uncommon bird, plant and invertebrate species, including marsh fritillary, curlew and black grouse.

Current status

Purple moor-grass and rush pasture covers a range of species-rich vegetation dominated by purple moor-grass and/or tall rushes, predominantly on peaty gleys and shallow peats but also extending onto mineral soils. This is a scarce habitat which is largely restricted to the lowlands and upland fringes of south-west England, southern Wales, Cumbria, south-west Scotland and parts of Northern Ireland.

Purple moor-grass and rush pasture occurs in all Natural Areas in Cumbria. It is found adjacent to many of the lakes in the Lake District, such as Bassenthwaite and Elterwater and in the less intensively managed valleys such as Rusland valley. Lower valley sides support notable concentrations along flush lines, where this vegetation occurs in association with base-rich flushes, particularly over the Borrowdale volcanics of the central Lakes. The fringes of the Lake District and the Pennines support the other main concentration of this habitat in Cumbria. Notable examples occur on the west Cumbria coal field and to the north-east of Cockermouth. The rest of the resource is scattered

across the lowlands of the County as isolated fields or parts of fields. These include many of the rarest of the community types with notable examples to the north-west of Penrith.

The extent of the habitat in Cumbria is difficult to assess because it has not been specifically measured in the past. The Phase 1 habitat survey of Cumbria (Kelly and Perry 1990) maps over 12,000 ha of marshy grassland but this includes large areas of other species-poor habitats. It seems likely that the extent of the habitat may be less than 6,000 ha in Cumbria.

There are five National Nature Reserves supporting purple moor-grass and rush pasture in Cumbria. 23 Sites of Special Scientific Interest are notified for purple moor-grass and rush pasture communities in Cumbria. Some types of purple moor-grass and rush pasture are included within the *Molinia meadows on chalk and clay* habitat listed on Annex 1 of the EC Habitats Directive. In Cumbria 1 SSSI falls within a candidate Special Area of Conservation for this habitat.

Characteristic wildlife

Purple moor-grass and rush pasture grasslands are found in a variety of situations: on undulating plateaux and hillsides; in valley bottoms close to lakes and rivers, often forming the drier end of sequences from open water through swamps to dry land; adjacent to a variety of mire types, including valley mires and basin mires; in the damper parts of hay meadows; and, to a lesser extent, as hillside flushes. The vegetation often occurs in large and ecologically diverse community mosaics, although single community stands are not uncommon. Some constituent purple moor-grass and rush pasture stands are situated on the periphery of fens, within heathland sites or on low-lying coastal or inland floodplains.

Three broad types of the habitat have been identified in the county. Species-rich rush-dominated stands are generally dominated by a mixture of soft rush, jointed rush and sharp-flowered rush and can include a variety of herbs, including meadowsweet, marsh marigold, cuckoo flower, lady's smock, ragged robin, devil's-bit scabious, wild angelica, and common spotted orchid (Kelly and Perry 1990). Purple moor-grass - tormentil stands can be similarly flower-rich, with marsh thistle, wild angelica, greater bird's-foot-trefoil, devil's-bit scabious, meadowsweet, common valerian and lesser skullcap. The third type comprises the purple moor-grass - marsh hawk's-beard community, which is rich in small sedges and can include a number of the aforementioned tall herbs along with marsh valerian, saw-wort, great burnet and marsh hawk's-beard.

Purple moor-grass and rush pasture can be important for a variety of animals and invertebrates including butterflies such as the marsh fritillary and breeding birds such as redshank, snipe, lapwing, curlew and skylark.

Key species

The following rare or threatened species are associated with purple moor-grass and rush pastures in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern,

they are marked C.

water vole	<i>Arvicola terrestris</i>	P
skylark	<i>Alauda arvensis</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
yellow wagtail	<i>Motacilla flava</i>	C
black grouse	<i>Tetrao tetrix</i>	P
redshank	<i>Tringa totanus</i>	C
barn owl	<i>Tyto alba</i>	C
lapwing	<i>Vanellus vanellus</i>	C
great crested newt	<i>Triturus cristatus</i>	P
marsh fritillary	<i>Eurodryas aurinia</i>	P
narrow-bordered hawk-moth	<i>Hemaris tityus</i>	P
sword grass moth	<i>Xylena exsoleta</i>	P
Lilljeborg's whorl snail	<i>Vertigo lilljeborgi</i>	C
pink meadowcap	<i>Hygrocybe calyptraeformis</i>	P
marsh clubmoss	<i>Lycopodiella inundata</i>	P

Best management practice

Purple moor-grass and rush pasture depends on management of the vegetation to arrest succession to other types of plant communities, such as woodland, or changes to wetter, or drier, grassland or mire types. The nature of the management will depend on the objectives for any one site, taking into account the requirements of particular plant or animal species that may be present. The most important factors in managing these habitats are to ensure that they are sufficiently wet to support the characteristic plants and animal species and that they are appropriately grazed. Grazing is generally essential to the maintenance of this habitat and the ideal grazing stock are cattle. Cattle are more tolerant of wet conditions than sheep; they are less selective in their grazing behaviour than sheep, particularly when tackling more rank vegetation types or controlling scrub; and they can be used for grazing during the summer flowering period, where necessary, as they do not graze flowers in preference to the non-flowering parts of plants, unlike sheep.

Current issues

The issues that are associated with purple moor-grass and rush pasture largely relate to the management requirements of the habitat although development and other activities can be of local significance:

- The application of herbicides and fertilisers reduces species richness and can lead quickly to the loss of the habitat. Land drainage can lead to the loss of the habitat through drying out of the soil and abandonment of maintenance of drains and ditches can in certain circumstances lead to changes to wetter conditions which are equally unsuitable. However, the latter situation may be more easily reversed with the reintroduction of suitable management than the former.
- Grazing by sheep as opposed to cattle can lead to a reduction in the overall diversity of the habitat and the loss of rare species. The decline in beef suckler herds in Cumbria is, therefore, of particular concern in relationship to this habitat
- Agricultural abandonment and the cessation of grazing, as a result of a reluctance to farm wet land, or changes in land management, such as tree planting, leads to rankness and scrub encroachment and a reduction and loss in the characteristic plants and animals of the habitat.
- Developments (e.g. windfarms) and mineral extraction (for example, opencast coal) can lead to the loss and fragmentation of this habitat.

Current action

- Agri-environment schemes such as the Lake District and the North Pennines Environmentally Sensitive Areas schemes and the Countryside Stewardship scheme provide financial incentives to manage purple moor-grass and rush pasture in a way that is sympathetic to its nature conservation interest.
- A small number of purple moor-grass and rush pastures are managed for nature conservation objectives by organisations including English Nature and Cumbria Wildlife Trust.
- Forestry Commission Woodland Grants Schemes provide for open areas which frequently comprise this habitat.
- The habitat is included in the selection criteria for County Wildlife Sites and there is a programme of survey and designation which is due to be completed by 2005.
- A number of organisations across the County provide farm conservation advice and/or carry out practical management for nature conservation which will benefit purple moor-grass and rush pasture. These include the Arnsdale/Silverdale Countryside Management Service, Farming and Wildlife Advisory Group,

East Cumbria Countryside Project, Solway Rural Initiative, West Cumbria Groundwork Trust and Cumbria Farm Link.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for purple moor-grass and rush pastures in *Biodiversity: the UK Steering Group Report* (1995). This plan is currently undergoing revision to bring it into line with other recently published grassland plans.

The current Plan sets the following national objectives and targets:

- Secure sympathetic management of at least 13,500ha of purple moor-grass and rush pasture by the year 2000, divided between the four countries as follows: Wales 4,000ha, England 5,000 ha, Northern Ireland 4000ha and Scotland 500 ha.
- Initiate experimental attempts to re-create 500 ha of purple moor-grass and rush pasture on land adjacent to, or nearby, existing sites, by the year 2005.

The aim is to secure favourable management for a minimum of 25% of this scarce habitat within the time frame. These UK targets have been translated into targets for each Natural Area in England. The targets for Cumbria set out below are based on the relevant Natural Area targets.

The UK Biodiversity Action Plan includes an action plan for marsh fritillary, a species which is restricted to purple moor-grass and rush pasture in Cumbria.

National Lead Agency

Countryside Council for Wales.

Local contacts

Ian Slater, English Nature, Juniper House, Murley Moss, Kendal, Cumbria, LA9 7RL. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species and habitat action plans are of relevance to purple moor-grass and rush pasture:

Phase I

- water vole
- great crested newt
- marsh fritillary
- pearl-bordered fritillary
- high brown fritillary
- wet woodlands
- lowland raised bog
- basin mire

Phase II

- coastal and floodplain grazing marsh
- swamps and tall-herb fen
- springs and flushes
- valley mires
- northern hawk's-beard

References

Kelly and Perry 1990, *Wildlife Habitat in Cumbria*. Nature Conservancy Council.
Nature Conservancy Council (1990), *Handbook for Phase I Habitat Survey*. Peterborough.
Rodwell, J.S. (1991), *British Plant Communities, Volume 2. Mires and Heaths*. Cambridge University Press.

Objectives, targets and proposed actions for purple moor-grass and rush pasture in Cumbria

Broad Objective A		Ensure no further loss of purple moor-grass and rush pasture in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Arrest the depletion of purple moor-grass and rush pasture throughout its distribution in Cumbria	1 Keep the extent of SSSI coverage under review and notify sites as necessary to fill gaps in the coverage.	EN	O	SS	
	2 Designate as Special Areas of Conservation all purple moor-grass and rush pasture which meet selection criteria as soon as is practicable.	DETR, EN	M	SS	
	3 Carry out a review of the need to manage further key sites as National Nature Reserves by 2002.	EN	O	SS	
	4 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of purple moor-grass/rush pasture, by 2006.	CWT, LAs	L	SS	

Broad Objective B		Ensure the favourable condition of all sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Within SSSIs, initiate rehabilitation management for all significant stands of purple moor-grass and rush pasture in unfavourable condition by 2004, with the aim of achieving favourable status wherever feasible by 2010	1 Assess the condition of all purple moor-grass and rush pasture within SSSIs using standard criteria by 2002.	EN	M	RM	
	2 Where necessary, secure the uptake of positive management agreements with owners and occupiers of all purple moor-grass and rush pasture SSSIs by 2004.	EN, MAFF	M	SS	
2 For all other purple moor-grass and rush pastures secure favourable condition over 30% of the resource by 2005 (divided between Natural Areas as shown below) and as near to 100% as is practicable by 2015. Prioritisation of areas should take into account the needs of the marsh fritillary action plan	1 Ensure purple moor-grass and rush pasture is considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, EN	O	SS	
	2 Ensure Woodland Grant Schemes and Forest Design Plans protect purple moor-grass and rush pasture, taking into account management requirements of the habitat.	FC, EN	O	SS	
	3 Provide advice on management and grants to owners and occupiers of Wildlife Sites with purple moor-grass/rush pasture, by 2008.	CWT, FWAG	L	A	
3 Monitor changes in the extent and condition of purple moor-grass and rush pasture in order to assess the effectiveness of conservation action	1 Collate available information on the extent and condition of purple moor-grass and rush pasture into a database by 2003 and consider need for further survey.	EN, LDNPA, MAFF, CWT	M	RM	
	2 Devise a strategy for monitoring the extent and condition of the habitat by	EN, LDNPA, CWT	M	RM	
4 Promote awareness and understanding and best management practice for purple moor-grass and rush pasture	1 Produce guidelines for the identification, condition assessment and management of purple moor-grass and rush pasture by 2002.	EN	M	RM	
	2 Carry out two demonstration days on the identification, condition assessment and management of purple moor-grass and rush pasture by 2003.	EN, MAFF, FWAG, ECCP, NT, LDNPA	M	A	

Natural Area Targets for Operational Objective 2:

Cumbria Fells and Dales:	1000ha
West Cumbria Coastal Plain:	30% of high priority areas (to be identified)
Solway Basin:	50ha
Eden Valley:	20ha
North Pennines:	50ha (including Northumberland)
Yorkshire Dales:	750ha (including North Yorkshire)

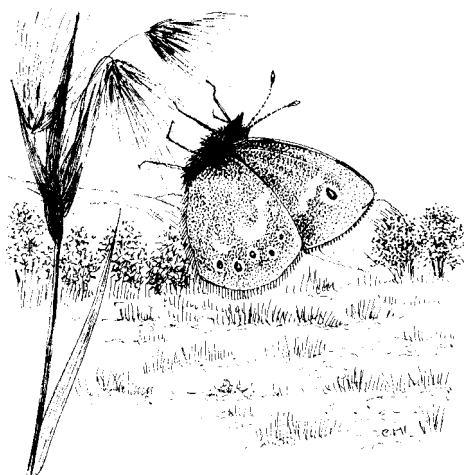
Broad Objective C		Increase the extent of purple moor-grass and rush pasture		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Initiate experimental attempts to re-create at least 25ha of purple moor-grass and rush pasture by the year 2005, in places that will link or expand existing sites, in particular those that will benefit the marsh fritillary	I Identify suitable sites and draw up a strategy to meet the target by 2004.	EN, MAFF, LDNPA, CWT, RSPB, NT, ECCP, NWW, CCC	M	RM/SS

Natural Area Targets:

Cumbria Fells and Dales:	10 ha
Eden Valley:	10 ha
Yorkshire Dales:	5 ha (including North Yorkshire)

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
CA = Countryside Agency; CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; ECCP = East Cumbria Countryside Project; EN = English Nature; FC = Forestry Commission; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust; NWW = North West Water Ltd.; RSPB = Royal Society for the Protection of Birds
Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).
Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Blanket Bog

Blanket bog is one of the most extensive wildlife habitats present in Cumbria. However, despite this, it is a globally scarce habitat, confined to parts of the world with a cool humid climate, mainly on seaboard exposed to moisture-laden oceanic winds.

Current status

Blanket bog is a mantle of deep peat (> 0.5 m) which formed over gently undulating hills, on plateaux and in hollows in the uplands following widespread woodland clearance by Neolithic man, although at higher altitudes it may be a climax vegetation from a time when the climate was cool and wet. It is found in areas of high rainfall and humidity and develops over several thousand years as a result of the decay of vegetation in cool humid conditions.

Although extensive where it occurs, blanket bog is a globally scarce habitat and it is thought that 10 to 12% of the World's resource is in the UK (approximately 1.5 million hectares), much of which is in Scotland. The cool, wet climate of Cumbria provides the right climatic conditions and the shallow slopes of the Pennines are particularly suitable for its development. Over 31,000 hectares were recorded by the Cumbria Phase I survey (Kelly and Perry 1990). Extensive areas of blanket bog are found in the North Pennines, Border Uplands, Yorkshire Dales and Cumbria Fells and Dales Natural Areas.

Large areas of blanket bog, particularly in the Bewcastle Fells, have been drained and planted with conifers. It is estimated that 65% of the conifer plantations in Carlisle District are on blanket peat.

One National Nature Reserve supports blanket bog in Cumbria. 13 Sites of Special Scientific Interest are notified for their blanket bog. Blanket bog is listed in Annex 1 of the EC Habitats Directive and active examples are a priority habitat. In Cumbria, 6 SSSI fall within 2 candidate Special Areas of Conservation for this habitat. The breeding bird populations it supports are covered by the EC Birds Directive and 4 SSSI fall within one proposed Special Protection Area. A number of sites supporting this habitat are owned or managed by conservation organisations including English Nature.

Characteristic wildlife

The plant community which has developed on these bogs is characterised by the presence of *Sphagnum* bog mosses, hare's-tail cotton-grass, common cotton grass, heather, bilberry, crowberry, and mosses such as *Pleurozium schreberi*. In the far north-east of Cumbria blanket bogs have similarities

to raised bogs (see *lowland raised mires* habitat action plan) and species such as the bog moss *Sphagnum magellanicum* and cross-leaved heath are common. Elsewhere deer grass and purple moor-grass can be abundant. Inappropriate management, particularly heavy grazing and/or inappropriate burning, can lead to an absence of *Sphagnum* bog mosses and/or heather.

Blanket bog in the north Pennines supports internationally important numbers of moorland breeding birds, including golden plover, dunlin and merlin.

Key species

The following rare or threatened species are associated with blanket bogs in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

golden plover	<i>Pluvialis apricaria</i>	C
black grouse	<i>Tetrao tetrix</i>	P
lapwing	<i>Vanellus vanellus</i>	C
large heath	<i>Coenonympha tullia</i>	C
a cranefly	<i>Limonia (Malanolimonia) styliifer</i>	
narrow-bordered hawk-moth	<i>Hemaris tityus</i>	P
argent and sable	<i>Rheumaptera hastata</i>	P
sword grass moth	<i>Xylena exsoleta</i>	P
yellow marsh saxifrage	<i>Saxifraga hirculus</i>	P

Best management practice

Blanket bogs are typically managed as rough sheep pasture and, where heather is present, for grouse shooting. Grouse management frequently involves controlled rotational burning of strips of heather to produce an intimate mosaic of stands of different ages. Burning may also be carried out by graziers; however, they tend to burn much larger areas of vegetation. In the past peat extraction by hand for fuel has been a localised feature of blanket bogs, but this practice is uncommon today.

Ideally blanket bog should be grazed lightly. There is some debate as to whether controlled burning is detrimental to the nature conservation interest of

blanket bog; however it is certainly poor practice at altitudes greater than 500m. Below this level rotations should be in excess of 20-25 years. Drainage and peat extraction are damaging to blanket bogs.

Current issues

- The main threats to blanket bogs are:
- o continuing effects of past gripping (little new gripping now occurs);
 - o heavy grazing, causing loss of heather and other species and exacerbating erosion, particularly on areas of Common Land;
 - o over burning and accidental or uncontrolled fires;
 - o acidification from atmospheric deposition;
 - o damage to vegetation by inappropriate use of vehicles for sporting or agricultural uses;
 - o recreational pressure, including erosion and disturbance of birds, caused by off-road driving, motorbike scrambling, mountain bikes, horse riding and walking;
 - o development, such as wind farms, which can damage the vegetation and peatland hydrology;
 - o loss of ground nesting birds as a result of the decline of game keeping;
 - o persecution of raptors leading to a decline of some key species such as hen harrier;
 - o climate change, possibly leading to changes in climax vegetation, different rates of peat accumulation, and possibly greater plant productivity and agricultural potential;
 - o afforestation, especially the extensive conifer plantations in the Bewcastle Fells (little new afforestation is now occurring, but this could change if the market changes);
 - o the potential threat from commercial peat extraction for fuel or horticulture.

In terms of relative importance it is over-grazing (past and present) and the continued effects of past moor-gripping and forestry which have caused the most significant and widespread loss of blanket bog and decline of its biodiversity.

Current action

- o The freehold rights to Moor House NNR are held by English Nature but even here the grazing pressures are uncontrolled because it is covered by common rights and part of the reserve has mineral rights held by others.

- Parts of Geltsdale and Glendue Fells have freehold or leasehold (shooting rights) held by the Royal Society for the Protection of Birds, although grazing pressures are not controlled by the leasehold rights (here there are tenant farmers). Some land is in an English Nature management agreement which holds sheep numbers at mid 1980 levels and another area is in a Ministry of Agriculture, Fisheries and Food Moorland Scheme agreement which has reduced sheep numbers.
- About 1,700 ha of land, which is predominantly blanket bog but includes other habitats, on Moor House and Cross Fell SSSI is under private agreements between landlords and tenant farmers to restrict grazing pressures. About 1,900 ha is under similar agreements on Appleby Fells SSSI. English Nature North Pennine Moorland and Allotment Wildlife Enhancement Scheme agreements cover some 7,000 ha on these two SSSIs, which encourage good burning practice and grip blocking as well as controlling grazing pressure. About 400 ha on Moor House and Cross Fell is in a Countryside Stewardship agreement which has reduced stock levels. About 2,200 ha of land on Moor House and Cross Fell SSSI has a Moorland Management Plan under the Northern Uplands Objective 5b Area Moorland Regeneration Project (NUMRP) which provides grant aid for farming and grouse shooting activities subject to environmental conditions. This land is covered by the other types of agreement specified above. A further 2,600 ha is in negotiation for this grant aid on Moor House and Cross Fell and Appleby Fells SSSIs; this land is also covered by existing agreements. Some of this grant aid goes towards blocking moor grips and providing winter housing for sheep to reduce grazing pressures.
- Some areas of blanket bog are within Lake District Environmentally Sensitive Area scheme agreements which restrict grazing pressures.
- Grouse moor owners and keepers continue to control predators of ground nesting birds (particularly foxes and carrion crows) despite over-grazing causing a decline in grouse moor viability. Illegal persecution of raptors is frowned upon by the majority of estate owners. BASC, the national representative body for shooters, only supports legal methods of predator control and has been working with the Raptor Working Group to help resolve conflicts between raptors and some game species.
- The Border Mires Committee, led by Forest Enterprise, covers all the areas owned by FE in the Bewcastle Fells area. The conservation of the SSSIs and other areas is covered by a general agreement called the Border Mires Management Plan. Butterburn Flow is managed by Northumberland Wildlife Trust under an agreement with Forest Enterprise. Substantial parts of Kielder Mires SSSI are subject to detailed management plans and Forest Design Plans agreed between FE and English Nature. These provide for some significant conifer removal and drain blocking to restore areas of blanket mire. Negotiations have also taken place between English Nature and Tilhill Economic Forestry to remove conifers on parts of Kielder Mires SSSI and between EN, RAF and FE at Spadeadam Mires SSSI to block drainage ditches and remove conifers. Substantial areas are now being restored (including 37 ha of cleared plantation at the latter site).
- MAFF continues to pursue a policy of environmental cross-compliance on semi-natural vegetation in the Less Favoured Area which aims to address significant current over-grazing.

Context in relation to other plans:

UK Habitat Action Plans

The UK Biodiversity Group Tranche 2 Action Plans vol. 6 contains an action plan for blanket bog. The plan sets out the following national objectives and targets:

- Maintain the current extent and overall distribution of blanket mire currently in favourable condition.
- 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 340,000ha (i.e. around 30% of the total extent of restorable blanket mire).
- Introduce management regimes to improve to, and subsequently maintain in, favourable condition a further 280,000ha of degraded blanket mire by 2010.
- Introduce management regimes to improve the condition of a further 225,000ha of degraded blanket mire by 2015, resulting in a total of 845,000ha (i.e. around 75% of the total extent of restorable blanket mire) in, or approaching, favourable condition.

National Lead Agency
Scottish Natural Heritage

Local contacts
English Nature, Juniper House, Murley Moss
Business Park, Kendal LA9 7RL

Associated plans in the Cumbria BAP
The following Cumbria habitat action plans are of relevance to blanket bog:

- Phase I
- upland heathland
 - limestone grassland
 - lowland raised mire
- Phase II
- black grouse
 - farmland birds

References

Kelly, P G & Perry K A 1990. *Wildlife Habitat in Cumbria. Nature Conservancy Council Research and Survey in Nature Conservation No.30.*

Objectives, targets and proposed actions for blanket bog in Cumbria

Broad Objective A		Ensure no further loss of blanket mire in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Create database of all blanket peat sites in Cumbria and categorise relative importance	1 Use soil maps, remote sensing data and Phase 1 & 2 surveys to determine extent of blanket peat soils with and without semi-natural vegetation cover. Categorise as follows: i) peat soil, not semi-natural but restorable to bog; ii) Semi-natural, poor condition; iii) Semi-natural, good condition needing further work; iv) ditto, not needing further work.	EN, CWT, NWW, LDNPA	S	RM
	2 Ensure planning and legislative mechanisms protect existing blanket bog			
	1 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of blanket bog, by 2006.	CWT	L	SS
	2 Ensure no new forestry plantations damage or destroy blanket bog through Forest Design Plans & grant-aid.	FC, FE	O	SS

Broad Objective A		Ensure no further loss of blanket mire in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Investigate effects and solutions relating to pollution and climate change	1 Collect data on effects of acidification and climate change on blanket bogs.	EA, MAFF, DETR, NW Climate Change Group	S	RM
	2 Raise awareness of effects and seek mitigation. (See also action under Land Management and Policy for the Wider Environment).	EA, MAFF, DETR, NW Climate Change Group, LAs	M	CP/SS

Broad Objective B		Ensure favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Promote appropriate management on SSSIs, Wildlife Sites & other areas of blanket bog supporting semi-natural vegetation in order to maintain the current extent and overall distribution of blanket bog currently in favourable condition Introduce management regimes to improve the condition of designated blanket bogs so that the total area in, or approaching, favourable condition is: - by 2005: 30% of restorable area - by 2010: 55% of restorable area - by 2015: 75% of restorable area	1 Seek improvements in grazing regimes through CAP reform, cross-compliance measures and agri-environment schemes.	MAFF, EN, FWAG, NUMRP, ECCP	M	SS
	2 Prevent/discourage new drainage activities and restore natural drainage patterns where drainage has taken place, through SSSI mechanism, owner/occupier (o/o) liaison and appropriate schemes such as WES, CSS etc.	MAFF, EN, CWT, FWAG, NUMRP, Moorland Assoc., ECCP	M	SS
	3 Restore areas affected by forestry by removing trees from areas of peat where restoration of hydrology is achievable.	FE, FC, EN, NWW, ECCP	M	SS
	4 Encourage appropriate burning regimes through advice to o/o and incentive schemes such as WES or CSS.	MAFF, EN, CWT, FWAG, Moorland Assoc., ECCP, NWW,	M	SS
	5 Discourage inappropriate use of vehicles for management purposes through advice to o/o and incentive schemes.	MAFF, EN, FWAG, CWT, Moorland Assoc., NWW, ECCP	M	SS

Broad Objective B		Ensure favourable condition of all sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	6 Use planning legislation to prevent, where possible, inappropriate recreational uses.	CCC, DC, LDNPA, EN	O	SS
	7 Seek opportunities to work with moorland owners to resolve issues associated with raptors.	EN, RSPB, DETR, Moorland Assoc., NWW	O	SP
2 Foster increased awareness and understanding of the biodiversity of blanket bog and how it can be protected	1 Provide information and advice to land managers through Site Management Statements on SSSIs, North Pennines Wildlife leaflet and advice to managers of Wildlife Sites.	EN, CWT, FWAG, MAFF, NUMRP, Moorland Assoc., ECCP	O	CP
	2 Disseminate information to the general public through press releases and articles in newspapers and magazines.	EN, CWT, FWAG, MAFF, NUMRP, Moorland Assoc., ECCP	O	CP
3 Monitor changes in extent and quality of blanket bog in Cumbria so that an assessment can be made of the effectiveness of conservation action	1 Collate information on Cumbria from UK inventory being developed by SNH. By 2002.	EN	M	RM
	2 Devise a strategy for monitoring quality and extent of blanket bog within one year. By 2002.	EN, CWT	M	RM
	3 Implement the strategy within two years. By 2003.	EN, CWT	M	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CA = Countryside Agency; CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; EA = Environment Agency; ECCP = East Cumbria Countryside Project; EN = English Nature; FC = Forestry Commission; FE = Forest Enterprise; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food; NUMRP = Northern Uplands Moorland Regeneration Project; RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Upland Heathland

During the mid to late 20th century over 35% of the heathland in Cumbria was lost through agricultural improvement, afforestation and overgrazing.

Current status

There are extensive areas of heathland in the upland areas of Cumbria. They characteristically lie between 300m and 750 m, between enclosed, improved agricultural land and montane heath at higher altitudes. The habitat can, however, occur within allotments below the top wall or fence-line. It predominantly overlies base-poor rocks on soils ranging from acid brown earths to podsoles. A small amount of heathland overlies limestone on acidic silt that is deposited in hollows in the surface of the limestone. It occurs in the Cumbrian Fells and Dales, North Pennines and Yorkshire Dales Natural Areas.

Upland heathland is recognised as being of international importance, because its distribution is largely confined to the western sea-board of Europe. The UK resource is very significant, comprising an estimated 2 million hectares. The current English extent is estimated at 269,000 ha (Felton and Marsden 1990). This has been subject to considerable losses since 1947, due to afforestation and heavy grazing by sheep. In Cumbria, losses between the 1940s and the 1980s are estimated at 36%.

There is difficulty in estimating the current extent of heathland in Cumbria due to dated survey information, further confused by the problem of drawing a distinction between heathland and grassland with suppressed heather cover. The best estimate comes from The Cumbria Phase I Survey (Kelly and Perry 1990) which identified the total wet and dry heath in Cumbria to be 20,860 ha, with a further total of 10,500 ha of heath/grassland mosaic. These figures will include a relatively small amount of lowland heath.

There is one National Nature Reserve supporting upland heathland in Cumbria. 10 Sites of Special Scientific Interest are notified for their upland heathland. Upland heathland is included within the *northern Atlantic wet heaths with Erica tetralix and dry heaths (all subtypes)* types identified in Annex I of the EC Habitats Directive. However, there are no candidate Special Areas of Conservation for this habitat in Cumbria. A number of sites supporting this habitat are owned or managed by conservation organisations.

Dry heath, dominated by heather and variable quantities of bilberry and bell heather; characteristically occurs on the steeper hill slopes and as mosaics with acid grasslands. Wet heath, characteristically with cross-leaved heath and/or purple moor-grass, occurs in waterlogged valleys and, in the uplands, often in association with blanket bog. Upland heathland in Cumbria, as throughout the range of this habitat, is strongly influenced by climate, altitude, slope and management practices.

Upland heathland is important for a variety of bird species, such as red grouse, black grouse, hen harrier, merlin and peregrine, as well as curlew, golden plover and twite. Although often rich in shrubs, heather moorland is poor in ground flora but supports rich communities of invertebrates including some uncommon ground beetles and the emperor moth.

Key species

The following rare or threatened species are associated with upland heathlands in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

skylark	<i>Alauda arvensis</i>	P
black grouse	<i>Tetrao tetrix</i>	P
hen harrier	<i>Circus cyaneus</i>	C
golden plover	<i>Pluvialis apricaria</i>	C
lapwing	<i>Vanellus vanellus</i>	C
natterjack toad	<i>Bufo calamita</i>	P
adder	<i>Vipera berus</i>	C
a wood ant	<i>Formica lugubris</i>	P
mountain ringlet	<i>Erebia epiphron</i>	C
a fly	<i>Cetema transversa</i>	
a fly	<i>Chirosia montana</i>	
a fungus gnat	<i>Macrocera bipunctata</i>	
argent and sable moth	<i>Rheumaptera hastata</i>	P
northern dart moth	<i>Xestia alpicola alpina</i>	P
sword grass moth	<i>Xylota exsoleta</i>	P
an hemipteran	<i>Psammotettix frigidus</i>	
juniper	<i>Juniperus communis</i>	P
chickweed wintergreen	<i>Trientalis europaea</i>	

Upland heathland requires light grazing, at densities of 1.5 ewes/ha or less in summer; to prevent the development of woodland. However, higher grazing densities are detrimental and can lead to loss of dwarf shrub cover. Damage to heather is particularly acute when there is high stocking in September/October and to a lesser extent in April. Damage is concentrated on the heather edge, particularly on the down-slope edge, and can be exacerbated by foddering of stock within or near the heather edge. Grazing needs to be accompanied by good shepherding, which spreads sheep out over the whole moor on a regular basis, to prevent stock concentrating in one area.

Many areas of dry heath are burnt, either for grouse shooting or for grazing. Controlled burning on long rotational cycles is not necessarily harmful to the biodiversity of upland heathland; however too frequent burning can greatly reduce both the floristic and invertebrate diversity of stands. Appropriate burning rotation lengths vary according to factors such as altitude and local climate; however in Cumbria they will rarely be less than 10 to 15 years in length.

Current issues

- Upland heath is a characteristic part of extensive areas of rough pasture used to graze sheep. Its quality, and long-term survival is known to be threatened by high grazing levels, particularly in autumn and winter. Grazing damage can also be exacerbated by lack of shepherding.
- Common land poses a particular problem in Cumbria. The subsidy regime encourages heavy stocking by individual farmers, and reductions in sheep numbers by individual farmers would be penalised by forage being utilised by sheep from neighbouring flocks. Only co-operative action could achieve sustainable grazing regimes in the absence of fenced units. Even with co-operation, appropriate management of a vegetation mosaic may be difficult to achieve if there are restrictions in the ability to fence land. In view of the difficulties involved, those commons which have managed to enter agri-environment schemes deserve much praise.
- Although uncontrolled and too frequent burning of heathland is highly damaging to the habitat,

carefully implemented burning regimes can be beneficial, through rejuvenation of heather plants, especially where associated with carefully-managed grazing. Currently, very little appropriate burning is carried out, due to a lack of manpower and expertise, a situation which also applies to ESA agreement land where sheep numbers have been reduced and sensitive burning would be useful in restoration.

- Game management on upland heath can benefit ground-nesting birds through control of predation by foxes and crows. However, illegal persecution of birds of prey, particularly hen harriers, would clearly damage the nature conservation interest of upland heathland sites.
- Drainage is not a widespread issue on heathland in Cumbria, but it can be damaging in wet heaths, and is more frequent within patches of wet heath contained within allotments rather than on the open fells. Agricultural hill land improvements in such areas have in the past also led to loss of upland heathland.
- Erosion in the uplands, including that within areas dominated by heather, is of widespread concern on steeper slopes. This is likely to be due to a number of factors, including stocking rates, climate change and possible acidification from pollution. Erosion can also be exacerbated by heavy use of footpaths, but the extent of this damage in percentage terms is relatively small, even in the Lake District. However, recreational disturbance of sensitive species is likely to be a more significant issue.
- Loss of heathland vegetation to development such as wind farms is localised and involves very small areas of habitat. However, the management of the heathland within a wind-farm is likely to be more crucial in determining whether it retains conservation interest. Damage by bird-strike has been reported in non-Cumbrian sites, but this may be strongly influenced by site specific characteristics.
- Afforestation has been a significant cause of heathland loss in the past. However, the current occurrence of heathland within plantation blocks can extend the resource, and Forest Design Plans provide the opportunity to maintain heathland in areas excluded from agricultural livestock.

Current action

- In the Lake District ESA a high uptake of the heather fell option has been achieved. This is making a valuable contribution towards maintaining the current extent of upland heathland. However, within Tier 1, the maintenance stocking density for upland heath depends upon the heather already being in relatively good condition. Thus declines in heathland quality within Tier 1 are believed to be occurring if heather is in poor condition. To recover heather quality, a higher uptake of Tier 2 prescriptions is required. Some agreements are in a higher Tier.
- Within Countryside Stewardship there is a scattering of heathland agreements, particularly in the Pennines.
- There is the prospect of significant areas of heather moorland (some of which is upland heath and much of which is blanket bog) coming under agreements in association with the Northern Uplands Moorland Regeneration Project. This partnership is led by the Moorland Association, managed by Agriculture Development and Advisory Service, and funded with the aid of help from MAFF and EC Structural Fund support.
- In addition to these positive schemes, MAFF continues to pursue its cross-compliance policy on semi-natural vegetation within the Less Favoured Area, and has taken action in cases of proven significant overgrazing.
- Atmospheric pollution issues are being studied by a joint Ministry of Agriculture, Fisheries and Food/Department of Environment, Transport and the Regions study, and by the North-West Region Climate Group.

Context in relation to other plans:

UK Habitat Action Plans

The UK Biodiversity Group Tranche 2 Action Plans vol. 6 contains an action plan for upland heathland. The plan sets out the following national objectives and targets:

- maintain the current extent and overall distribution of the upland heathland which is currently in favourable condition.
- achieve favourable condition on all upland heathland SSSIs by 2010, and achieve demonstrable improvements in the condition of

- at least 50% of semi-natural upland heath outside SSSI by 2010 (compared with their condition in 2000).
- seek to increase dwarf shrub cover to a minimum of 25%, where it has 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.
 - initiate management to re-create 5000ha 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.

National Lead Agency

Within England the lead agency for upland heath is English Nature.

Local contacts

Upland Focus Group of the Cumbria Biodiversity Partnership.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to upland heathland:

Phase I

- blanket bog
- upland oak woodland
- natterjack toad
- juniper

Phase II

- lowland heath
- springs and flushes
- montane heath and grassland
- montane rock ledge, outcrop and scree
- sub-montane and lowland natural rock-ledge, outcrop and scree
- black grouse

References

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

Kelly and Perry 1990, Wildlife Habitat in Cumbria. Nature Conservancy Council.

Objectives, targets and proposed actions for Upland Heathland in Cumbria

Broad Objective A	Retain the current distribution and extent of upland heathland in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time- scale	Type
I Ensure that heathland extent is not reduced by severe grazing pressures	1 Compile inventory of heathland sites at risk of loss of current extent of heathland habitat, and supply to MAFF.	EN, CWT, LDNPA	S	SS
	2 Identify priority sites on which grazing pressure is to be investigated.	EN, MAFF	S	SS
	3 Target agri-environment and integrated management schemes at upland heathland to obtain more favourable management.	MAFF, EN, FWAG, ECCP	S	SS
	4 Take action under cross-compliance and overgrazing regulations if significant severe overgrazing is likely to be persistent.	MAFF	M	SS

Broad Objective A		Retain the current distribution and extent of upland heathland in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
	5 Seek to ensure that no heathland areas are significantly deteriorating through grazing pressure by 2010.	MAFF, EN LDNPA, NT, NWW, Moorland Assoc., CWT, FWAG, ECCP	L	SS	
2 Ensure that heathland extent maintains linkages between the greatest geographical concentrations of heathland in Cumbria	1 Give priority attention to key stepping-stone heathland sites such as Birkbeck and Crosby Ravensworth Commons.	EN, MAFF	M	SS	
3 Ensure that the planning and legislation system protects upland heathland	1 Ensure that all areas of heathland that meet SSSI criteria are notified by 2005.	EN	M	SS	
	2 Ensure no SSSI consent is issued that would permit damage or destruction of upland heathland.	EN	O	SS	
	3 Seek to ensure that no heathland is lost to coniferous plantation through plantings grant-aided by Forestry Commission or through inappropriate Forest Design Plans.	FC FE, private forestry companies	S	SS	
	4 Seek to ensure that no heathland is lost through agricultural improvement.	MAFF, EN	S	SS	
	5. Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of upland heathland, by 2006.	CWT	L	SS	

Broad Objective B	Achieve favourable conservation management for at least 75% of upland heathland				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Achieve favourable conservation management on all upland heathland SSSIs by 2010, and achieve demonstrable improvement in the conservation status of at least 50% of upland heath outside SSSIs by 2010	1 Prepare and implement management plans for all upland heathland SSSIs/SACs by 2005.	EN, LDNPA	M	SS	
	2 Undertake condition assessment of all existing management agreements.	EN, MAFF	L	RM	
	3 Ensure that all heathland on cSAC sites have Site Management Statement (SMS) objectives for upland heath by 2000.	EN	S	SS	
	4 Adjust and/or renegotiate agreements (upgrade agreements, add additional off-wintering payments etc.) as opportunities arise, to achieve target.	EN, MAFF	M/L	SS	
	5 Acquire ownership, or assist conservation bodies to acquire ownership, of heathland sites, where appropriate.	EN	L	SS	
	6 Encourage owners/occupiers to undertake appropriate burning regimes, providing assistance where possible.	EN, MAFF	M	SS	
2 Make efforts to obtain ESA agreement over 90% of the resource within the Lake District ESA by 2003	1 Proactively target new ESA agreements.	MAFF, NT	S	SS	
	2 Set objectives for new agreements to be achieved in five years.	MAFF	M	SS	
	3 Ensure that all heathland on cSAC sites have SMS objectives for upland heath by end 2000.	EN	S	SS	
	4 Seek to ensure that all SSSI for which heathland objectives have been set are subject to either an ESA or a WES agreement.	EN, MAFF	M	SS	
	5 Provide advice on management and grants to owners and occupiers of Wildlife Sites with upland heathland (within Lake District ESA), by 2008.	CWT, FWAG	L	A/SS	

Broad Objective B **Achieve favourable conservation management for at least 75% of upland heathland**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Seek to ensure that 90% of resource outside the Lake District ESA is within CSS or a WES agreement	1 Seek to ensure that all SSSIs with heather outside Lake District ESA are subject to either CSS or a WES agreement.	EN, MAFF	M	SS
	2 Ensure that all heathland on cSAC sites have SMS objectives for upland heath by 2000.	EN	S	SS
	3 Proactively target further CSS agreements.	MAFF	S	SS
	4 Provide advice on management and grants to owners and occupiers of Wildlife Sites with upland heathland (outside Lake District ESA), by 2008.	CWT, FWAG	L	A/ SS

Broad Objective C **Create and enhance mosaics and transitions of upland heathland with other habitats**

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Achieve favourable management for all areas of upland heath adjacent to montane heath, blanket mire and upland sessile oak-woodland	1 Target all management schemes to these areas and adjust and/or renegotiate agreements (upgrade agreements, add additional off-wintering payments etc.) as necessary to achieve targets.	EN, MAFF	M	SS
	2 Ensure that all heathland on multi-interest cSAC sites have SMS objectives for upland heath by 2000.	EN	S	SS

Broad Objective D By 2010, seek to restore heathland on 500ha of upland habitat where dwarf shrubs have been reduced or eliminated

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Restore heather cover in areas adjacent to or contiguous with existing heather fell, or where heather could occur in a mosaic with montane heathland, blanket mire, and upland sessile oak woodland	1 Identify suitable target areas in appropriate Natural Areas. Set targets for each NA.	EN, NT, LDNPA	M	RM
	2 Promote CSS, ESA or WES agreements to achieve targets.	EN, MAFF, LDNPA	M	SS

Broad Objective E Foster increased awareness and understanding of the importance of upland heathland and how to manage it

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Provide training, advice and publicity	1 Provide training courses in condition assessment and the setting of management objectives and prescriptions for upland heathland management.	EN, MAFF, LDNPA	M	SS/CP
	2 Establish a network of sites demonstrating good environmental practice.	FWAG, MAFF, LDNPA	M	CP
	3 Produce leaflets in association with training days.	EN	M	CP
2 Contribute to political awareness of the role of common land reform in securing biodiversity objectives for upland heathland	1 Document information on case histories where progress on heathland actions has been hindered by the difficulty, under present legislation, for commoners to take up agri-environment schemes on common land.	EN, NFU, MAFF, LDNPA, NT, CWT	S/M	RM

Broad Objective F		Monitor the quality and extent of upland heathland			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Monitor the quality, extent and management of heathland in Cumbria	I Develop an agreed monitoring strategy within the county by 2002.	EN, MAFF, LDNPA	M	RM	

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CWT=Cumbria Wildlife Trust; ECCP=East Cumbria Countryside Project; EN=English Nature; FC=Forestry Commission; FE=Forest Enterprise; FWAG=Farming and Wildlife Advisory Group; LAs =Local Authorities; LDNPA=Lake District National Park Authority; MAFF=Ministry of Agriculture, Fisheries and Food; NT=National Trust; NWW=North West Water Ltd.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Basin Mire

The majority of basin mires in Cumbria are found in lowland situations and they are often surrounded by intensive agriculture. They do not usually fit in with any type of modern land management system and, unless they are managed as nature reserves or are used for low intensity activities such as rough shooting, tend to exist as unmanaged islands.

Current status

Basin mires, or basin fens, form in water-logged hollows where there is little or no lateral flow of water (no stream outlet or gradient). As peat forms in the basin from dead plant remains the mire surface will gradually rise. While the surface vegetation remains accessible to groundwater the mire remains a basin fen; however, if the surface rises above the influence of groundwater, so that it is fed solely by rainwater, the mire develops into a raised mire (see *lowland raised mire* Action Plan). There is a great deal of variation in habitat both within and between sites due to topography and hydrology, nutrient status, management history and the dynamics of successional change.

Basin mires are a rare habitat type in the UK and NW England. Basin mires occur mainly in lowland areas, although a few examples occur in the uplands. Nationally important sites occur in the Eden Valley (e.g. Cliburn Moss, Moorthwaite Moss, Newton Reigny Moss), Solway Plain (e.g. Biglands Bog), Cumbria Fells and Dales and West Cumbria Coastal Plain Natural Areas. Although this habitat is

widely distributed, the number of sites is small. Basin mires fed by base-rich groundwaters are particularly uncommon and Cumbria contains several important examples of this type.

There are 4 National Nature Reserves containing basin mires in Cumbria. 14 Sites of Special Scientific Interest are notified for their basin mire. Basin mires are included within the *Alkaline fens; Molinia meadows on chalk and clay; transition mires and quaking bogs; depressions on peat substrates (Rhynchosporion); and calcareous fens with Cladium mariscus and Carex davalliana* types identified in Annex I of the EC Habitats Directive, the latter is a priority habitat. A number of sites supporting this habitat are owned or managed by conservation organisations.

Characteristic wildlife

Many basin mires exhibit a range of vegetation communities across their surface, with central zones which are largely oligotrophic, characterised by species such as *Sphagnum* bog mosses, common cotton grass, cross-leaved heath, cranberry, white

beaked-sedge, bog rosemary and bottle sedge. Around the margins of the mire more mesotrophic vegetation can be present, which may include species like greater tussock sedge, cyperus sedge, marsh cinquefoil, bog bean and marsh pennywort. The exact composition of this vegetation depends greatly on the mineral and nutrient status of the groundwater feeding the mire.

Where the water table is at or above ground level for most of the year, swamp vegetation may develop, usually dominated by a single species such as common reed, greater tussock sedge or, rarely, great fen sedge and, whilst other species are often present, they are rarely abundant. Willow carr can be a significant component of basin mire vegetation, particularly where there has been some drainage or peat cutting. Birch and Scots pine can also be a feature of drier parts of basin mires.

A number of birds breed on basin mires, including reed warbler, sedge warbler, reed bunting and snipe. The invertebrate fauna of these mires includes the white-faced darter, variable damselfly, large heath butterfly, raft spider and a number of water beetles.

Key species

The following rare or threatened species are associated with basin mires in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

reed bunting	<i>Emberiza schoeniclus</i>	P
redshank	<i>Tringa totanus</i>	C
great crested newt	<i>Triturus cristatus</i>	P
a reed beetle	<i>Donacia aquatica</i>	P
a water beetle	<i>Hydroporus rufifrons</i>	P
a longhorn beetle	<i>Oberea oculata</i>	P
medicinal leech	<i>Hirudo medicinalis</i>	P
a snail	<i>Vertigo geyeri</i>	P
marsh earwort	<i>Jamesoniella undulifolia</i>	P
Norfolk flapwort	<i>Leiocolea/Lophozia rutheana</i>	P
a moss	<i>Campyliadelphus elodes</i>	
a moss	<i>Calliergon giganteum</i>	
slender green	<i>Hamatocaulis vernicosus</i>	P
feather moss		
a moss	<i>Pseudobryum cinclidioides</i>	

Best management practice

Basin mires are largely self-sustaining systems, requiring little management provided that they have not been subjected to drainage or eutrophication of groundwater supplies. However, the process of natural succession will lead to the development of wet woodland over the mire and, while this is a habitat of nature conservation interest in its own right, in some circumstances scrub clearance may be appropriate to protect uncommon open mire vegetation types and species.

Current issues

Management of the catchment

- Management of the catchment can have profound effects. Enrichment of water entering the site, for example through intensive agricultural use (ploughing, fertilising etc.), will lead to the proliferation of fast-growing, competitive species (eg. nettles and coarse grasses) and development of eutrophic swamp at the expense of the specialist mire communities. Nutrients can be picked up by the peat or locked up in sediments and then slowly released, making the process very difficult to reverse. The hydrological catchment needs to be managed in a way that reduces these impacts, but this needs to be done with the agreement of surrounding landowners.
- Drainage of adjacent agricultural land can change the quantity of water flowing in or out of the mire.
- Drainage of the mire itself to reduce waterlogging or flooding of adjacent agricultural and forestry land.
- Excessive water abstraction could affect the quantity of water reaching the mire. This could also affect water quality by reducing the dilution of pollutants
- Other sources of pollution: agricultural, industrial or domestic effluents.

Natural succession/lack of management

- Scrub (particularly birch, willow and Scots pine) will develop, particularly on drier sites or parts of sites; this may lead to further drying of the mire by evapotranspiration and to the shading out of some elements of the mire vegetation. However, in some situations, these wet woodlands are of value in themselves, so careful thought needs to be given to site objectives before tree/scrub

clearance is carried out. On some sites the vegetation may be changing from fen to ombrotrophic mire. Again, careful thought needs to be given to site objectives before deciding whether or not these changes are desirable.

Other site management issues

- Basin mires generally fall outside agricultural management and so are often not included in agri-environment schemes. The result is that funding for rehabilitation management is often not available in this habitat.
- Afforestation: effects of trees, as above. Also likely to have associated drainage works.
- Basin mires are often divided into numerous strips, each with a different owner. This can cause problems in carrying out management of the site as a whole, particularly in relation to hydrological issues.
- Attempts at reclamation to agriculture: drainage, fertilizer/pesticide application, etc.
- Peat cutting may be damaging, especially if it has adverse impacts on hydrology. However, in very exceptional circumstances, small-scale peat cutting could be beneficial by keeping the vegetation in contact with minerotrophic waters.
- Rubbish dumping. These sites are often of little agricultural use so may become dumping sites for local use.
- Fire.
- Grazing - both overgrazing and undergrazing.
- The creation of pools, to attract waterfowl for example, can lead to the loss of, or changes in, mire vegetation.

Current action

- British and European policy and legislation on water resources/quality is continuing to develop. Relevant developments, which may have important implications for basin mires, include the current Abstraction Licencing Review and the future European Water Framework Directive.
- English Nature's Cumbria Basin Mire Enhancement Project aims to clarify the nature conservation objectives for basin mire SSSIs and implement the management necessary to achieve these objectives, possibly through lottery funding. English Nature would like to carry this forward in conjunction with this local Biodiversity Action Plan, working in partnership with other organizations as far as possible.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for fen habitats, which include basin mires in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Identify priority fen sites in critical need of rehabilitation and initiate this by the year 2005. All rich fen and other sites with rare communities should be considered.
- Ensure appropriate water quality and water quantity for the continued existence of all SSSI fens by 2005.

National Lead Agency

English Nature

Local contacts

Jean Johnston and Sue Evans, English Nature, Juniper House, Murley Moss Business Park, Kendal LA9 7RL. Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to basin mire:

Phase I

- lowland raised mire
- wet woodland
- reedbed
- purple moor-grass and rush pasture
- great crested newt
- bats
- slender green feather-moss
- white-faced darter
- variable damselfly
- Geyer's whorl snail

Phase II

- swamps and tall herb-fen
- springs and flushes
- valley mires
- medicinal leech

Objectives, targets and proposed actions for Basin Mires in Cumbria

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Broad Objective A		Identify present distribution of basin mire in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Establish the distribution of all basin mires in Cumbria	I Survey and map the distribution of all potentially restorable basin mires in Cumbria to establish total resource, as part of SSSI and Wildlife Sites programmes. By 2005.	CWT, EN	M	RM

Broad Objective B		Maintain current area of basin mire in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Ensure that planning and legislative mechanisms protect existing basin mires	<p>1 Review Local Environment Agency Plans (LEAPs) to ensure that they contain adequate policies to protect basin mire habitats and species. Where this is not the case, make amendments at next revision.</p> <p>2 Keep the extent of SSSI coverage under review and notify sites as necessary to fill gaps in coverage.</p> <p>3 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of basin mire. By 2005.</p>	EA EN CWT	O O M	PL SS SS

Broad Objective C		Ensure the favourable condition of all SSSI sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Review objectives for all Cumbrian basin mire sites	I Identify priority plant communities and species (in Cumbrian context) to be conserved. Consider successional stages of these sites and overall balance of these across the county/natural areas. Consider long-term objectives for these sites.	EN	M	RM

Broad Objective C		Ensure the favourable condition of all SSSI sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	2 Consider the need to undertake invertebrate surveys where this is necessary for clarifying objectives.	EN	M	RM
2 Identify SSSIs which are not in favourable condition	1 Compare current site condition with the site objectives.	EN	S	RM
	2 Compare current site condition with historical records (where these exist) to attempt to identify changes taking place.	EN	M	RM
	3 Carry out basic hydrological observations/investigations where necessary to characterise problems.	EN, EA	M	RM
	4 Prioritise sites for action.	EN	M	SS
3 Initiate measures to achieve water quality appropriate for favourable condition (initiating rehabilitation on priority sites by the year 2005)	1 Where sites appear to be adversely affected by catchment management, agree workable strategy for each site to ensure that a catchment "buffer zone" is protected (eg. by including catchments in SSSI boundaries and/or management agreements, or by achieving appropriate management through Agri-Environment Schemes).	EN, MAFF, EA	M	SS
	2 Implement these strategies.	EN, MAFF	M	SS
	3 Maintain a list of Basin Mire SSSIs with apparent water quality problems, and identify and implement actions necessary to improve water quality on these sites.	EN, EA, MAFF	M	SS
4 Initiate measures to ensure that all basin mires have appropriate quantities of water to achieve favourable condition (initiating rehabilitation on priority sites by the year 2005)	1 Produce 'Abstraction Management Strategies' and review all abstraction licenses. Amend or revoke licenses as necessary to prevent damage to SSSIs. (As detailed in the Government's Abstraction Licensing Review and the legislation which is to follow).	EA	Timescale dependent on legislation	SS

Broad Objective C		Ensure the favourable condition of all SSSI sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	2 Carry out hydrological surveys where necessary to understand water budgets on sites. Also ascertain possible hydrological effects on adjacent land of any remedial works proposed on the mire. (EA contribution dependent upon Abstraction Management Strategies).	EN, EA	M	RM
	3 Prepare and implement Water Level Management Plans for the 3 basin mires on the agreed list.	EA, DCs, EN	M	SS
	4 Where appropriate, ensure that water levels are maintained by implementing programmes of ditch damming and sluice control. Address any associated problems or concerns on adjacent land.	EN, EA	M	SS
5 Initiate other management necessary to achieve favourable condition (Identifying priority sites in critical need of, and initiating rehabilitation by the year 2005)	1 Where appropriate, plan and implement scrub clearance.	EN	M	SS
	2 Consider reintroduction of small-scale peat cutting to maintain or restore minerotrophic conditions on some fen sites.	EN	M	SS
6 Monitor changes in the extent and quality of basin mires in Cumbria so that an assessment can be made of the effectiveness of conservation action	1 Monitor and report on the condition of basin mires in SSSIs every 5 years.	EN	O	RM
	2 Monitor water quality/water quantity where changes in vegetation indicate a need.	EN, EA	O	RM
7 Foster increased awareness and understanding of the importance of basin mires and their management needs	1 Complete Site Management Statements on all SSSIs with basin mires by end 2000. Review as necessary as vehicle for consultation with Owners and Occupiers and to summarise agreed management.	EN	S	SS
	2 Carry out appropriate consultation/ negotiation with owners and occupiers of sites (and of any other adjacent land which might be affected) before planning any management works.	EN	M	SS

Broad Objective C		Ensure the favourable condition of all SSSI sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	3 Carry out appropriate consultations with interested members of the public (particularly where there is significant public access) before carrying out any major management works.	EN	M	CP/SS
	4 Provide information and advice, via key organisations, to all appropriate landowners/managers with land on or adjacent to basin mires on their importance and management, linked to agreed habitat management needs.	EN, EA, LAs	M	CP
Broad Objective D		Ensure the favourable condition of non-SSSI basin mires		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Initiate rehabilitation management to achieve favourable condition status of priority non-SSSI basin mires. By 2005	1 Ensure basin mires are considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, EN, CWT	M/L	SS
	2 Assess the effectiveness of agri-environment schemes and other funding mechanisms in addressing basin mire conservation.	EN	M	SS
	3 Provide advice to owners and occupiers of basin mire Wildlife Sites. By 2008.	CWT	L	SS/CP
	4 Develop a strategy for the restoration of priority non-SSSI basin mires. By 2005.	CWT, EN	M	SS

Broad Objective D		Ensure the favourable condition of non-SSSI basin mires		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
2 Monitor changes in the extent and quality of basin mires in Cumbria so that an assessment can be made of the effectiveness of conservation action	1. Devise a strategy to monitor and report on the condition of non-SSSI basin mires. By 2005.	CWT	M	RM

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CWT = Cumbria Wildlife Trust; EA = Environment Agency; EN = English Nature; LAs = Local Authorities; MAFF = Ministry of Agriculture, Fisheries and Food.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Lowland Raised Mire

Raised mires are of nature conservation interest for their plant and animal communities. They are also invaluable as an archaeological resource as they preserve a record of past vegetational changes through the plant remains and pollen preserved in the peat. Some mires also preserve human remains and artefacts.

Current status

Lowland raised mires (or bogs) are areas of deep peat which have developed on low-lying, level ground, mostly on marine, estuarine or fluvial deposits adjacent to estuaries or on the floodplains of rivers, but also over sites of shallow glacial lakes which became infilled and occupied by fen vegetation. Over many thousands of years the decay of wetland vegetation and the growth of specialised mire plants has led to the development of domes of peat, as much as 10m deep, with a veneer of surface vegetation. The mire surface on these domes is higher than the surrounding land and these mires receive all their water from rainfall. As a result a characteristic vegetation, adapted to nutrient-poor, acidic conditions has developed.

Oceanic lowland raised mire, the type found in Cumbria, is restricted to western and northern Britain, the Irish Midlands, the Netherlands, Denmark and a narrow coastal strip of Norway. Losses of this habitat have been severe throughout Europe.

The raised mire habitat was never extensive in Britain and most of that now remaining is in Scotland. The major concentration of raised mires is found in southern and eastern Scotland and north west England.

Most of the raised mires in Cumbria are concentrated around the coastal plains of the Solway Estuary and Morecambe Bay. The mires seen today are the remnants of formerly very extensive bogs. Further inland there are also some naturally smaller sites which have developed in more confined situations such as basins and floodplains.

94% of the raised bogs in Britain have been destroyed since the beginning of the 19th century (Lindsay and Immerzi, 1996) and all of the remainder have been damaged, mostly through attempts at drainage, peat extraction and afforestation. However some retain plant communities typical of raised bogs and a relatively undamaged hydrology. Raised mires are now nationally rare. Cumbria has most of the remaining raised mires in England and a relatively large area of little-damaged bog.

Active raised bogs and degraded raised bogs (still capable of natural regeneration) are listed in Annex I of the EC Habitats Directive, the former is a priority habitat. There are 19 SSSIs in Cumbria which are designated for their raised mire interest. Seven of these are included in three candidate Special Areas of Conservation and eight are partly National Nature Reserves.

Characteristic wildlife

The least-damaged mires have a rich assemblage of *Sphagnum* bog mosses, growing with hare's-tail cotton grass, common cotton grass and cross-leaved heath. Other species present may include bog rosemary, cranberry and sundews. On modified bogs the communities have more affinities with wet heath. Heather may dominate and deer grass and bog myrtle are more common. Where the ground is drier bilberry or purple moor-grass may be dominant. Scrub in the form of birch, pine or rhododendron often becomes established and, particularly around the edges of the bog, can develop into woodland.

Raised bogs support a number of uncommon plant and animal species and have a unique invertebrate assemblage including dragonflies, such as white-faced darter, moths, butterflies and bog bush cricket. They are also important for some breeding bird species, including curlew, snipe and nightjar.

Key species

The following rare or threatened species are associated with lowland raised mires in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

skylark	<i>Alauda arvensis</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
redshank	<i>Tringa totanus</i>	C
adder	<i>Vipera berus</i>	C
a water beetle	<i>Acilius canaliculatus</i>	
a water beetle	<i>Graptodytes granularis</i>	
a water beetle	<i>Hydrochus brevis</i>	
a water beetle	<i>Hydroporus scalesianus</i>	
a water beetle	<i>Laccornis oblongus</i>	
large heath	<i>Coenonympha tullia</i>	C

bog bush cricket	<i>Metrioptera brachyptera</i>	
variable damselfly	<i>Coenagrion pulchellum</i>	
white-faced darter	<i>Leucorrhinia dubia</i>	C
keeled skimmer	<i>Orthetrum coerulescens</i>	
a dung fly	<i>Cordilura hyalinipennis</i>	
a fly	<i>Hercostomus angustifrons</i>	
a horse fly	<i>Hybomitra micans</i>	
a crane fly	<i>Limnophila fasciata</i>	
small grass emerald	<i>Chlorissa viridata</i>	
moth		
grey scalloped bar moth	<i>Dyscia fagaria</i>	C
narrow-bordered bee	<i>Hemaris tityus</i>	P
hawk moth		
a linyphiid spider	<i>Centromerus levitarsis</i>	
a bug	<i>Micracantha marginalis</i>	
a bug	<i>Paradelphacodes paludosus</i>	
a moss	<i>Calliergon (=Cratoneuron) giganteum</i>	
a moss	<i>Dicranum bergeri (=undulatum)</i>	
a bog moss	<i>Sphagnum fuscum</i>	
a bog moss	<i>Sphagnum imbricatum</i>	
marsh clubmoss	<i>Lycopodiella inundata</i>	P

Best management practice

Undamaged raised mires do not require any management in order to maintain them. However, all of the mires in Cumbria have been damaged to varying degrees and require at least restoration management and possibly periodic or low-level ongoing management subsequently. Attempts at restoration are aimed at improving the hydrological regime of the site so that there is a higher and more consistent water table. Long term management to maintain areas of open water may be required as ditches become colonised by vegetation and are filled in.

Restoration management in its simplest form involves removal of scrub from areas of mire vegetation and blocking of ditches in order to raise the water table. More badly damaged sites may require measures such as bunding or other engineering works. For the longer term conservation of these sites it may also be necessary to raise water levels on land which was formerly part of the mire but is currently in another use.

Current issues

The main issue affecting raised mires in Cumbria is water loss through past damage to the site. The major cause is through old ditch systems put in to prepare the mire for peat extraction, but can also be due to afforestation, commercial peat extraction or reclamation leaving a small or awkwardly-shaped mire remnant. The lowered water table resulting from drainage not only affects the mire communities directly but also allows the growth of scrub. The trees accelerate water loss and eventually the mire becomes wet woodland.

Creation of new lowland raised mires is not technically possible at present and extension of mire communities over their former extent will also be impractical in most cases. Usually much of the marginal peat has been cut and removed with the remainder converted to improved agricultural grassland or arable by ploughing and the application of inorganic fertilisers. Restoration of these areas is problematic as the hydrological link with the main peatland may have been severed, the ground level and water table are lower than the surviving mossland and the effects of fertiliser and lime application are hard to reverse except over a long timescale. Conservation measures must therefore concentrate on the existing resource.

- Creation of new mires and extension of existing sites is not possible at present.
- Commercial extraction of peat causes direct loss of mire communities but also damages the hydrology of the whole bog, making restoration difficult or impossible.
- Resolution of impacts of current activities, including revocation of licences and consents, may be required where damaging activities have statutory consent.
- Drying-out of mires due to past damage e.g. drainage ditches. Some of this damage (ditching and scrub growth) is relatively straightforward, if expensive, to deal with but other damage may be irreversible
- Drying-out of mires due to drainage of surrounding land where there is a hydrological connection with the mire.
- Use of bogs for growing trees damages the bog, both through disturbance during planting and maintenance activities, and through transpiration and interception of water and through shading.

- Multiple/unknown ownership makes arranging management more difficult.
- Agricultural reclamation is a minor threat at present but past reclamation has left most mires hydrologically isolated or truncated and further losses would decrease the likely success of restoration measures.
- Domestic peat cutting now only takes place on a small number of sites. It is a minor form of damage at the present time but cessation would benefit those mires where it occurs.
- Air pollution may affect mire communities, but its effects are little understood in this country.
- Uncontrolled fire has the potential to cause extensive damage. This is more common in north Cumbria than in the south.
- Recreational activities can lead to direct damage or conflict with restoration objectives.
- Conflict with other conservation aims. Other habitats or species may require management which conflicts with restoration management of the mire eg. red squirrels or deer.

Current action

- Restoration of damaged mires in Cumbria is being undertaken by English Nature, Cumbria Wildlife Trust and Royal Society for the Protection of Birds.
- Restoration techniques are being developed on National Nature Reserves and Wildlife Trust Reserves.
- Statutory protection: Ongoing protection of SSSI and County Wildlife Sites through Local Authority local and structure plan policies and Lake District National Park Management Plan.
- Preparation of Water Level Management Plans by the Environment Agency.
- Review of mineral planning permissions by Cumbria County Council and Lake District National Park Authority.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for lowland raised mire in the UK Biodiversity Group Tranche 2 Action Plans Vol. 6 (1999), which sets the following UK objectives and targets:

- Maintain the current distribution and extent (c6,000ha) of primary near-natural lowland raised peat bog in the UK, and ensure that the condition of this resource is maintained where

favourable or enhance through appropriate management.

- 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; c7,000ha), and aim to achieve favourable condition of these areas by 2015.
- 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.
- Initiate by 2005 improvement or restoration management on areas which have been identified above according to the agreed timescales.

National Lead Agency

Lead Agency: English Nature (to be confirmed)

Local contacts

Jacqui Ogden, English Nature, Juniper House,
Murley Moss Business Park, Kendal LA9 7RJ.
Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to lowland raised mires:

Phase I

- red squirrel
- white-faced darter
- basin mires
- reedbed
- purple moor-grass and rush pasture

Phase II

- lowland heath
- swamps and tall herb fen

References

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.

Objectives, targets and proposed actions for lowland raised mires in Cumbria

Broad Objective A	No further loss of lowland raised mire in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Use statutory provisions to protect lowland raised mires	1 Seek to refuse consent for proposals which would damage lowland raised mires or be detrimental to their management.	LAs, EA, EN CWT	O-L	SS
2 Complete identification of lowland raised mires in Cumbria	1 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of lowland raised mire, by 2006.	CWT, LAs	L	RM/SS
3 Put conservation of Cumbrian mires into a national context	1 Encourage production of a national strategy.	EN, CWT	M	PL
	2 Provide information required for national strategy.	EN, CWT	M	PL

Broad Objective B		Achieve favourable condition for all active or potentially active sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Monitor and report on the condition of sites	1 Assess the baseline condition of all lowland raised mire SSSI and Wildlife Sites using standard criteria by 2002, including collection of new information where appropriate (eg survey of selected invertebrate groups).	EN, CWT	M	RM
	2 Carry out monitoring against defined objectives for each site.	EN, CWT, RSPB, LDNPA	O-L	RM
2 Ensure appropriate restoration measures are in place within the mire	1 Draw up and implement a programme for conservation management of SSSIs, with the aim of achieving their favourable condition.	EN, CWT RSPB, ECCP, LDNPA	O-L	SS
	2 Provide advice on management and grants to owners and occupiers of Wildlife Sites with lowland raised mire, by 2008.	CWT, FWAG	L	A/ SS
	3 Increase area under favourable management through the acquisition and management of nature reserves and through the provision of advice and positive management agreements with landowners.	EN, CWT RSPB, LDNPA, ECCP	O-L	SS
3 Seek to bring all hydrologically important land surrounding mires into favourable management	1 Identify hydrological units for restorable sites by 2003.	EN, CWT, EA?	M	RM
	2 Seek to bring all hydrologically important land surrounding mires into favourable management, including increasing water levels where this would be beneficial, by 2015. This may include involvement or amendment of environmental or agri-environment grant schemes.	EN, CWT, RSPB, EA, MAFF, LDNPA, NWW, ECCP	O-L	SS
	3 Amend deficient SSSI boundaries where this would enable better management of the site by 2005.	EN	L	SS
4 Prioritise the management of active/potentially active mire sites in Cumbria	1 Finish EN's Cumbria Strategy for SSSI by 2001.	EN	S	PL

Broad Objective B		Achieve favourable condition for all active or potentially active sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
5 SAC designation for sites meeting criteria	1 Pursue SAC status for the Witherslack Mosses (Rusland Valley Mosses, Nichols Moss, Meathop Moss, Foulshaw Moss).	EN DETR	S	PL/ SS

Broad Objective C		Increase public awareness and understanding of lowland raised mires		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Increase public awareness and understanding of lowland raised mires	1 Review the success of the National Peat Campaign in Cumbria and make recommendations for further action by 2002.	CWT EN, RSPB	M	CP/ RM
	2 Run demonstration days or guided walks on appropriate sites for target audience.	CWT , EN, ECCP	O	A/ CP
	3 Install a display in Tullie House Museum interpreting biodiversity and conservation of the Solway Mosses by end 2001.	THM , EN	S	CP

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; EA = Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; LAs = Local Authorities; LDNPA = Lake District National Park Authority; RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Reedbed

Reedbeds are amongst the most important habitats for birds in the UK. Where extensive, they support a distinctive breeding bird assemblage, which includes bittern, marsh harrier, bearded tit, reed warbler, sedge warbler, water rail and reed bunting.

Current status

Reedbeds are wetlands dominated by stands of common reed where the water table is at or above ground level for most of the year. They often include areas of open water and ditches. Small areas of wet grassland and carr woodland may also be associated with them. Nationally there are 5000ha of reedbed, made up of around 900 sites. Only 50 of these sites are greater than 20ha.

Within Cumbria it is likely that reedbed habitat has always been naturally relatively scarce and fragmented and less than 220 ha was recorded by Kelly and Perry (1990). Reedbeds are found in almost all the Natural Areas in Cumbria.

Eleven Sites of Special Scientific Interest in Cumbria contain reedbeds greater than 2ha in area, including one National Nature Reserve. Most of the significant reedbeds in Cumbria are designated as SSSIs and many are managed as nature reserves.

Characteristic wildlife

The term reedbed is often used to describe areas ranging from marginal fringes along river systems to

extensive blocks in lowland and coastal plains.

Although true reedbed is dominated by common reed, stands of other species such as reed canary-grass and yellow iris are sometimes also referred to as reedbeds. Large sites dominated by these other species have been included within this plan despite not being 'true' reedbed.

The variation in reedbed structure often depends on water levels within the system. Reedbeds which normally have 20cm or more of surface water in summer are referred to as 'reedswamp'. These areas are often of high invertebrate and bird interest but with little botanical diversity. 'Reedfen', where water levels tend to be at or below surface level during the summer, are often far more botanically complex and diverse.

A variety of factors such as size, age, water quality, geographical distribution etc. will lead to differences in the plant, animal and invertebrate communities found in reedbed. In Britain, species such as bittern appear to require reedbed in excess of 20 hectares in which to breed. Wintering bitterns will often use smaller sites but invariably move on in spring. Both marsh harriers and bearded tits are able to nest in smaller reedbeds than bitterns. In the case of marsh

harriers, their main requirements are for a secure nesting site and wet ditches to hunt along. Bearded tits require well-established drier reedbeds where the litter has accumulated.

In Cumbria characteristic birds of reedbeds include reed bunting, water rail, reed warbler; however occasional marsh harriers and even bitterns do occur.

Although common reed is the main species associated with reedbeds, there are always other plants to be found. Reedmace, yellow iris, bur-reed and rushes are often found where reed is less dominant. In drier stands hemp agrimony, great willowherb and bittersweet occur and, where succession has progressed, scrub species such as willow and alder become frequent.

Otters can be associated with reedbeds especially where a healthy eel population is found.

Water voles and water shrews can also be found in the ditches which run through and round the body of the reedbed, however both species are rare in Cumbria, although water shrews may be under-recorded.

In the UK there are 700 invertebrate species associated with reedbed, of which 40 are entirely dependent upon reedbed. Of these 40 species only one is found in Cumbria, the silky wainscot moth.

Common frogs and toads are often found in reedbeds but generally only where fish are absent.

Key species

The following rare or threatened species are associated with reedbeds in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

water vole	<i>Arvicola terrestris</i>	P
European otter	<i>Lutra lutra</i>	P
bittern	<i>Botaurus stellaris</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
a reed beetle	<i>Donacia aquatica</i>	P
silky wainscot moth	<i>Chilodes maritimus</i>	

Best management practice

In Cumbria most reedbeds are unmanaged, however without management reedbeds may naturally dry out and turn to woodland in the medium to long term. Operations such as reed cutting, scrub control and water level management will slow down or reverse this process. The appropriate management will be site specific and dependant on the species that currently use or are to be encouraged to use the reedbed.

The key elements of a reedbed management are water levels, water - reed interfaces, reed/vegetation management including reed cutting, scrub management, reed litter depths. Specialist advice should be sought prior to reedbed management to ensure best management practice for a specific site.

Current issues

- Drainage of existing reedbed and associated wetlands with agricultural intensification.
- Surface and groundwater abstraction causing lowering of water levels within existing reedbeds.
- Water quality - diffuse or point source pollution.
- Population isolation as a result of fragmentation of existing areas.
- Development pressures.
- Absence of targeted management for existing reedbed habitat.
- Recreational pressures.

Current action

- The Environment Agency, English Nature and Royal Society for the Protection of Birds are currently collaborating on a lowland wetland project in the North of England to identify sites which have a realistic potential for wetland creation/restoration including reedbed and wet grassland.
- The Environment Agency encourages protection of reedbed sites through its Local Environment Agency Plans and within the Shoreline Management Plan process.
- The Environment Agency has produced Water Level Management Plans for many important wetland sites including reedbeds.
- The Environment Agency, English Nature and Cumbria County Council seek to highlight and

promote the importance of reedbeds through the planning process.

- Small-scale reedbed creation for water quality improvement is supported by the Environment Agency where appropriate.
- Cumbria Wildlife Trust/Local Authority programme of survey and designation of County Wildlife Sites, including reedbeds, to be completed by 2005.
- A national Heritage Lottery bid is currently being drawn up for reedbed/wet grassland/fen restoration and creation by English Nature and partners. Sites in Cumbria will be investigated as part of this bid.
- The English Nature Action for Bittern Project has provided funding for reedbed rehabilitation and extension in England.
- Royal Society for the Protection of Birds has a priority programme for reedbed rehabilitation and creation on existing reserves and are creating new reedbeds on land of low nature conservation interest purchased by the society.
- Monitoring of populations of key reedbed species is carried out annually by a range of statutory and voluntary organisations.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for reedbeds in Biodiversity: the UK Steering Group Report (1995), which sets the following UK objectives and targets:

- Identify and rehabilitate by the year 2000 the priority areas of existing reedbed (targeting those of 2 ha or more) and maintain this thereafter by active management. [This target will provide habitat for 40 pairs of bitterns and provide optimum conditions for other reedbed species and should be targeted in the south-east.]
- Create 1,200 ha of new reedbed on land of low nature conservation interest by 2010. [The creation of new reedbed should be in blocks of at least 20 ha with priority for creation in areas near to existing habitat, and linking wherever possible. The target should provide habitat for an estimated 60 breeding pairs of bitterns boosting the numbers to previous levels. It should be targeted in the south-east of Britain.]

National Lead Agency

National lead agency for reedbed is English Nature.

Local contacts

Environment Agency - Judith Bennett.

Phone: 01768 866666.

English Nature - Paul Glading.

Phone: 01539 792800.

Associated plans in the Cumbria BAP

The following Cumbria species and habitat action plans are of relevance to reedbeds:

Phase I

- water vole
- variable damselfly
- wet woodland
- purple moor-grass and rush pasture
- lowland raised mire
- basin mire
- coastal plan
- mesotrophic standing waters
- rivers and streams

Phase II

- coastal and flood-plain grazing marsh
- swamps and tall herb fen
- valley mires
- oligotrophic standing waters
- standing waters on marl
- coastal saltmarsh
- saline lagoons

References

Kelly and Perry 1990, Wildlife Habitat in Cumbria. Nature Conservancy Council.

Objectives, targets and proposed actions for reedbeds in Cumbria

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Broad Objective A	Maintain and improve the quality of existing reedbed sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Ensure all significant reedbeds have appropriate statutory or Wildlife Site designations	1 Identify and incorporate into database/GIS all existing reedbed in Cumbria.	EA, EN, RSPB, CWT, LDNPA	M	RM
	2 Review and designate appropriate reedbeds as SSSI.	EN	M	SS
	3 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of reedbeds, by 2006.	CWT, LAs	L	SS
2 Protect existing reedbed sites from drainage and over abstraction	1 Use Environment Agency consents to protect reedbeds from over abstraction, drainage or pollution.	EA , statutory and non statutory consultees	O	SS
3 Promote appropriate management of existing reedbed	1 Ensure reedbed is considered in the setting up of new agri-environment agreements and in any revision of existing agreements to ensure that, where possible, the habitat is brought into favourable management to contribute to national BAP and local Natural Area targets for the habitat.	MAFF, EN, RSPB		
	2 Invertebrate and other surveys may be required to determine if existing management successful or appropriate.	EN, CWT, RSPB	M	RM
	3 Ensure best management practice is applied to all reedbeds under conservation management by 2005 and other priority non-statutory sites by 2010.	EN, CWT, NT, RSPB, ECCP, FWAG	M/L	A/SS
	4 Provide advice on management grants to owners of Wildlife Sites with reedbed by 2008.	CWT, FWAG	L	A
	5 Raise awareness of value of reedbed of all sizes to landowners.	RSPB, EA, EN, CWT, DCs, LDNPA, FWAG	O	CP

Broad Objective A		Maintain and improve the quality of existing reedbed sites			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
4 Rehabilitate sites as appropriate	1 Identify landowners and mechanisms available to facilitate appropriate management.	EN, DCs, LDNPA, EA, CWT, RSPB	O	SS	
Broad Objective B		Create new reedbed			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Create at least 270ha of new wet reedbed in Cumbria	1 Develop existing lowland wetland project to create new reedbeds in Cumbria: identify appropriate area(s), liaise with landowners, identify constraints, draw up and implement plan of action.	EN, EA, RSPB, CWT	S/M	SS	
2 Promote small scale reedbed creation (<10ha)	1 Promote reedbed creation through land-owning/land managing organisations.	EN, RSPB, EA, ECCP, NWW	M	SS	
	2 Provision for management and creation of reedbed within agri-environment schemes.	MAFF	S	SS	
3 Monitor the status and management of reedbed habitat within Cumbria	1 Develop an agreed strategy to monitor the extent and quality of existing reedbeds and the establishment of new ones.	EN, RSPB, EA, CWT, LDNPA	M	RM	
4 Promote reedbed creation on minerals and waste sites	1 Promote reedbed creation on minerals and waste sites, through negotiation and appropriate planning conditions and/or obligations.	CCC, RSPB, EA, EN	M	SS	

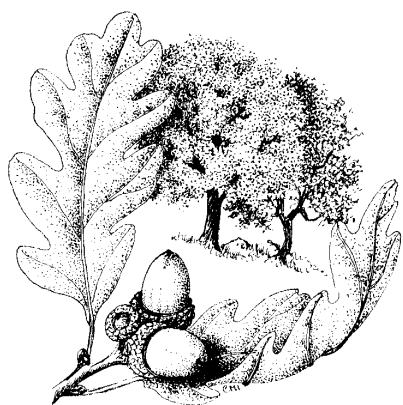
Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CCC = Cumbria County Council; CLA = Country Landowners Association; CWT = Cumbria Wildlife Trust; EA = Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; FWAG = Farming and Wildlife Advisory Group; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NFU = National Farmers Union; NWW = North West Water; RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Upland Oak Woodland

Upland Oakwoods are one of the most distinctive landscape features of the Lake District. In the past these woods supported a thriving industry, supplying charcoal to the iron foundries of Britain. Evidence of this can still be found in many woods in the form of coppice stools and pitsteads - platforms upon which coppiced oak was burnt to form charcoal.

Current status

Upland oakwoods occur throughout the north and west of the UK with major concentrations in Argyll and Lochaber, Cumbria, Gwynedd, Devon and Cornwall. Related woodland does occur on the continent, particularly in the more oceanic areas, but the British and Irish examples are recognised as internationally important because of their extent and distinctive plant and animal communities. For some of the species associated with upland oak woodland, Britain and Ireland hold a substantial part of the world or European population.

Upland oakwood is present throughout Cumbria, with the main concentrations in the Cumbria Fells and Dales, Eden Valley and Border Uplands Natural Areas. Upland oakwoods make a major contribution to the landscape character of parts of Cumbria, notably in the Lake District National Park.

There are no precise figures for the total extent of this woodland type, but it is believed to be between about 70,000 and 100,000 ha in the UK.

Kelly and Perry (1990) stated that there are over 19,700 ha of semi-natural broadleaved woodland in Cumbria, with the highest densities in the south and west of the county. Phillips, in the Provisional Inventory of Ancient Woodland (1994), gives a figure of 15,593 ha of ancient woodland (woods >2ha) in Cumbria, 62% of which is in the Lake District National Park. While the majority of this woodland will be upland oakwood, accurate information is not available on the relative proportions of the different woodland types.

Nationally, upland semi-natural woods have declined by about 30-40% in area over the past 60 years. There has been a considerable amount of change in the extent and composition of woodland in Cumbria during the previous century. Phillips (1994) gives a figure for Cumbria of approximately 5% clearance of ancient woodland and 37% replanting (primarily with non-indigenous conifers and broadleaves). A survey of the Lake District National Park (LDSPB 1978) concluded that over the previous 30 years the most significant change in the National Park, since fellings during World War II,

had been the widespread introduction of conifers, both through underplanting and complete conversion. Some broadleaved woodland had also disappeared through felling for agricultural purposes. While specific cases are well documented, it is not known what proportion of these changes affected upland oakwoods. The Lake District National Park report also recognised that new woods, including upland oakwoods, were developing through natural regeneration on open ground.

There are 29 Sites of Special Scientific Interest designated for upland oak woodland in Cumbria, six of which form a candidate Special Area of Conservation, identified under the European Community Habitats Directive (*old oak woods with Ilex and Blechnum in the British Isles are listed on Annex 1 of the Directive*). There is one Cumbrian National Nature Reserve for upland oak woodland.

Characteristic wildlife

Upland oakwoods are characterised by a predominance of oak (most commonly sessile, but locally pedunculate) and birch in the canopy, with varying amounts of holly, rowan and hazel as the main understorey species. The range of plants found in the ground layer varies according to the underlying soil type and degree of grazing. These include: bluebell, bramble and fern communities; grass and bracken dominated zones; and heathy, moss-dominated areas. Most oakwoods also contain areas of more base-rich soils, often along streams or towards the base of slopes, where much richer communities occur, with ash and elm in the canopy, hazel in the understorey and ground plants such as dog's mercury and ramsons. Elsewhere, small alder stands, or peaty hollows covered by bog mosses may occur. These elements are an important part of the upland oakwood system.

The wet climate in the north and west of the UK favours ferns, mosses and liverworts and these groups form a very important and characteristic component of upland oak woods. Many also hold very diverse lichen communities. Upland oakwoods also have a distinctive breeding bird assemblage, with redstart, wood warbler, pied flycatcher and tree pipit being associated with them throughout much of their range. The invertebrate communities are not particularly well studied compared to those

in some other woodland types, but this habitat supports a range of notable species.

Key species

The following rare or threatened species are associated with upland oak woodland in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

pine marten	<i>Martes martes</i>	C
dormouse	<i>Muscardinus avellanarius</i>	P
Brandt's bat	<i>Myotis brandtii</i>	C
Natterer's bat	<i>Myotis nattereri</i>	C
noctule bat	<i>Nyctalus noctula</i>	C
red squirrel	<i>Sciurus vulgaris</i>	P
spotted flycatcher	<i>Muscicapa striata</i>	P
black grouse	<i>Tetrao tetrix</i>	P
song thrush	<i>Turdus philomelos</i>	P
northern wood ant	<i>Formica lugubris</i>	P
red wood ant	<i>Formica rufa</i>	P
a weevil	<i>Procas granulicollis</i>	P
high brown fritillary	<i>Argynnis adippe</i>	P
pearl bordered fritillary	<i>Boloria euphrosyne</i>	P
oak bush-cricket	<i>Meconema thalassium</i>	
forester moth	<i>Adscita statices</i>	C
goat moth	<i>Cossus cossus</i>	
netted carpet moth	<i>Eustroma reticulata</i>	P
argent and sable	<i>Rheumaptera hastata</i>	P
square spotted clay moth	<i>Xestia rhomboidea</i>	P
sword grass moth	<i>Xylota exsoleta</i>	P
a snail-killing fly	<i>Pteromicra leucopeza</i>	
a fly	<i>Suillia oxyphora</i>	
a fly	<i>Tachypeza heeri</i>	
a lacewing	<i>Nothochrysa fulviceps</i>	
a pill woodlouse	<i>Armadillium pictum</i>	C
tender slug	<i>Limax tenellus</i>	C
a true bug	<i>Sehirus biguttatus</i>	
white-egg bird's-nest fungus	<i>Crucibulum laeve</i>	
a fungus	<i>Hapalopilus rutilans</i>	
a fungus	<i>Hygrocybe spadicea</i>	P
a fungus	<i>Lentinellus ursinus</i>	
hedgehog puffball	<i>Lycoperdon echinatum</i>	
a lichen	<i>Lobaria amplissima</i>	
a lichen	<i>Micarea stipitata</i>	
a lichen	<i>Pseudocyphellaria intricata</i>	
a liverwort	<i>Lepidozia cupressina</i>	

a liverwort	<i>Plagiachila atlantica</i>	
a liverwort	<i>Plagiachila killarniensis</i>	C
a moss	<i>Antitrichia curtipendula</i>	
a moss	<i>Campylopus setifolius</i>	P
a moss	<i>Sematophyllum micans</i>	
juniper	<i>Juniperus communis</i>	P
Killarney fern	<i>Trichomanes speciosum</i>	P

Best management practice

Upland oak woodlands are often unmanaged and in many circumstances this is not detrimental to their nature conservation interest. However where they are managed, or where the introduction of management is being contemplated, a number of factors should be taken into consideration:

- Upland oak woodlands are highly susceptible to damage by heavy machinery and where ever possible a low impact approach to management should be taken.
- Many upland oak woodlands have been traditionally managed as coppice, and this is generally more appropriate than high forest.
- Moderate to heavy grazing is detrimental to woodland ground flora and inhibits natural regeneration of trees. Grazing stock should generally be excluded; however, occasional light grazing may be acceptable.

Current issues

Losses of existing upland oakwoods through clearance and replanting is not seen as a major issue at present. The main current factors affecting the habitat which need to be addressed are:

- Uncontrolled grazing by stock (including supplementary winter feeding) and deer throughout much of the range of the woods.
- Invasion by non-native species such as *Rhododendron ponticum*.
- Development pressures, including illegal tipping.
- Effects of air pollution and climate change, especially on lichen and bryophyte communities.
- Unsympathetic forest management (including unsympathetic felling rates, the choice of broadleaved species planted, or the methods of working) can be detrimental to woodland biodiversity.
- Perceived conflicts between the landscape policies of National Parks Authorities and the requirement for fencing to extend existing woodland, and for new woodland planting.

Current action

Regulatory Framework

The UK Forestry Standard recommends that the total area of semi-natural woodland should not be reduced and that the ecological interest of ancient semi-natural woodland should be maintained. National priorities are contained in the England Forestry Strategy. Management of semi-natural woodlands, including upland oakwoods, has to be in accordance with guidelines published by the Forestry Commission to receive felling licences or grant-aid. Statutory protection such as the Habitats Directive, Wildlife and Countryside Act 1981, Regional Planning Guidance and Planning Policy Guidance provides the basis for habitat protection. In Cumbria, key statutory policy documents include the Cumbria and Lake District Joint Structure Plan, the various Local Plans and the Lake District National Park Management Plan. Further guidance is through the Cumbria Woodland Vision, Cumbria Landscape Strategy, The Countryside Character Profiles and Natural Area Profiles.

Native Woodland Initiative

A national concordat between the Forestry Commission and National Park Authorities to promote the sympathetic management and expansion of native broadleaved woodland, locally implemented through an Accord Group with representatives from all the signatories.

Challenge Fund

A partnership project between the Forestry Commission and National Park Authorities to promote the creation of new native woodland. Forestry Commission provides 100% funding towards the capital cost of establishing suitable schemes. In the first two years of the Challenge Fund 145 ha (5 schemes) of new woodland has been agreed in Lake District. This is predominantly upland oakwood.

Forestry Commission Heritage Lottery Fund Bid - Our Native Woodland Heritage

A partnership bid between Forestry Commission, National Park Authorities, Nature Conservation Agencies, Department of Environment, Transport and the Regions, Department of Agriculture Northern Ireland and others at a local and national level. The main thrust of the Project would be improving, restoring and expanding semi-natural woodlands.

Long Term Forest Plans

Forest Enterprise is continuing to prepare Forest Design Plans for each of its properties. Forest Enterprise is implementing its Habitat Action Plan for Upland Oakwood. Long-term forest plans are being prepared by the Graythwaite Estate and the National Trust for its woodlands in Borrowdale.

Restoration of Atlantic Oakwoods LIFE Project

The National Trust has obtained European funding through the Restoration of Atlantic Oakwoods LIFE Project to secure and maintain favourable condition of the cSAC upland oakwoods in Borrowdale.

English Nature Ullswater Study

The Ullswater area was one of three study sites in the UK which were assessed for their potential to create new native woodland. The Lake District study assessed sites between the lakeshore and the treeline.

Helvellyn and Skiddaw Massif Management Plans

These two management plans contain proposals for extending existing woodland in gills, crags and screes and for small scale new native woodland planting.

Grant-aid and Advice

Main source of grant-aid: Forestry Commission Woodland Grant Scheme. Other sources: Farm Woodland Premium Scheme, Lake District and Pennine Dales Environmentally Sensitive Area Schemes, Lake District National Park Authority, Countryside Stewardship, English Nature.

Advice from: Forestry Commission, Farming and Rural Conservation Agency through agri-environment schemes, East Cumbria Countryside Project, Cumbria Broadleaves, Lake District National Park Authority, English Nature, Cumbria County Council and publications such as Forestry Practice Guide No. 5 *Upland Oakwoods*.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for upland oak woodland in *Biodiversity: the UK Steering Group Report* (1995), which sets the following UK objectives and targets:

- Maintain the existing area (70,000 to 100,000 ha) of upland oakwoods and improve its condition, by a mixture of management for timber (predominantly as low intensity high forest), as

sheltered grazing, and minimum intervention.

- Avoiding other habitats of high nature conservation value, expand the area of upland oakwood by about 10% on to currently open ground, by some planting but particularly by natural regeneration, by 2005.
- Identify and encourage the restoration of a similar area (about 10%) of former upland oak woodland that has been degraded by planting with conifers or invasion by rhododendron.

National Lead Agency

Forestry Commission

Local contacts

Phil Taylor, Lake District National Park Authority, Murley Moss, Oxenholme Road, Kendal, LA9 7RL. Phone: 01539 724555.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to upland oak woodland:

Phase I

- upland mixed ash woodland
- wet woodland
- ancient and/or species-rich hedgerows
- *Lobaria amplissima* (a lichen)
- red squirrel
- bats
- song thrush
- juniper
- netted carpet moth

Phase II

- scrub communities (other than juniper)
- parkland, wood pasture and veteran trees
- black grouse
- red wood ant

References

Kelly, P.G. and Perry, K.A. 1990. *Wildlife habitat in Cumbria*. Research and Survey in Nature Conservation No 30. Nature Conservancy Council. Peterborough.

Lake District Special Planning Board. 1978. *Broadleaved woodlands of the Lake District*. LDSPB, Kendal.

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Objectives, targets and proposed actions for upland oakwood in Cumbria

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Broad Objective A	Maintain the existing area of upland oakwood and improve its condition				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Improve the information base and knowledge of the distribution, extent and management of upland oakwoods	1 Repeat Monitoring Land Use Change Survey for LDNPA.	LDNPA, FC, EN, NWW, MAFF	S	RM	
	2 Identify three sites for long-term monitoring and research on upland oakwoods, including managed and minimum intervention sites.	FC, EN, NT, LDNPA	S	RM	
	3 Co-ordinate surveys of ancient woodland invertebrates.	Woodland Focus Group	M	RM	
	4 Improve information on veteran trees in Cumbria, as part of national recording schemes, through day to day work and specific surveys, e.g. National Trust and LDNPA properties and ESA schemes.	EN, LDNPA, NT, CWT, FC, CCC, ECCP, MAFF	O	RM	
	5 Maintain advisory service on the marketing and use of products from upland oakwoods.	CB, FC, ECCP	O	A	
	6 Targeting owners and managers, implement one training course per year on the conservation and management of semi-natural woodland, including the special features and conditions that apply to upland oakwoods.	CB, FC, EN, LDNPA	O	A	
	7 Develop joint database on semi-natural broadleaved woodland, making information widely available in a useful format such as GIS.	FC, LDNPA, EN, NT, CCC, CWT, MAFF, ECCP	M	RM	
2 Initiate measures to secure management to achieve favourable condition in 100% of upland oakwoods within SSSIs by 2004. Overall aim to achieve favourable condition for 50% of the sites by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring designated upland oakwoods into conservation management.	FC, FE, EN	M	SS	
	2 Complete Site Management Statements on SSSIs not in management/grant schemes. By 2004.	EN	M	SS	

Broad Objective A		Maintain the existing area of upland oakwood and improve its condition			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
3 Initiate measures to secure management to achieve favourable condition in 70% of non-SSSI upland oakwoods by 2004. Overall aim to achieve favourable condition for 50% of the total resource by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring upland oakwoods into conservation management.	FC, LDNPA, EN, NT, ECCP, CCC, CWT, MAFF, FWAG	O	SS	
	2 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of upland oak woodland, by 2006.	CWT, LAs	L	SS	
	3 Implement FE Endangered Habitat Action Plan for Upland Oakwood.	FC	S	SS	
Broad Objective B		Expand the area of upland oakwood			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Avoiding other existing sites of importance for nature conservation, cultural heritage and amenity, and, where acceptable in the landscape, expand the area of upland oakwood on currently open ground by some planting but particularly by natural regeneration	1 Establish new upland oakwood sites at suitable locations. EN target for new upland oakwood in Cumbria is 1150ha by 2005 (minus achievements between 1995 and present).	FC, LDNPA, EN, ECCP, NT, CB, CWT, NWW, MAFF, FWAG	M	SS	
	2 Extend the period and eligible area for the Forestry Commission Challenge Fund to other parts of Cumbria.	FC	M	PL	

Broad Objective C		Restore former upland oak woodland			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
I Restore former upland oak woodland that has been degraded by planting with conifers or invaded by non-native species such as Rhododendron. Target for restoration of upland oakwood sites 500ha by 2005 (minus achievements between 1995 and present)	1 Identify prime sites for eradication of Rhododendron in upland oakwood sites, and undertake eradication.	FC , LDNPA, EN, ECCP, CB, CWT, NWW, MAFF	M/ O	SS	
	2 Identify prime sites for removal of non-native conifers in upland oakwood (where appropriate on cultural and landscape grounds), and undertake this removal.	FC , EN, LDNPA, ECCP, NT, CB, CWT, MAFF, NWW	M/ O	SS	
	3 Implement Forest Enterprise Upland Oakwood Habitat Action Plan.	FC (FE)	M	SS	

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CB = Cumbria Broadleaves; CCC = Cumbria County Council; CWT = Cumbria Wildlife Trust; ECCP = East Cumbria Countryside Project; EN = English Nature; FC = Forestry Commission; FE = Forest Enterprise; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry of Agriculture, Fisheries and Food; NT = National Trust; NWW = North West Water Limited.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Upland Mixed Ashwood

Ash woodland is characteristic of limestone areas, such as around Morecambe Bay and the Orton Fells, where it replaces the oak woodland typical of other parts of Cumbria. Lancaster whitebeam only occurs around Morecambe Bay, where it is found on limestone cliffs and scree in open ash woodland.

Current status

The term upland ashwoods is used for woods on base-rich soils in the north and west of Britain, in most of which ash is a major species. The term “upland” reflects the abundance of this type of woodland on base-rich soils in upland Britain, rather than the altitude at which individual woodlands occur.

Upland ashwoods are found on base-rich soils throughout the uplands of north west Britain and Northern Ireland. In Cumbria, upland ash woodland is particularly concentrated on the limestones of Morecambe Bay (where it is locally extensive) and Orton Fells in the Cumbria Fells and Dales Natural Area, and parts of the North Pennines and Yorkshire Dales Natural Areas. Stands of ashwood on flushed base-rich soils, along gills and at the base of slopes within upland oak woods are covered by the Upland Oak Woodland Action Plan.

There are no precise data on the total extent of upland ashwoods in the UK, but the estimated total extent of ancient semi-natural woodland of this type is 40,000 to 50,000 ha. Nationally, upland ash

woodland has declined in area through clearance, overgrazing and replanting with non-native species, by about 30-40% over the last 50 years.

In Cumbria there are 15,593 ha of ancient semi-natural woodland (Phillips, 1994), an unknown proportion of which is upland ashwood. On the Morecambe Bay limestone this proportion may be about 90%, but in the other areas it will be much lower. There are no precise data for losses of upland ashwood in Cumbria, but Phillips (1994) gives figures of approximately 5% clearance of all ancient woodland and 37% replanting with conifers and other non-native species, between approximately 1920 and the mid 1980s.

There are four National Nature Reserves supporting upland mixed ash woodland in Cumbria. 34 Sites of Special Scientific Interest are notified for their upland mixed ash woodland. This habitat is included within the *Tilio-Acerion ravine forests and Taxus baccata woods* habitat types identified in Annex I of the EC Habitats Directive. In Cumbria, six SSSI fall within two candidate Special Areas of Conservation for this habitat.

Characteristic wildlife

Ash is the principal tree species, though oak can also be common. A notable feature of these woods is Lancaster whitebeam, which is endemic to the Morecambe Bay area. There is a prominent and varied shrub layer with hazel, field maple, spindle and buckthorn. The ground flora is very diverse and dog's mercury, wild garlic, primrose and herb robert are all common. Many scarce woodland flowers also occur, such as dark red helleborine and mezeureum. Yew may form small groves in intimate mosaics with the other major tree species.

Upland mixed ashwoods harbour a rich invertebrate fauna and, when coppiced, are noted for butterflies, such as high brown fritillary. The dense shrub layer found in some examples provides suitable habitat conditions for dormouse.

Key species

The following rare or threatened species are associated with upland mixed ashwoods in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

pine marten	<i>Martes martes</i>	C
dormouse	<i>Muscardinus avellanarius</i>	P
Brandt's bat	<i>Myotis brandtii</i>	C
Natterer's bat	<i>Myotis nattereri</i>	C
noctule	<i>Nyctalus noctula</i>	C
red squirrel	<i>Sciurus vulgaris</i>	P
spotted flycatcher	<i>Muscicapa striata</i>	P
black grouse	<i>Tetrao tetrix</i>	P
song thrush	<i>Turdus philomelos</i>	P
northern wood ant	<i>Formica lugubris</i>	P
red wood ant	<i>Formica rufa</i>	P
high brown fritillary	<i>Argynnis adippe</i>	P
northern brown argus	<i>Aricia artaxerxes</i>	P
pearl bordered fritillary	<i>Boloria euphrosyne</i>	P
Duke of Burgundy	<i>Hamearis lucina</i>	C
a weevil	<i>Procas granulicollis</i>	P
oak bush-cricket	<i>Meconema thalassium</i>	
a fly	<i>Chirosia montana</i>	
a fly	<i>Suillia oxyphora</i>	
a fly	<i>Tachypeza heeri</i>	
tender slug	<i>Limax tenellus</i>	C

forester moth	<i>Adscita statices</i>	C
barred tooth-stripe moth	<i>Trychopteryx polcommata</i>	P
square spotted clay moth	<i>Xestia rhomboidea</i>	P
sword grass moth	<i>Xylota exsoleta</i>	P
white-egg bird's-nest fungus	<i>Crucibulum laeve</i>	
a fungus	<i>Hapalopilus rutilans</i>	
a fungus	<i>Lentinellus ursinus</i>	
hedgehog puffball	<i>Lycoperdon echinatum</i>	
a lichen	<i>Lobaria amplissima</i>	
a lichen	<i>Ramonia nigra</i>	
a liverwort	<i>Lepidozia cupressina</i>	
a liverwort	<i>Plagiochila killarniensis</i>	C
a moss	<i>Antitrichia curtipendula</i>	
a moss	<i>Sematophyllum micans</i>	
juniper	<i>Juniperus communis</i>	P

Best management practice

Upland ash woodlands are often unmanaged and in many circumstances this is not detrimental to their nature conservation interest. However, where they are managed, or where the introduction of management is being contemplated, a number of factors should be taken into consideration:

- Upland ash woodlands are highly susceptible to damage by heavy machinery, and wherever possible a low impact approach should be taken to management.
- Many upland ash woodlands have been traditionally managed as coppice, and this is generally more appropriate than high forest. Coppicing is often important to maintain the rich field layers and invertebrate populations, particularly butterflies, associated with this woodland type.
- Moderate to heavy grazing is detrimental to woodland ground flora and inhibits natural regeneration of trees. Grazing stock should generally be excluded; however occasional light grazing may be acceptable.

Current issues

Losses of upland ashwoods through clearance and replanting is not seen as a major issue at present, but has been in the past. The main current factors affecting the habitat are, in order of importance:

- Uncontrolled grazing by and feeding of stock throughout much of the range of woods.

- Uncontrolled grazing by deer throughout much of the range of woods.
- Invasion by non-native species.
- Unsympathetic forest management, including cessation of coppice management and neglect.
- Previously introduced non-native species within these woodlands continue to have a detrimental effect.
- Pheasant-rearing, causing enrichment of ground flora.
- Development pressures, such as caravan sites and quarrying.
- Effects of air pollution and climate change, especially on lichen and bryophyte communities.

Current action

Regulatory framework

Those applicable to Cumbria include national policies and regulations such as the England Forestry Strategy and forest guidelines, felling licences, Wildlife and Countryside Act, Habitats and Species Regulations, but also local authority Structure and Local Plans (which contain policies for the protection of ancient semi-natural woodland).

Challenge Fund

A Forestry Commission/National Park Authorities partnership to promote and grant-aid new native woodland in National Parks. The Forestry Commission has also operated similar grants to encourage coppicing for butterflies, targeting the Morecambe Bay Limestone area.

Native Woodland Initiative

A national concordat between Forestry Commission and National Park Authorities to promote sympathetic management and expansion of native woodlands.

LIFE funding

An application has been made to fund appropriate management of limestone pavement (some of which is wooded) in the Morecambe Bay Pavements cSAC.

Forest Enterprise Habitat Action Plans

Forest Enterprise has produced and is now implementing a Habitat Action Plan for Limestone Pavement (some of which is wooded).

Forestry Commission Heritage Lottery Fund Bid - Our Native Woodland Heritage

A partnership bid to improve, restore and expand semi-natural woodlands. Cumbrian Projects have been included within the bid.

Grant aid and advice

The main grant source is the Forestry Commission's Woodland Grant Scheme, including the Farm Woodland Premium Scheme. Other grants are available from the Lake District and Pennine Dales Environmentally Sensitive Areas schemes, Lake District National Park Authority, English Nature (only SSSIs) and Countryside Stewardship scheme.

Advice is available from the above organisations, Cumbria Broadleaves and East Cumbria Countryside Project. The Forestry Commission also publish guidance on the management of semi-natural woodlands, specifically Forestry Practice Guide No 4 *Upland Mixed Ashwoods*.

Survey and evaluation

English Nature and others (e.g. Lake District National Park Authority, Forestry Commission and East Cumbria Countryside Project) carry out limited survey and monitoring programmes that can be used to contribute towards knowledge of the extent and condition of the upland mixed ashwood resource.

Management

Many upland ash woodlands, particularly those in nature reserves, are under appropriate management regimes, such as long term coppicing rotations.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for upland mixed ashwoods in the UK Biodiversity Group Tranche 2 Action Plans Vol. 2 (1999), which sets the following UK objectives and targets:

- Maintain the current extent of ancient semi-natural woodland (considered to be 40,000 to 50,000ha) and the total extent and distribution of upland mixed ashwood.
- Initiate measures intended to achieve favourable condition in 100% of upland mixed ashwoods within the SSSI/ASSIs and Special Areas of

Conservation, and in 80% of the total resource by 2004, and achieve favourable condition over 70% of the designated sites and 50% of the total resource by 2010.

- Initiate restoration to upland mixed ashwood cover of at least 2,400 ha. Complete restoration to site-native species over half this area by 2010 and all of it by 2015.
- Initiate colonisation or planting of 6000 ha of upland mixed ashwood on un-wooded or ex-plantation sites. Complete establishment of half of this by 2010 and all of it by 2015.

National Lead Agency

Forestry Commission.

Local contacts

Phil Taylor, Lake District National Park Authority,
Murley Moss, Oxenholme Road, Kendal, LA9 7RL.
Phone: 01539 724555.

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to upland mixed ashwood:

Phase I

- upland oak woodland
- wet woodland
- limestone pavement
- ancient and/or species-rich hedgerows
- red squirrel
- pearl-bordered fritillary
- high brown fritillary
- netted carpet moth
- juniper
- song thrush
- bats

Phase II

- parkland, wood pasture and veteran trees
- scrub communities (other than juniper)
- black grouse
- red wood ant
- dormouse

References

Phillips, P.M. 1994. *Cumbria inventory of ancient woodland (provisional)*. English Nature. Peterborough.

Objectives, targets and proposed actions for upland mixed ashwoods in Cumbria

Broad Objective A

Maintain the current extent and distribution of upland ashwood in Cumbria

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
I Ensure planning, forestry management and other legislative mechanisms protect existing areas of upland mixed ashwood	1 All new Woodland Grant Schemes and Forest Design Plans to include provisions for maintaining existing areas of upland mixed ashwood.	FC, FE	O	SS
	2 Consider the need to designate further upland mixed ashwoods in Cumbria as SSSI, by 2004.	EN	M	SS
	3 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of upland mixed ash woodland, by 2006.	CWT, LAs	L	SS

Broad Objective A

Maintain the current extent and distribution of upland ashwood in Cumbria

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
2 Refine knowledge on the extent and status of existing upland mixed ashwood	1 Produce a computerised inventory of designated and other significant upland ashwood sites in Cumbria, to show amounts of woodland designated, in conservation management, and their condition (based on the national FC inventory). By 2002.	FC, EN, LDNPA, CWT	M	RM

Broad Objective B

Ensure favourable condition of upland mixed ashwoods in Cumbria

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Initiate measures intended to achieve favourable condition in 100% of upland mixed ashwoods within the SSSIs and SACs by 2004, and achieve favourable condition over 70% of these sites by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring SSSI upland mixed ashwoods into conservation management.	FC, FE, EN	O	SS
	2 Complete Site Management Statements on SSSI not in management/grant schemes by 2004.	EN	M	SS
	3 Implement FE limestone pavement/ashwood management plans.	FE, EN	O	SS
2 Initiate measures intended to achieve favourable condition in 80% of the total resource by 2004, and achieve favourable condition of 50% of the total resource by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring significant non-SSSI upland mixed ashwoods into conservation management.	FC, EN, CWT, LDNPA, CB, ECCP, MAFF FWAG	O	SS
	2 To seek to extend the period and eligible area of the Coppice for Butterflies Challenge Fund (to include Orton Fells as well as Morecambe Bay Limestones).	FC	S	PL
	3 Implement FE limestone pavement/ashwood management plans.	FE	O	SS
	4 Ensure favourable condition of all upland mixed ashwoods owned by statutory agencies and NGOs by 2010.	FE, CWT, NWW, RSPB, LDNPA, EN, NT, ECCP	L	SS

Broad Objective B		Ensure favourable condition of upland mixed ashwoods in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
3 Monitor the extent and condition of upland mixed ashwoods in Cumbria, so that the effects of conservation management can be judged	1 Monitor and report on the condition of upland mixed ashwoods in sites under conservation management every 6 years, and make information widely available in a useful format.	EN, CWT, LDNPA, FC, NT, NWW, RSPB, ECCP	O	RM
	2 Use the National Inventory of Woodland and Trees to report on the current condition of upland mixed ashwoods, and make the results widely available. By 2001.	FC	M	RM
4 Foster understanding and best management practice for upland mixed ashwoods in Cumbria	1 Hold 4 demonstration events at "best practice" sites throughout Cumbria. By 2001.	FC, EN, LDNPA, NWW, CB	S	A
	2 Provide advice on the use and marketing of products from upland mixed ashwoods.	FC, CB	O	A
Broad Objective C		Increase the area of upland mixed ashwood in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Initiate restoration and re-creation of 1600 ha of upland mixed ashwood in Cumbria (see below). Complete restoration or establishment of over half this area by 2010 and all of it by 2015	1 Prepare and implement a plan for identifying priority areas for creating new upland mixed ashwoods in Cumbria (avoiding existing areas of significant nature conservation and archaeological interest). By 2002.	EN, FC, LDNPA, CWT, RSPB, ECCP, CB, NWW	M	RM
	2 Instigate restoration of woodland in limestone pavement sites through implementation of FE/EN site management plans.	FE	O	SS
	3 Identify opportunities to create and restore upland mixed ashwoods within existing and future Forest Design Plans and Woodland Grant Schemes.	FC	O	SS
Natural Area Targets: Cumbria Fells and Dales: 500ha Solway Basin: 50ha Eden Valley: 50ha Border Uplands*: 350ha North Pennines*: 250ha Yorkshire Dales*: 350ha				
* these areas and figures are shared with other counties				

Broad Objective C

Increase the area of upland mixed ashwood in Cumbria

Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
	4 Extend the period and eligible area of the new native woodland challenge fund scheme (to include all of Morecambe Bay Limestone area, Orton Fells, North Pennines, and Yorkshire Dales). By 2005.	FC	S/M	PL
	5 Introduce a new funding scheme targeted towards restoration of existing upland mixed ashwoods in Morecambe Bay Limestone Area, Orton Fells, North Pennines, Yorkshire Dales and Lake District. By 2005.	FC	S/M	PL

Key to Tables

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.

CB = Cumbria Broadleaves; CCC = Cumbria County Council; CWT = Cumbria Wildlife Trust;

ECCP = East Cumbria Countryside Project; EN = English Nature; FC = Forestry Commission;

FE = Forest Enterprise; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF =

Ministry of Agriculture, Fisheries and Food; NT = National Trust; NWW = North West Water Limited;

RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.



Wet Woodland

Pollen cores show that wooded peat-filled hollows within ancient woodlands in upper Borrowdale and Eskdale have existed for thousands of years.

Current status

Wet woodland occurs on poorly drained or seasonally wet soils. It is found on floodplains, as successional habitats on fens, mires and bogs, along streams and hillside flushes, and in peaty hollows. The soils on which these woods occur range from nutrient-rich mineral to very acid, nutrient-poor organic ones. Wet woodland reaches its greatest extent on lowland floodplains and on poorly drained, flushed hillsides in the uplands. It is also found as small stands on wet ground within other woodland types. Wet woods frequently occur in mosaic with other habitats, such as fens.

There are no precise data on the total extent of wet woodland in the UK or Cumbria. Estimates made by English Nature suggest there might be 25-30,000 hectares of ancient semi-natural wet woodland in England. The area of wet woodland of more recent origin may be at least as large again. No figures are available for Cumbria.

Extensive floodplain forest is now extremely rare, both in the UK and Cumbria. The Irthing and Kingwater valleys have some of the finest remaining fragments in the county. Extensive hillside wet

woodland is also extremely rare, with a few examples present on hill slopes in the far north-east of the county and around Ullswater and Martindale. Most of these woods are on common land or in pastures and open to grazing livestock. Other significant areas of wet woodland are found around some of the lakes in the Lake District, notably in the Rothay and Brathay valleys, Esthwaite Water, and in the Derwent valley.

Wet woodlands are a frequent component of ancient semi-natural woodland associated with flushes, streamsides and peat-filled hollows. These are most frequent in the woods of the Lake District, south Lakeland and the Pennine river valleys. The action plans for upland oak and upland ash woodland take account of wet woodlands where they are a part of these types.

There are very small areas of willow woodland on the west Cumbria coast, associated with dune slacks, saltmarshes and valley mires.

Finally, secondary wet woodland is frequent on raised mires and other low-lying peatlands, usually dominated by birch.

There are 2 National Nature Reserves supporting wet woodland in Cumbria and 32 Sites of Special Scientific Interest are notified for their wet woodland.

Characteristic wildlife

Wet woodland is usually dominated by willow, alder and birch or a combination of these. There may also be some bird cherry, guelder rose, hazel and other shrubs. Depending on the presence of woodland on drier ground, other tree species may be present, for example, rowan and ash. Self seeding Scots pine, larch and spruce may also be present.

The ground flora of wet woodland is enormously variable, depending on the hydrological condition, soil type and management. On sites with a rich, mineral soil there can be a mixture of flowering herbs, sedges and grasses. The latter may predominate on heavily grazed sites. Some stands may be dominated by a single species, for example, reed canary-grass or common reed. On peat, Sphagnum mosses may be abundant with sedges and other plants characteristic of fens.

Key species

The following rare or threatened species are associated with wet woodland in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

European otter	<i>Lutra lutra</i>	P
Natterer's bat	<i>Myotis nattereri</i>	C
Daubenton's bat	<i>Myotis daubentonii</i>	C
pipistrelle bat	<i>Pipistrellus pipistrellus</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
spotted flycatcher	<i>Muscicapa striata</i>	P
black grouse	<i>Tetrao tetrix</i>	P
song thrush	<i>Turdus philomelos</i>	P
great crested newt	<i>Triturus cristatus</i>	P
a leaf beetle	<i>Donacia aquatica</i>	P
a longhorn beetle	<i>Oberea oculata</i>	P
a horse fly	<i>Hybomitra micans</i>	
a gall fly	<i>Platyparea discoidea</i>	
a snail-killing fly	<i>Pteromicra leucopeza</i>	
a fly	<i>Tachypeza heeri</i>	

goat moth	<i>Cossus cossus</i>	C
netted carpet	<i>Eustroma reticulata</i>	P
waved carpet	<i>Hydrelia sylvata</i>	P
argent and sable	<i>Rheumaptera hasta</i>	P
square spotted clay	<i>Xestia rhomboidea</i>	P
sword grass	<i>Xylena exsoleta</i>	P
white-egg bird's-nest fungus	<i>Crucibulum laeve</i>	

Best management practice

Wet woodlands are often unmanaged and in many circumstances this is not detrimental to their nature conservation interest. However where they are managed, or where the introduction of management is being contemplated, a number of factors should be taken into consideration:

- Wet woodlands are highly susceptible to damage by heavy machinery and wherever possible a low impact approach should be taken to management.
- Many wet woodlands have been traditionally managed as coppice, and this is generally more appropriate than high forest.
- Moderate to heavy grazing is detrimental to woodland groundflora and inhibits natural regeneration of trees. Grazing stock should generally be excluded, however small numbers of cattle grazing in autumn may be acceptable.

Current issues

Like all woodlands, one of the main issues affecting wet woodlands is the lack of regeneration due to grazing and browsing animals. However, this woodland type is also significantly affected by water quality and changes in the hydrological regime. The following summarises the issues.

- Lowering of water tables through drainage and abstraction resulting in a change to dry woodland types.
- Poor water quality arising from eutrophication, effluents and rubbish dumping leading to changes in species composition.
- Invasion by non-native species, which eliminates native species and lowers conservation value.
- Direct loss or damage through, for example, dumping of rubbish.
- Lack of regeneration because of grazing animals, stock feeding and shelter.
- Air pollution which may affect bryophyte and lichen communities.

- Tree diseases, for example, alder *Phytophthora* root disease. Although not currently significant in Cumbria, it may become so.
- Piecemeal loss and fragmentation of woodland through changes in land use.
- Flood prevention measures and in-river works leading to loss of natural river dynamics or changes in hydrology of wet woodland sites.
- Inappropriate silvicultural management, for example, planting of species mixtures inappropriate to the site conditions.
- Climate change affecting amount and pattern of rainfall.

Current action

A number of the key wet woodland sites in Cumbria are SSSI or managed by conservation organisations.

- National forestry policies, management guidance and Lake District National Park policies refer to the conservation and sympathetic management of native woods, including wet woodlands. The Forestry Commission has published guidance on the management of wet woodlands.
- The Lake District and Pennine Dales Environmentally Sensitive Areas include prescriptions which can contribute to protecting wet woodlands and providing positive management for small woods.
- The Environment Agency is preparing water level management plans for wetland SSSIs where they carry out or regulate river works. Many of these include wet woodlands.
- A number of organisations in Cumbria promote and carry out conservation works which safeguard or create wet woodlands. This includes the East Cumbria Countryside Project, Cumbria Broadleaves and Eden Rivers Trust. Several other river catchments also have charitable trusts for promoting river habitat improvements.
- The National Parks Accord on Native Woodlands includes targets for creating and restoring wet woodlands.
- A number of organisations is currently carrying out programmes to control or eradicate non-native species, such as rhododendron, Himalayan balsam and Japanese knotweed, in wet woodlands.

Context in relation to other plans:

UK Habitat Action Plans

There is a UK Biodiversity Action Plan for wet woodland in the *UK Biodiversity Group Tranche 2 Action Plans, Vol. II* (1999), which sets the following UK objectives and targets:

- Maintain the existing area of wet woodland and improve its condition.
- Achieve favourable condition of all wet woodlands within SSSIs and in 80% of the total resource by 2010.
- Initiate restoration of 3,200 hectares of native wet woodland by 2015.
- Establish 6,750 hectares of new wet woodland on unwooded or ex-plantation sites by 2015.

The restoration targets are based on the desirability of restoring about 10% of the ancient semi-natural wet woodland resource. Plan implementation will require more precise estimates of the extent and distribution of wet woodland and criteria for determining suitable areas for woodland creation. These national targets have been translated into targets for each Natural Area in England.

National Lead Agency

Forestry Commission.

Local contacts

Phil Taylor, Lake District National Park Authority (01539 724555) and Allan Stewart, English Nature (01539 792800).

Associated plans in the Cumbria BAP

The following Cumbria species/habitat action plans are of relevance to wet woodlands.

Phase I

- lowland raised mire
- purple moor-grass and rush pasture
- upland mixed ash woodland
- upland oak woodland
- rivers and streams
- reedbed
- basin mire
- netted carpet moth

Phase II

- swamps and tall herb-fen
- coastal sand dune

References

Rodwell, J.S. (Ed.) (1991) *British Plant Communities, volume 1: Woodlands and scrub*. Cambridge University Press.

Objectives, targets and proposed actions for Wet Woodland in Cumbria

Broad Objective A	Maintain current area of wet woodland in Cumbria				
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Refine knowledge on extent and status of existing wet woodland	1 Produce a database of designated and other significant wet woodland sites in Cumbria by 2002.	EN, FC, LDNPA, CWT, NWW	M	RM	
	2 Produce estimates of amount of wet woodland in Cumbria by 2002. To show amounts of woodland designated, in conservation management and in favourable and unfavourable condition.	EN, FC, LDNPA, CWT, NWW	M	RM	
2 Ensure forestry management and other legislative mechanisms protect existing areas of wet woodland	1 All new Woodland Grant Schemes and Forest Design Plans to include provisions for maintaining existing areas of wet woodland.	FC	O	SS	
	2 Review SSSI series for wet woodlands in Cumbria. By 2002.	EN	M	SS	
	3 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of wet woodland, by 2006.	CWT, LAs	L	SS	
	4 Ensure changes of land use and land drainage operations do not result in loss of wet woodlands.	FC, EA, LAs	O	SS	

Broad Objective B		Ensure favourable condition of most wet woodland sites in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type	
1 Initiate measures to achieve favourable condition in 100% of wet woodlands within SSSIs by 2004. Overall Aim of achieving favourable condition on 70% of sites by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring SSSI wet woodlands into conservation management. By 2004.	EN, FC, FE, MAFF, FWAG	M	SS	
	2 Complete Site Management Statements on all SSSIs with wet woodland by 2002.	EN	M	SS	
	3 Where appropriate enter into management agreements to safeguard SSSI wet woodlands.	EN, LDNPA, ECCP	L	SS	
2 Initiate measures to achieve favourable condition in 80% of wet woodland by 2004. Overall aim of achieving favourable condition on 50% of the total resource by 2010	1 Target Woodland Grant Schemes and Forest Design Plans to bring non-SSSI wet woodlands into conservation management.	FC, FE, ECCP	O	SS	
	2 Ensure favourable condition of all wet woodland sites owned by statutory agencies and NGOs by 2010.	NT, CWT, LDNPA, FE, RSPB, NWW	L	SS	
	3 Agree action plan for further eradication of exotic herbaceous species from wet woodlands by 2002.	FC, FE, LDNPA, NT, EN, CWT, RSPB, NWW	M	SS	
	4 Contribute to development of Countryside Stewardship, ESAs and Woodland Challenge funding so that they include provisions for wet woodlands and targeting of areas of particular importance for wet woodlands.	FC, EN, LDNPA, ECCP, CWT	O	A	
3 Monitor the extent and condition of wet woodlands in Cumbria so that the effects of conservation management can be judged	1 Monitor and report on the condition of wet woodlands in designated sites and under conservation management in Cumbria every six years, and make data widely available in an useful format.	EN, CWT, LDNPA, FE, NT, NWW, RSPB	O	RM	
	2 By 2002 use the National Inventory of Woodland and Trees to report on the condition of wet woodlands in Cumbria.	FC, FE	M	RM	

Broad Objective B		Ensure favourable condition of most wet woodland sites in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
4 Foster understanding and best management practice for wet woodlands in Cumbria	1 Re-launch guidelines for management of wet woodlands and creation of wet woods and promote to all relevant authorities, by 2002.	FC	M	CP
	2 Hold four demonstration visits to 'best practice' sites in Cumbria, by 2002.	FC, CB	M	CP

Broad Objective C		Increase the area of wet woodland in Cumbria		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Restore and re-create 380 hectares of wet woodland in Cumbria by 2020 with half of this area completed by 2010 (See Natural Area targets below)	1 Identify suitable sites for 2-3 large new wet woodlands by 2005.	FC, EN, FE, EA, CWT, NT, LDNPA, NWW, ECCP, CB	M	RM
	2 Identify opportunities to create and restore wet woodland within existing and forthcoming Forest Design Plans and Woodland Grant Schemes. By 2002.	FC, FE	M	RM
	3 Prepare and implement a plan for identifying priority areas for creating new wet woodlands in Cumbria by 2002.	FC, EN, Rivers Trusts, ECCP, CWT, LDNPA, NFU	M	SS
	4 Create and restore 20 hectares of wet woodland each year for the next 20 years.	FC, LDNPA, EN, MAFF, CB, ECCP, NFU, NT	L	SS

Natural Area targets for Cumbria

Border Uplands:	10ha
Solway Basin:	100ha
North Pennines:	15ha
Eden Valley:	100ha
Yorkshire Dales:	5ha
Cumbria Fells & Dales:	100ha
West Cumbria Coastal Plain:	50ha

Suggested organisational involvement: Key Deliverers in bold type; Partners in plain type.
CB = Cumbria Broadleaves; CWT = Cumbria Wildlife Trust; EN = English Nature; EA = Environment Agency; ECCP = East Cumbria Countryside Project; FC = Forestry Commission; FE = Forestry Enterprise; LAs = Local Authorities; LDNPA = Lake District National Park Authority; MAFF = Ministry for Agriculture Fisheries and Food; NFU = National Farmers' Union; NT = National Trust; NWW = North West Water; RSPB = Royal Society for the Protection of Birds.

Timescale: O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

Type: Type of action; PL=Policy &Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.

APPENDIX I:

Abbreviations

ADAS	Agricultural Development and Advisory Service
AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BC	Butterfly Conservation
BCT	Bat Conservation Trust
BDS	British Dragonfly Society
BSBI	Botanical Society of the British Isles
BTCV	British Trust for Conservation Volunteers
BTO	British Trust for Ornithology
CA	Countryside Agency
CAP	Common Agricultural Policy
CB	Cumbria Broadleaves
CBC	Cumbria Bird Club (also Common Bird Census)
CBP	Cumbria Biodiversity Partnership
CCC	Cumbria County Council
CEH	Centre for Ecology and Hydrology
CLA	Country Landowners Association
CSGBI	Conchological Society of Great Britain and Ireland:
CWT	Cumbria Wildlife Trust
DETR	Department of the Environment, Transport and the Regions
EA	Environment Agency
EC	European Community
ECCP	East Cumbria Countryside Project
EN	English Nature
ESA	Environmentally Sensitive Area
EU	European Union
FA	Forestry Authority
FC	Forestry Commission
FE	Forest Enterprise
FoE	Friends of the Earth
FoLD	Friends of the Lake District
FRCA	Farming and Rural Conservation Agency
FWAG	Farming and Wildlife Advisory Group
GONW	Government Office for the North West
HA	Highways Agency
HCT	Herpetological Conservation Trust
IFE	Institute for Freshwater Ecology
ITE	Institute of Terrestrial Ecology
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LA21	Local Agenda 21
LDNPA	Lake District National Park Authority
LEA	Local Education Authority
LEAP	Local Environment Agency Plan
LNR	Local Nature Reserve
LPA	Local Planning Authority
MAFF	Ministry of Agriculture, Fisheries and Food
MCS	Marine Conservation Society

MoD	Ministry of Defence
MS	Mammal Society
NFU	National Farmers' Union
NGO	Non-Governmental Organisation
NNR	National Nature Reserve
NT	National Trust
NVC	National Vegetation Classification
NWW	North West Water Ltd
PC	Parish Council
PPG	Planning and Policy Guidance Note
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SFC	Sea Fisheries Committee
SNH	Scottish Natural Heritage
SPA	Specially Protected Area
SRI	Solway Rural Initiative
SSSI	Site of Special Scientific Interest
THM	Tullie House Museum, Carlisle
UK	United Kingdom
VAC	Voluntary Action Cumbria
VWT	Vincent Wildlife Trust
WOT	World Owl Trust
YDNPA	Yorkshire Dales National Park Authority

APPENDIX 2:

Glossary

acidification - changes in chemistry in any area which results in a more acid environment, e.g. acid rain leading to the unnatural acidification of water or soils that have limited capacity to neutralise such changes in chemistry.

acid grassland - grassland occurring on soils which have an acidic pH of below 5, often on un-enclosed hillsides.

aftermath - a term associated with grazed grassland describing the new growth of the sward after management, e.g. cutting of hay meadows or burning.

Agenda 21 - a comprehensive programme of action needed throughout the world to achieve sustainable development for the coming century. A product of the EARTH SUMMIT, it has given rise in the UK to numerous community initiatives - Local Agenda 21 - of which Local Biodiversity Action Plans are an integral part.

Agenda 2000 - in July 1997 the European Commission (EC) published "Agenda 2000: for a stronger and wider Europe". The primary aim of this was to deepen the reforms of the CAP started in 1992, in preparation for the next round of WTO negotiations and the enlargement of the EU. The UK Government published draft regulations for reform in this country in 1998 and a consultation process followed. AGENDA 2000 is intended to run from 1 January 2000 through to 2006.

agri-environment - relating to the agri-environment Regulation of the CAP obliging Member States to offer farmers a set of incentive payments for voluntarily pursuing non-intensive farming that is of benefit to the environment.

alien species - a species which does not naturally occur within an area and which has usually arrived as a result of man's intervention (whether deliberate or accidental). Alien species often have adverse effects on native species as a result of competition.

allotment - pasture taken in and enclosed from the fell, generally used for grazing and holding stock, they may or may not be IMPROVED.

AMP - see ASSET MANAGEMENT PLANS.

anaerobic - in the absence of free oxygen (O₂).

ancient woodland - woodland with continuous cover since at least 1600 AD.

anthropogenic - originated by man.

Arctic-alpine plant species - plants which display a central and southern European montane distribution and also appear at high latitudes such as Scandinavia, Iceland and Greenland.

Area of Outstanding Natural Beauty - A region of England and Wales which is considered sufficiently attractive to be protected from over-development. AONBs are designated by the Countryside Agency.

Asset Management Plans - Plans that are required by law to be produced by a water company carrying out capital investment that is charged to the consumer. AMPs have to take into account EU Directives such as those covering Urban Waste Water Treatment and the Habitats Directive. AMPs have to be approved by OFFWAT. The current Plan is AMP3.

away winter - send stock to lowland pasture for the winter.

biodiversity - 'the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'

Bern Convention - The abbreviated term for the Bern Convention on the Conservation of European Wildlife and Natural Habitats. This imposes obligations on signatories to conserve wild plants, birds and other animals.

Biodiversity Action Plan (BAP) - originating from the Rio EARTH SUMMIT and taken to a national level, the overall goal of the Plan is to conserve and enhance biological diversity within the UK and to contribute to the conservation of global diversity through all appropriate mechanisms. The Plan includes HABITAT ACTION PLANS and SPECIES ACTION PLANS. See LOCAL BIODIVERSITY ACTION PLAN.

blanket bog or mire - term to describe a peatland formed in areas of high rainfall and covering large areas of flat and gently sloping ground in the uplands.

bog - OMBROTROPHIC mire generally low in nutrients and receiving water purely from rain, snow etc.

Bonn Convention - The abbreviated term for the Bonn Convention on the Conservation of Migratory Species of Wild Animals. This requires the signatories to protect listed endangered migratory species.

broad habitat - one of a framework of habitat categories developed for the UK BAP covering all habitats in the UK including the surrounding sea to the edge of the continental shelf. Categories include broadleaved woodland, calcareous grassland, blanket bog e.t.c.

Bryophytes - A major group of plants that includes mosses and liverworts.

calcareous - limey or growing on soil derived from the decomposition of calcareous rocks, such as limestone.

carr - wet woodland composed of trees such as willow and alder; which is a successional stage between open water and dry woodland.

chasmophyte - a plant which grows in the crevices of rocks.

climax - a plant community determined and maintained in a given area by the prevailing climatic and soil conditions - essentially those which would develop and be present in the absence of human intervention.

coastal squeeze - a process whereby the loss of habitats in the coastal zone, especially through development and coastal protection, coupled with sea-level rise can lead to a decreasing area of semi-natural coastal habitats for wildlife.

Common Agricultural Policy (CAP) - provides the principle framework for agricultural policy in all countries belonging to the European Union.

conservation headland - in arable fields, these are areas of the crop nearest the field boundary which are managed to encourage flowers to survive and so provide food for seed and insect-eating birds.

conservation plan - required under AGRI-ENVIRONMENT schemes. Maps features of environmental interest and includes information on planned management including capital works.

coppice - a form of woodland management where trees or shrubs are cut regularly at the base to promote regrowth.

Countryside Stewardship Scheme (CSS) - a scheme operating outside ESAs of annual payments where farmers enter into 10 year management agreements and receive incentive payments for positive environmental management. The scheme is administered by FRCA for MAFF and covers a wide range of habitats.

Disadvantaged Areas (DAs) - see LESS FAVOURED AREAS.

dystrophic - fresh water systems with very poor nutrient levels.

Earth Summit - United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992. Here the UK Prime Minister signed the Biodiversity Convention which brought about the BIODIVERSITY ACTION PLAN.

emergent vegetation - plants that grow in water but have leaf structures that emerge above the surface.

endemic species - a species of organism confined to a particular country, region or island.

Environmental Conditions - used in the EU to refer to the attachment of environmental conditions to agricultural support payments under the CAP commodity regimes.

Environmentally Sensitive Area (ESA) - areas of high landscape and conservation value, designated under EC regulations where "traditional" farming is under threat, in which farmers enter into 10 year management agreements and receive incentive payments for positive environmental management. The scheme is administered by FRCA for MAFF and covers a wide range of habitats.

ericoid/ericaceous - pertaining to plants of the Heath family (Ericaceae).

eutrophic - nutrient enriched.

eutrophication - the process of nutrient enrichment.

fen - MIREs that receive water from the surrounding land and so contain nutrients and minerals picked up from rocks and soil. They support plants that differ from mires that are fed only by rainwater (see BOGS).

flush - a type of FEN which is irrigated by a SPRING or soakway. Typically occurs as discrete areas of wet-loving vegetation on hillsides.

fodder/foddering - animal food/provision of animal food.

grip - moorland drainage ditch.

habitat - a place in which a particular plant or animal lives. Often used in a wider sense, referring to major assemblages of plants and animals found together such as woodland or heath.

Habitat Action Plan - a document which describes the current status of a PRIORITY HABITAT in the UK BIODIVERSITY ACTION PLAN or a habitat included in a LOCAL BIODIVERSITY ACTION PLAN, sets targets and objectives for its management, restoration and/or creation, and proposes the actions necessary to achieve them.

hagg/hagging - gullying in blanket bogs.

hay meadow - enclosed grassland managed for the purpose of gathering hay, usually cut once a year in the summer.

Habitats and Species Directive - an EC directive that seeks to encourage the maintenance of BIODIVERSITY by establishing a 'favourable conservation status' for specific natural habitat types and species considered to be of importance in EC countries. See SPECIAL AREA OF CONSERVATION.

heft - a piece or parcel of land in unenclosed hill and mountain pasture to which sheep are attached, usually because they have been bred on it. A 'hefted' flock is one made up of many hefts, ie. home ranges or territories.

herbs - any VASCULAR PLANT that is not woody, e.g. all flowers, grasses and ferns.

high forest - forest where the majority of trees are allowed to reach maturity.

Hill Livestock Compensatory Allowance (HLCA) - headage payment available to beef and sheep farmers within LESS FAVOURED AREAS.

hydrosere - a plant SUCCESSION originating in a wet environment such as a lake edge.

improved grassland - grassland which has been agriculturally improved by the application of fertilisers or herbicides, by drainage or by ploughing and reseeded. Such swards generally contain a very limited range of plant species, mainly those which either demand or tolerate high nutrient levels and grazing. They have lost many of the species characteristic of unimproved SEMI-NATURAL grassland.

in-bye - enclosed grassland, often surrounding farm buildings.

instream - occurring within the confines of a river channel.

intake - improved pasture taken in and fenced from the hill.

invertebrate - animals without a backbone.

Less Favoured Areas (LFAs) - areas covered by EU Directive 75/268. In the UK these are split into 'disadvantaged' areas and 'severely disadvantaged' areas.

ley - a short-term pasture, often cut for SILAGE or hay, sown to last for one or more years, after which it is ploughed and another crop sown.

LIFE fund (L'instrument Financier pour l'Environnement) (EU) - A financial instrument, established to assist the development and implementation of the EU's environmental policy.

livestock unit - method of describing different stock types and age groups based on their energy requirements. Standard ratios are used, commonly based around one livestock unit equalling one Friesian dairy cow.

Local Agenda 21 - see AGENDA 21.

Local Biodiversity Action Plan - a framework for the delivery of the UK Biodiversity Action Plan at the local County or Regional level.

Local Nature Reserve (LNR) - areas designated by the local authority, often owned by them and managed by other bodies, such as wildlife trusts.

macrophyte - aquatic plant (vascular and non-vascular) that can be seen with the naked eye and is therefore not microscopic.

managed retreat - the progressive shifting of the boundary of natural coastal and maritime habitat landward, by moving man-made sea defences back or removing or re-modelling them, creating new intertidal areas.

Management Agreement - contractual term used to describe documented agreements completed with land owners and occupiers regarding their management of land, often within an incentive scheme for example ENVIRONMENTALLY SENSITIVE AREAS and COUNTRYSIDE STEWARDSHIP.

marl lakes - fresh water bodies with concentrations of dissolved calcium carbonate greater than 100 mg/l.

meadow - see HAY MEADOW.

mesotrophic - of a moderate nutrient status.

minerotrophic - fed by ground water, often used when describing MIRES.

mire - a general term applied to plant communities developed on waterlogged ground on both PEAT and mineral soils. The term includes both FENS and BOGS.

montane - used to describe the zone above the altitude at which trees naturally occur.

moorland - the unenclosed land of the uplands supporting upland heath (wet and dry), blanket and other upland mires and upland grassland.

Moorland Scheme - UK scheme under the EU agri-environment programme which closed in 1998 and was incorporated into the COUNTRYSIDE STEWARDSHIP scheme. It was aimed at protecting and improving moorland environments by providing incentive payments for farmers in defined areas to reduce livestock grazing.

National Nature Reserve (NNR) - sites of national or international importance for their wildlife or natural features which have been declared by English Nature or its predecessors under the National Parks and Access to the Countryside Act 1949 or the Wildlife and Countryside Act 1981. They are either owned or controlled by English Nature or held by approved bodies such as wildlife trusts.

National Vegetation Classification (NVC) - a classification used to describe British PLANT COMMUNITIES.

nationally rare plants - plant species recorded nationally in 15 or fewer 10 km squares of the national grid.

nationally scarce plants - plant species recorded nationally in 16 to 100 10 km squares of the national grid.

native species - species that occur naturally in an area, and therefore one that has not been introduced by humans either accidentally or intentionally.

Natural Areas - tracts of countryside which are readily recognised by their characteristic land forms, wildlife and land use. English Nature has divided the whole of England into Natural Areas. They are not designations and they are not confined by traditional administrative boundaries. Natural Areas are intended to provide a framework to identify the priorities and objectives for nature conservation at a local level. They have a key role to play in the translation of national BIODIVERSITY ACTION PLAN targets for habitats and species into action at the local level, and for setting targets for species and habitats which are important and characteristic locally.

neutral grasslands - grasslands that are mostly found within enclosed field systems on moist mineral soils with a pH between 5 and 6.5.

NPK - an abbreviation for nitrogen, phosphorous and potassium in describing the composition of a fertiliser.

oligotrophic - nutrient poor (not necessarily base poor).

ombrotrophic - supplied solely by water derived from the atmosphere (rain, snow, fog etc.).

Palaearctic - a region of the earth defined in terms of its plants and animals that covers Europe, Asia and North Africa.

peat - soil of partially decomposed vegetable matter; accumulated under waterlogged (anaerobic) conditions, sometimes made up entirely of *Sphagnum* mosses.

plant community - a group of plants growing in a particular area under particular conditions of soil, climate etc. Communities can be classified in broad terms such as broadleaved woodland or in greater detail such as upland mixed ash woodland.

poaching - the trampling of land when wet, by stock, so the soil becomes churned and muddy, often to the detriment of the vegetation.

pollard - woodland management whereby mature trees are cut to promote regrowth above the reach of browsing stock.

primary forest - the surviving fragments of primaeval forests, the CLIMAX vegetation type of this country.

Priority Habitat (formerly 'key habitat') - a habitat category targeted for action through a HABITAT ACTION PLAN. A list of 39 key habitats was published in the UK Steering Group Report (1995), qualifying on the basis of international obligations, rarity and decline, functional importance and importance for PRIORITY SPECIES. A further 8 marine habitats are now included. Not to be confused with 'priority' habitats under the EC Habitats Directive.

Priority species (formerly 'key species') - species targeted for action through a SPECIES ACTION PLAN in the UK Steering Group Report (1995). Not to be confused with 'priority' species under the EC Habitats Directive.

Ramsar Site - wetlands of international importance designated under the Ramsar convention 1971, which requires signatory countries to protect internationally important wetlands, especially those used by migratory water birds, and to use wetlands wisely.

raptor - a bird of prey.

Red Data Book - lists NATIONALLY RARE species.

Regionally Important Geological/ Geomorphological Site (RIGS) - geological and geomorphological sites, excluding SSSIs, that are considered worthy of protection for their educational, research, historical or aesthetic importance.

ride - cleared area in woodland, often linear; for access, fire breaks and to provide open areas for game and wildlife.

riparian - relating to or situated on the bank of a river or stream.

Rural Development Regulation - "second pillar of the CAP" under AGENDA 2000. Brings together instruments for LESS FAVOURED AREASs, AGRI-ENVIRONMENT, forestry, early retirement, rural development and STRUCTURAL FUNDS.

scree - angular rock debris, often mobile, formed from weathering of parent material, mainly by frost action, and often located below the parent outcrop.

secondary woodland - woodlands that occupy sites that have not been continuously wooded since 1600 AD (see ANCIENT WOODLAND).

semi-improved grassland - grassland which has been modified by the application of fertilizers (generally at a low level over a long period of time), herbicides, intensive grazing or drainage such that its species-richness and diversity is lower than that of unimproved SEMI-NATURAL grassland but still retains some characteristics of the semi-natural grassland from which it has been derived.

semi-natural - PLANT COMMUNITIES of native species that are not at their CLIMAX stability and are often created by direct or indirect effects of man. Most of the plant communities in Britain that are of nature conservation importance are semi-natural.

Severely Disadvantaged Areas (SDAs) - see LESS FAVOURED AREAS.

silage - partially fermented conserved fodder.

sinkhole - a steep sided depression found commonly in limestone areas, usually the result of solution weathering.

Site of Special Scientific Interest (SSSI) - sites of national importance for their plants, animals, or geological or physiographical features designated by English Nature under the Wildlife and Countryside Act 1981 (as amended).

slurry - liquefied animal manure.

Special Area of Conservation (SAC) - areas that need to be protected under the EC HABITATS DIRECTIVE. Sites of Community importance for habitats or species listed in the Directive where 'a favourable conservation status' is to be maintained or restored. With SPECIAL PROTECTION AREAS they will form a network of protected areas across the European Union to be known as 'Natura 2000'.

Special Protection Area (SPA) - areas that are required to be protected under the EC Birds Directive 1979 as habitats for vulnerable species on Annex I of the Directive and also regularly occurring migratory species. With SPECIAL AREAS OF CONSERVATION they will form a network of protected areas across the European Union to be known as 'Natura 2000'.

Species Action Plan - a 10-15 year plan which sets objectives and targets for the maintenance or enhancement of their populations and range, and the actions necessary to achieve them. Present in both the UK BIODIVERSITY ACTION PLAN and LOCAL BIODIVERSITY ACTION PLANS.

species richness - the number of species in an ecosystem.

spring - a type of FEN comprising the vegetation associated with an upwelling of water from the land surface which often occur at the head of FLUSHES and watercourses.

stock - term used to refer to livestock such as sheep and cattle.

Structural Funds - measures to aid economic and social development in the EU. Objective 5b areas currently cover large tracts of the English uplands but will be replaced by smaller Objective 1 and 2 areas under AGENDA 2000.

submerged vegetation - plants rooted to the bed of a water body and either completely submerged or with only part of their shoots floating or emergent.

succession - a gradual sequence of changes in vegetation over a period of time until an equilibrium has been attained and a CLIMAX community is established, e.g. ungrazed grassland developing into scrub and then woodland. See also PLANT COMMUNITY.

supplementary feed - feed used to supplement livestock dietary requirements usually during the winter. This often consists of conserved fodder, such as hay or SILAGE, feed blocks or concentrates.

sustainable development - development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

swamp - a broad term covering mostly tall, EMERGENT VEGETATION occurring adjacent to open water.

sward - above ground components of grassland vegetation comprising grasses and HERBS.

top - to cut grass sward or selected plant species to favour growth of palatable shoots or for weed control.

UK Biodiversity Action Plan - see BIODIVERSITY ACTION PLAN.

unimproved grassland - grassland that has not been subject to agricultural improvement through the use of fertilizers, herbicides, intensive grazing or drainage. Such grasslands are often SPECIES-RICH and are important for wildlife.

vascular plant - plants that have a vascular system of vessels for conducting liquids. Include all flowers, trees, ferns etc.

whole farm plan - integrated management plan for a whole farm which incorporates physical characteristics, information on agricultural activities and environmental features. May include management objectives.

Wildlife and Countryside Act 1981 (as amended)- This act protects certain species that are threatened by human activity. It also places a duty upon English Nature to notify owners and occupiers with an interest in an area of land if it believes that area is of special interest by way virtue of its biological or geological features. These sites are known as SITES of SPECIAL SCIENTIFIC INTEREST.

Wildlife Enhancement Scheme (WES) - voluntary and flexible scheme run by English Nature providing positive incentives in the form of annual and standard capital payments for the sensitive management of SITES OF SPECIAL SCIENTIFIC INTEREST in certain parts of England.

Wildlife Site - A non-statutory designation of sites at the county/district level. Sites in Cumbria are assessed by the Cumbria Wildlife Trust and are included in Local Authority Plans.

wildwood - the original woodland cover, relatively unaffected by human activity.

Woodland Grant Scheme - Forestry Commission grant which provides support for the establishment, by planting or regeneration, and management of woodland.

World Heritage Site - a site designated by the World Heritage Committee after nomination by the UK Government under the 1972 Convention on the Protection of the World Cultural and Natural Heritage.

APPENDIX 3:

Organisation of the Partnership

Given the size and diversity of the Cumbria's Biodiversity Partnership, it is necessary to have structures in place that organise and best make use of partners skills and the extent and role each wishes to play in the development and implementation of the BAP. This section summarises the various groups and committees that have developed to undertake the functions of the BAP. A Project Officer is employed by the Partnership to co-ordinate the production and subsequent implementation and monitoring of the BAP.

It is a reflection of the dedication, commitment and interest within the Partnership that a diverse range of groups has been established and have taken on the various roles that together will enable the BAP to move from plan production to implementation and monitoring.

The Partnership

The Partnership was formally established at a Forum meeting in July 1998 (following a resolution at an earlier conference held by Cumbria Wildlife Trust in 1997), and with the employment of a dedicated Project Officer in the April of that year. The initial composition has since greatly expanded, both in the number of organisations and in the range of interests and expertise encompassed. Membership to the partnership is entirely open and more partners are continually welcomed on board. At the time of writing, 115 organisations are represented.

Forum meetings, held approximately annually, form one of the main methods of communication between this wider Partnership and those who are closely involved in the management of the BAP, namely the Project Officer, Steering Committee and the Working Groups. This is supplemented by Cumbria's Wealth of Wildlife, the Partnership's Newsletter.

Steering Committee

The Steering Committee functions as a strategic management group, advising on the fundamental issues and direction of the BAP. It is the Committee to which all the other groups report and acts to resolve any problems that may arise during the running of the Partnership. The Committee comprises senior representatives from the following organisations, currently:

Organisation	Representative
Country Landowners Association	Jolyon Dodgson
Countryside Agency	(currently vacant)
Cumbria County Council	John Hetherington, Judy Palmer and Cllr: Ron Calvin
Cumbria Local Development Agencies Forum	Isabel Thorne
Cumbria Wildlife Trust	Peter Bullard, Matthew Parsons
Eden District Council	Roger Hopcraft
English Nature	Des O'Halloran, Paul Glading
Environment Agency	Steve Garner
Farming and Wildlife Advisory Group	Ian Wrigley
Forestry Commission	Kit Brown
Friends of the Lake District	Mike Houston
Glaxo Wellcome	Carl Milner
Lake District National Park Authority	Phillip Taylor, Cllr: Helen Jones
Ministry of Agriculture, Fisheries and Food	Tony Adams
National Farmers' Union	Veronica Waller

Organisation

National Trust
North West Water Ltd
Royal Society for the Protection of Birds

Representative

Fiona Southern
Peter Head
(currently vacant)

Technical Working Group

This group has a variety of functions, all of a scientific or technical nature, including overseeing the selection process of species and habitats for which action plans will be produced, advising on the content and development of action plans, formulating recommendations for monitoring and reporting. This group meets about monthly. The current membership is:

Organisation

Cumbria County Council
Cumbria Wildlife Trust
English Nature
Environment Agency
Lake District National Park Authority
Ministry of Agriculture, Fisheries and Food
National Trust
Royal Society for the Protection of Birds
Tullie House Museum

Representative

Judy Palmer
Matthew Parsons
Paul Glading, Ian Slater, Erica Donnison
Steve Garner
Phillip Taylor
David Martin
John Hooson
(currently vacant)
Steve Hewitt

Public Involvement Working Group

It is testament to the degree to which the Partnership acknowledges the importance of awareness-raising and public participation in biodiversity conservation that this group was established. The remit of this group is broad, and covers the production of literature, media work, publicity, liaison with the wider Partnership, and public involvement and education aspects of the individual species and habitat plans and action plans for common themes. This Group currently has a broad range of skills, including people from the fields of education, wildlife conservation, public affairs, voluntary sector, farming/landowning and Local Agenda 21. The current membership is:

Organisation

British Trust for Conservation Volunteers
Country Landowners Association
Cumbria County Council
Cumbria Local Development Agencies Forum
Cumbria Wildlife Trust
Field Studies Council (Blencathra)
Lake District National Park Authority
South Lakeland District Council

Representative

Frances Richardson
Jolyon Dodgson
Judy Palmer, Brian Hough
Isabel Thorne
Matthew Parsons, Rachel Osborn
Rob Lucas
Anne Blackburn
Stephanie Eastham, Annie Masson

Cumbria Biological Data Network

The production and implementation of the Cumbria BAP requires good quality data on species and habitats to be readily available. Data is important in the establishment of baselines against which targets can be measured, future monitoring of targets, and so that partner organisations can use information on the occurrence of species and habitats to inform conservation decisions.

The Cumbria Biological Data Network is a group of organisations set up to ensure that biological data is made more widely available for conservation and educational purposes. The partner organisations have entered into an agreement to share data for use in their day-to-day work. This "Joint Working Agreement" (JWA) was made in the Spring of 1999 by English Nature, Environment Agency, Cumbria County Council, Cumbria Wildlife Trust, Tullie House Museum and the Lake District National Park Authority.

Focus Groups

These groups were set up to co-ordinate the production of groups of habitat and species action plans. It is envisaged that they will go on to play a key role in the implementation and monitoring of action plans. The latter role, including the role of 'Key Deliverers' and 'Partners' is explained in the Introduction.

Focus Groups were set up to take forward the production of groups of similar plans, such as Agricultural Habitats, Woodland Habitats, Birds, Invertebrates, and so on. Each consists of a broad mixture of people - experts in the relevant field, conservation practitioners, local authorities, voluntary organisations, representatives of farming and landowning organisations. The wider Partnership was invited to take part in Focus Group meetings if they so wished, or to be consulted by correspondence.

Focus Groups appointed a Chair and one or more persons to draft action plans; these are listed below. Thorough consultation on all developing plans was undertaken, both within the Focus Group and with the two Working Groups and the Steering Committee.

Focus Group and Chair	Plans under Group's charge	Plan drafters
Mammals Erica Donnison, EN	bats	John and Shirley Martin, Westmorland and Furness Bat Group
	water vole	Tony Marshall, CWT
	red squirrel	Sarah Bentley, NPI North-West Red Alert
Birds Alistair Crowle, RSPB (since moved away from Cumbria)	barn owl	Alistair Crowle, RSPB
	song thrush	Alistair Crowle, RSPB
Amphibians Erica Donnison, EN	great crested newt	Tony Marshall, CWT
	natterjack toad	Erica Donnison, EN
Fish* Cameron Durie, EA	vendace	Cameron Durie, EA
Invertebrates Steve Hewitt, Tullie House Museum	water beetle <i>Hydroporus rufifrons</i>	David Bilton, University of Plymouth/ David Atty
	marsh fritillary	Paul Kirkland, Butterfly Conservation

Focus Group and Chair	Plans under Group's charge	Plan drafters
	pearl-bordered fritillary	Rob Petley-Jones, EN
	high brown fritillary	Rob Petley-Jones, EN
	netted carpet moth	John Hooson, NT
	sandbowl snail	Barry Colville, CWT/Conchological Society of Great Britain & Ireland
	Geyer's whorl snail	Barry Colville, CWT/Conchological Society of Great Britain & Ireland
	white-faced dragonfly	David Clarke, Tullie House Museum
	variable damselfly	David Clarke, Tullie House Museum
	caddisfly <i>Glossosoma intermedium</i>	Ian Wallace, Liverpool Museum
Plants Geoffrey Halliday	juniper	Ian Slater, EN
	slender green feather-moss	Keith Raistrick
	lichen <i>Lobaria amplissima</i>	Ivan Day
Agricultural Habitats David Harpley, CWT	hay meadows and lowland pastures	Ian Slater, EN
	calcareous grassland	Ian Slater, EN
	purple moor-grass/ rush pasture	Ian Slater, EN
	limestone pavement	Simon Webb, EN/Penny Knowles, CWT
Wetland Habitats Gareth Daglish, EN (current Chair to be appointed)	reedbeds	Judith Bennett, EA/Alistair Crowle, RSPB
	lowland raised mire	Jacqui Ogden, EN
	basin mire	Sue Evans, EN/Jean Johnston, EN
Woodland Habitats Phil Taylor, LDNPA	upland oak woodland	Phil Taylor, LDNPA
	upland mixed ash woodland	Karen Sampson, EN
	wet woodland	Allan Stewart, EN

Focus Group and Chair	Plans under Group's charge	Plan drafters
Aquatic Habitats Allan Stewart, EN	mesotrophic standing waters	Karen Rouen, EA/Steve Garner, EA
	rivers and streams	Steve Garner, EA/Allan Stewart, EN
Upland Habitats John Hooson, NT	blanket bog	Gareth Daglish, EN/John Hooson, NT
	upland heathland	Ian Soane, EN/John Hooson, EN
Cities, Towns and Villages Julian Smith, Groundwork West Cumbria	Cities, Towns and Villages.	Julian Smith, Groundwork/Matthew Parsons, CBP
Coastal Alistair Crowle, RSPB (since moved away from Cumbria)	coastal habitats	Chris Lumb, EN
	honeycomb worm reef	Chris Lumb, EN

*An existing group, the Vendace Steering Group, was used as the basis for the Fish Focus Group.

APPENDIX 4:

Species and Habitats for which Action Plans are to be Produced in Phase 2

i) Species

dormouse	hoverfly <i>Doros profuges</i>
black grouse (to be reviewed)	freshwater pearl-mussel
farmland birds (grouped plan)	least minor (moth)
schelly	river jelly-lichen
Atlantic salmon	northern hawk's-beard
wall mason bee <i>Osmia parietina</i>	a moss or liverwort (to be decided upon)
red wood-ant	pillwort
white-clawed crayfish	small white orchid
invertebrates of exposed river shingle (grouped plan)	pink meadow-cap fungus
medicinal leech	

ii) Habitats

- wood pasture, parkland and veteran trees
- scrub communities (other than juniper)
- calaminarion grasslands (plant communities associated with local mine spoil and waste)
- lowland heath
- coastal and flood-plain grazing marsh
- swamps and tall herb fen
- springs and flushes
- valley mires
- oligotrophic standing waters
- standing waters on marl (to be reviewed)
- montane heath and grassland
- montane rock ledge, outcrop and scree
- montane springs and flushes
- sub-montane and lowland natural rock-ledge, outcrop and scree
- maritime cliff and slope
- coastal vegetated shingle structure
- coastal saltmarsh
- coastal sand dune (incl. dune grass, heath, scrub and strand-line)
- intertidal rocky shores and reefs
- intertidal mudflats and sandflats
- sea-grass beds
- saline lagoons

Criteria used to Select Species and Habitats for Individual Action Plans.

NB criteria were not applied in a hierarchical way, nor is the list in order of importance.

- For species, is its conservation adequately covered by general habitat management, as might be effected through a habitat action plan?
- Is the species/habitat declining or threatened?
- For species, does it occur in only a handful of known sites? If so, the species action plan may not be a suitable approach, and it may be better conserved by other means, including mention in the appropriate habitat plan.
- Does Cumbria have a large proportion of the UK population of the species, or area of the habitat? If so, then we have a particular responsibility for its conservation. For species on the edge of their range and where they are more abundant in the main part of it, a local action plan may not be appropriate.
- Is the species a Priority Species or is the habitat a Priority Habitat in the UK BAP? A degree of priority should be given to these in the Cumbria BAP, especially where we have a significant proportion of the UK resource. However, species/habitats of more local importance should also be included where they fulfil some of the other criteria.
- Is a habitat important for a range of species, including UK Priority Species and species of local importance?
- Is a species of popular appeal, or can it be used as a “flagship” to promote a particular conservation issue.
- Can a real difference be made to the habitat or species through local actions “on the ground”?
- Does the choice of species/habitats represent a wide geographical coverage across the County?
- Does the choice of species/habitats encompass a broad range of conservation issues pertinent to Cumbria today?
- Does the choice of species/habitats encompass species which are relevant and interesting to a wide range of potential “audiences, not solely the “experts”?
- Does the choice of species/habitats cover the range within the county?

APPENDIX 6:

Sections of Individual Species and Habitat Action Plans

Each action plan has been written, as far as was possible, to “stand alone”, rather than having within the text many cross-references to appendices or other documents. This said, it has been necessary to include some information in the Appendices.

There follows a resume of each main section in each plan and its purpose:

Current status

Brief description of habitat; description of species.

International, national and local distribution/abundance.

Past changes in distribution, extent and quality of habitat; population and range of species.

Summary of coverage of habitat/species by Designations (e.g. National Nature Reserve or SSSI).

Legal Protection (species only)

Lists any protection through Wildlife and Countryside Act, Conventions and Directives.

Characteristic wildlife (habitat plans only)

Definition of the habitat in terms of the types of assemblages of animals and plants which are characteristic.

Key species (habitat plans only)

This lists all ‘Priority Species’ as defined by *UK Biodiversity Group Tranche 2 Action Plans (Vol. 1)* that occur in the relevant habitat in Cumbria, together with species of County importance (selected by species experts as being of high conservation importance in a Cumbrian context).

Relevant Ecology/Management Requirements (species plans only)

Brief description of life-cycle, migration, food, and reproduction insofar as it relates directly to conservation issues. Also lists the main habitat management prescriptions needed to maintain/encourage the species.

Best management practice (habitat plans only)

Brief paragraph that describes the range of factors that need to be considered when managing the habitat for biodiversity. Where appropriate, the context in terms of the agricultural setting is explained to demonstrate that habitats are maintained by agricultural use.

Current issues

List and brief explanation of the factors that affect the habitat or species. Explanation is given of relative importance of factors.

Current action

List and brief explanation of existing/ongoing work directly related to the species/habitat.

Context in relation to other plans

Explains how the Cumbria action plan relates to any UK plan for the species, and links with other plans in the Cumbria BAP.

UK Habitat Action Plans

If a UK plan exists for the species/habitat, gives the Volume number where it is to be found and lists the UK Objectives.

National Lead Agency (habitat plans only)

Shows the UK Lead Agency (usually Statutory Agency); these co-ordinate delivery of UK habitat action plans.

UK Contact Point and Lead Partner (species plans only)

Shows UK Contact Point (statutory bodies or Government Departments, who act as initial point of contact for anyone making general enquiries or wishing to become involved) and Lead Partner (statutory or non-statutory bodies of acknowledged conservation competence, who are responsible for co-ordinating implementation of a species action plan).

Local contact

This is a person who is able to field general enquiries about the subject of the action plan in question, in some cases the appropriate Focus Group Chair, and in others another competent person. For species plans there may be two contacts: one general conservation contact and one species expert.

Associated Plans in the Cumbria BAP

This shows those other species and habitat plans in the Cumbria BAP that are related to the plan in question, or should be referred to for contextual information.

References

This lists only those referred to in the text, if any. Other relevant sources are listed under Further Reading in Appendix 9.

Objectives

These are broken down into two levels; the Broad Objectives which summarise the overall aim and, within these, Operational Objectives which explain more of the mechanism for achieving the Broad Objective.

Targets

These are time-limited milestones towards the achievement of Objectives, and are expressed in terms of biological outcome or in terms of activity. Targets may be included within Broad or Operational Objectives and/or within Actions.

Proposed actions

These are the mechanisms for achieving Objectives, and where possible have a date for completion or enactment (NB where a deadline is expressed, e.g. "By 2001" this means the action is to be completed by the end of 2001). Suggested Organisational Involvement list those organisations (and in some cases individuals) that have been suggested as potential deliverers. One or more Key Deliverers are highlighted in bold; Partners are subsequently listed in plain type (see Section E for roles of these). A 'Timescale' column categorises each action into time periods, for ease of quick reference. A 'Type' column categorises each action, for example 'Policy and Legislation' or 'Advisory', for quick reference.

APPENDIX 7:

Relationship between BAP Habitats and National Vegetation Classification

The National Vegetation Classification (NVC) (Rodwell 1991) is a widely-used scheme for the detailed classification of British vegetation communities. It classifies stands of vegetation according to the presence/absence and relative abundance of a range of characteristic plant species, and takes into account the influence of environmental and management practices. NVC categories are assigned a letter (signifying the broad category, e.g. W for woodland; M for mire) and a unique identifying number, followed by the names of one or more of the category's characteristic plant species. Many communities may be further sub-divided into 'sub-communities', and these are denoted by lower-case letters.

The following descriptions relate the broader-scale habitat groupings used in the Biodiversity Action Plan to the finer-scale NVC categories. The descriptions vary in length and style according to the level of detail and type of emphasis appropriate to each.

ANCIENT AND/OR SPECIES-RICH HEDGEROWS

Hedgerows comprise various scrub and woodland types, though no NVC categories refer exclusively to hedgerows.

BASIN MIRES

1. Base rich fen NVC communities of basin mires include:-

M9 *Carex rostrata* - *Calliergon cuspidatum/giganteum* mire - including bottle sedge, *Carex rostrata*, common cotton grass, *Eriophorum angustifolium*, marsh bedstraw, *Galium palustre*, bog bean, *Menyanthes trifoliata*, marsh cinquefoil, *Potentilla palustris*, and the moss *Calliergon cuspidatum*. The nationally rare lesser tussock sedge, *Carex diandra* is associated with M9.

M26 *Molinia caerulea* - *Crepis paludosa* mire - including common sedge, *Carex nigra*, carnation sedge, *Carex panicea*, marsh hawksbeard, *Crepis paludosa*, marsh horsetail, *Equisetum palustre*, meadowsweet, *Filipendula ulmaria*, purple moor-grass, *Molinia caerulea*, tormentil, *Potentilla erecta*, meadow buttercup, *Potentilla acris*, devil's-bit scabious, *Succisa pratensis*, marsh valerian, *Valeriana dioica* and the moss *Calliergon cuspidatum*. The uncommon moss *Campylium elodes* is associated with M26.

2. Base poor fen NVC communities of basin mires include:-

M4 *Carex rostrata* - *Sphagnum recurvum* - including bottle sedge, *Carex rostrata*, the mosses *Polytrichum commune*, *Sphagnum cuspidatum* and *Sphagnum recurvum*.

M5 *Carex rostrata* - *Sphagnum squarrosum* mire - including common sedge, *Carex nigra*, bottle sedge, *Carex rostrata*, common cotton grass, *Eriophorum angustifolium*, marsh cinquefoil, *Potentilla palustris*, devil's-bit scabious, *Succisa pratensis*, the mosses *Aulacomnium palustre* and *Sphagnum squarrosum*.

3. Ombrotrophic bog NVC communities of basin mires include:-

M1 *Sphagnum auriculatum* bog pool community - including common cotton grass, *Eriophorum angustifolium*, bog bean, *Menyanthes trifoliata*, *Sphagnum auriculatum* and *Sphagnum cuspidatum*.

M2 *Sphagnum cuspidatum/recurvum* bog pool community - including cross-leaved heath, *Erica tetralix*, common cotton grass, *Eriophorum angustifolium*, round-leaved sundew *Drosera rotundifolia*, *Sphagnum cuspidatum* and *Sphagnum recurvum*. The uncommon bog sedge, *Carex limosa* and tall bog sedge, *Carex magellanica* are also associated with M2.

M6 Carex echinata - Sphagnum recurvum/auriculatum mire - including star sedge, *Carex echinata*, the mosses *Polytrichum commune*, *Sphagnum auriculatum*, *Sphagnum recurvum*, velvet bent grass, *Agrostis canina*, purple moor grass, *Molinia caerulea*, tormentil, *Potentilla erecta*, marsh violet, *Viola palustris*.

M18 Erica tetralix - Sphagnum papillosum raised and blanket bog - including heather, *Calluna vulgaris*, cross-leaved heath, *Erica tetralix*, common cotton grass, *Eriophorum angustifolium*, hare's tail cotton grass, *Eriophorum vaginatum*, mosses *Sphagnum papillosum*, *Sphagnum tenellum*, *Odontoschisma sphagni*.

4. Woodland NVC communities of basin mires include:-

W1 Salix cinerea - Galium palustre woodland - including grey willow, *Salix cinerea*, and marsh bedstraw, *Galium palustre*.

W2 Salix cinerea - Betula pubescens - Phragmites australis woodland - including grey willow, *Salix cinerea*, downy birch, *Betula pubescens*, common reed, *Phragmites australis*.

W3 Salix pentandra - Carex rostrata woodland - including grey willow, *Salix cinerea*, bay willow, *Salix pentandra*, angelica, *Angelica sylvestris*, cuckoo flower, *Cardamine pratensis*, bottle sedge, *Carex rostrata*, marsh marigold, *Caltha palustris*, meadowsweet, *Filipendula ulmaria*, marsh bedstraw, *Galium palustre*, water avens, *Geum rivale*, marsh valerian, *Valeriana dioica*, and the mosses *Calliergon cuspidatum*, *Mnium hornum* and *Rhizomnium punctatum*.

W4 Betula pubescens - Molinia caerulea woodland - including downy birch, *Betula pubescens*, purple moor-grass, *Molinia caerulea* and the mosses *Sphagnum recurvum* and *Sphagnum palustre*.

W5 Alnus glutinosa-Carex paniculata woodland

W6 Alnus glutinosa-Urtica dioica woodland

W7 Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum woodland

W18 Pinus sylvestris - Hylocomium splendens woodland - including Scots pine, *Pinus sylvestris*, heather, *Calluna vulgaris*, wavy hair-grass, *Deschampsia flexuosa*, bilberry, *Vaccinium myrtillus*, cowberry, *Vaccinium vitis-idaea*, and the mosses *Dicranum scoparium*, *Hylocomium splendens*, *Plagiomnium undulatum*, *Pleurozium schreberi* and *Rhytidiadelphus loreus*. The uncommon lesser twayblade, *Listera cordata* and creeping lady's-tresses, *Goodyera repens* are also associated with W18.

5. Swamp NVC communities of basin mires include:-

S2 Cladium mariscus - great fen sedge - swamp and sedge beds.

S2 is most characteristic of shallow, standing water in lowland topogenous mires fed by calcareous base-rich ground water.

S3 Carex paniculata - greater tussock sedge - swamp.

S9 Carex rostrata - bottle sedge - swamp.

S9 is typically a swamp of shallow to moderately deep, mesotrophic to oligotrophic, standing waters with organic substrates.

S25 Phragmites australis - common reed - tall-herb fen.

S27 *Carex rostrata* - *Potentilla palustris* tall-herb fen including bottle sedge, *Carex rostrata* and marsh cinquefoil, *Potentilla palustris*.

BLANKET BOG

In the north Pennines the main blanket bog National Vegetation Classification community is M19 *Calluna vulgaris* - *Eriophorum vaginatum* mire, while M20 *Eriophorum vaginatum* mire predominates in areas in poor condition. In the Lake District M17 *Trichophorum cespitosum* - *Eriophorum vaginatum* blanket mire is present. On the Bewcastle Fells M18 *Erica tetralix* - *Sphagnum papillosum* forms extensive stands. Within these communities M2 *Sphagnum cuspidatum/recurvum*, M3 *Eriophorum angustifolium* and, occasionally, M1 *Sphagnum auriculatum* bog pools may be present. Flush communities are also an important feature of blanket bogs and M6 *Carex echinata* - *Sphagnum recurvum/auriculatum* mire, M9 *Carex rostrata* - *Calliergon cuspidatum/giganteum* mire, M10 *Carex dioica* - *Pinguicula vulgaris* mire and M38 *Cratoneuron commutatum* - *Carex nigra* spring communities can all be present. A UK BAP priority species, yellow marsh saxifrage, is found in some of these flushes. The north Pennines supports 80-90% of the UK population of this species, with the majority of the population in flushes within blanket bog sites in Cumbria.

Areas of deep peat (> 0.5m) may also support other plant communities more typical of habitats where long histories of inappropriate management, particularly high frequencies of burning and/or heavy grazing, have removed the characteristic features of blanket mire vegetation. Such areas are still technically blanket bog due to the presence of deep peat. These can include dry heath (H9 *Calluna vulgaris* - *Deschampsia flexuosa* and H12 *Calluna vulgaris* - *Vaccinium myrtillus* heath), wet heath (M15 *Trichophorum cespitosum* - *Erica tetralix* mire), or even grassland (U6 *Juncus squarrosus* - *Festuca ovina* grassland or M25 *Molinia caerulea* - *Potentilla erecta* mire) communities. These communities can also occur naturally within areas of blanket bog where variation in peat depth and topography can create mosaics of these habitats.

CALCAREOUS GRASSLAND

In Cumbria there are three National Vegetation Classification calcareous grassland communities that are present. The greatest extent relates to those found on the Carboniferous limestone outcrops. These grasslands comprise CG9 blue-moor grass - limestone bedstraw grassland.

Away from the Carboniferous limestones, the principal community of calcareous grassland associated with base-rich igneous and metamorphic rocks in the Lake District mountains belong to the CG10 sheep's - fescue - common bent - thyme grassland community of the National Vegetation Classification.

The remaining community found in the County is the least extensive and this is CG2 sheep's fescue - meadow oat-grass grassland.

CITIES, TOWNS AND VILLAGES

No NVC categories are characteristic of the urban environment per se, although a great range of plant communities may be present.

COASTAL HABITATS

A very great number of NVC communities are present in the coastal environment. The broad scope of the Coastal Habitats plan does not lend itself to definition by NVC.

HAY MEADOWS AND LOWLAND PASTURES

Hay meadows and lowland pastures in Cumbria fall into the following plant communities as defined by the National Vegetation Classification:

Upland hay meadows:

MG3 *Anthoxanthum odoratum* - *Geranium sylvaticum* grassland.

Lowland hay meadows:

MG5 *Cynosurus cristatus* - *Centaurea nigra* grassland

MG4 *Alopecurus pratensis* - *Sanguisorba officinalis* floodplain meadow

MG8 *Cynosurus cristatus* - *Caltha palustris* flood pasture.

LIMESTONE PAVEMENT

There are no NVC categories which precisely describe the plant communities of limestone pavements, but they encompass elements of the following communities: W8 *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* woodland; W9 *Fraxinus excelsior* - *Sorbus aucuparia* - *Mercurialis perennis* woodland; W13 *Taxus baccata* woodland; W21 *Cretagus monogyna* - *Hedera helix* scrub; CG9 *Sesleria caerulea* - *Galium sternerii* grassland; OV38 *Gymnocarpium robertianum* - *Arrenatherum elatius* community; OV39 *Asplenium trichomanes-ramosum* - *Cystopteris fragilis* community.

LOWLAND RAISED MIRES

The main National Vegetation Classification community of near-natural raised mires is M18 *Erica tetralix*-*Sphagnum papillosum* mire, sometimes with M17 *Trichophorum cespitosum*-*Eriophorum vaginatum* mire. Bog pools contain M2 *Sphagnum cuspidatum/recurvum* or occasionally M1 *Sphagnum auriculatum* communities. Modified bogs can support other communities, typically M20 *Eriophorum vaginatum* mire, M15 *Trichophorum cespitosum*-*Erica tetralix* wet heath, H9 *Calluna vulgaris*-*Deschampsia flexuosa* heath, H12 *Calluna vulgaris*-*Vaccinium myrtillus* heath, M25 *Molinia caerulea*-*Potentilla erecta* mire and W4 *Betula pubescens*-*Molinia caerulea* woodland.

MESOTROPHIC STANDING WATERS

National Vegetation Classification does not lend itself particularly well to categorisation of standing waters. The following refers to a classification based upon nutrient levels and the presence or absence of certain plant species.

In general terms, the nutrient content of the inputs into a lake is an important determinant of its character. Mesotrophic lakes are those with a moderate amount of nutrients. For the purposes of this plan, they are defined as standing waters of at least 1 ha in size with the following typical characteristics:

- Nutrient levels within the narrow range 10-35 microgrammes l⁻¹ total phosphorus (and/or 300-650 microgrammes l⁻¹ inorganic nitrogen);
- A macrophyte community of type 5a or 5b, and/or an average macrophyte trophic ranking of 5-9 (following the methods of Palmer 1989). See below;
- An annual mean chlorophyll a concentration of 2.5-8 microgrammes l⁻¹.

The plan covers lakes, both natural and artificial, including those where only part of the site is mesotrophic.

The Palmer classification of standing water bodies is based on the presence or absence of submerged and floating plant species. It is derived from TWINSPLAN analysis of data for 1,124 sites in the UK, including sites in Cumbria.

The analysis grouped sites into ten major groupings each of which is characterised by certain key or indicator species. The ten lake types can be related to nutrient status of that type of lake, from very nutrient-poor (dystrophic or oligotrophic) to nutrient-rich (eutrophic). Using this scheme it is also possible to get a rough indication of the nutrient status of a lake by classifying its aquatic macrophyte community into one of the ten types.

Type 5 lakes are characterised by a high presence of alternate-flowered milfoil, bulbous rush, white water-lily, *Nitella spp* (a stonewort), shoreweed, several species of pondweed and *Chara spp* (a stonewort). This type is distinguished from oligotrophic types by the frequent presence of pondweed species and stoneworts and the less frequent presence of water lobelia, bulbous rush and quillwort. However, there can be intermediate types and within a lake there may be areas of both oligotrophic and mesotrophic character.

Eutrophic lake types tend not to have alternate-flowered milfoil, bulbous rush and shoreweed. They often have duckweed and significant algal blooms.

The average macrophyte trophic ranking is an index based on the presence and absence of particular species of aquatic plant. Depending on the species list for a lake, the index gives an indication of the likely nutrient status, for example, oligotrophic, mesotrophic or eutrophic.

PURPLE MOOR-GRASS AND RUSH PASTURE

In Phase I terms, the purple moor-grass and rush pasture habitat is restricted to forms of Marshy Grassland dominated by purple moor-grass and rushes (sharp-flowered rush and soft rush in the lowlands. Related vegetation on deep peat (>0.5m) is treated as modified mire vegetation in the Phase I classification and is excluded from the plan. Marshy grassland dominated by meadowsweet and iris is also excluded.

In National Vegetation Classification terms (Rodwell 1991) the plan covers the following plant communities in Cumbria (except where these occur on deep peat or at high altitudes): soft/sharp-flowered rush - marsh bedstraw rush pasture (M23), purple moor-grass - tormentil mire (M25) and purple moor-grass - northern hawk's-beard mire (M26). Certain related communities, notably meadowsweet - wild angelica mire (M27) and iris-meadowsweet mire (M28), are excluded.

The scope of the plan is restricted to the lowlands, and the altitudinal limit is set principally by the upper limit of enclosure. Thus, forms of rush (M23), and purple moor-grass (M25) pastures in the uplands are excluded. Stands of purple moor-grass - northern hawk's-beard mire (M26) may occasionally be found somewhat above the enclosure limit and, since they have predominantly lowland floristics, they are incorporated.

Purple moor-grass and rush pasture often occurs in complex community mosaics, although single community stands are not uncommon. In line with the National BAP, conservation priorities are focussed on the scarcer, more restricted and generally more species-rich communities, particularly M26 and species-rich M23a (the sharp-flowered rush sub-community) and M25c (the wild angelica sub-community), on large and ecologically diverse community mosaics and on examples supporting populations of uncommon and declining species including the marsh fritillary butterfly. Some constituent purple moor-grass and rush pasture stands are situated on the periphery of fens, within heathland sites or on low-lying coastal or inland floodplains.

Of the community types that are known to occur in Cumbria, the NVC M23a are by far the commonest and can be found throughout the county. M25c are much less common and tend to be restricted to small stands and M26 is the rarest.

REEDBED

The principle NVC communities are S4 *Phragmites australis* reedbed; S25 *Phragmites australis* - *Eupatorium cannabinum* fen; S26 *Phragmites australis* - *Urtica dioica* fen; W2 *Salix cinerea* - *Betula pubescens* - *Phragmites australis* woodland.

Stands of S28 *Phalaris arundinacea* fen, and many of the communities of swamp and tall herb-fen, may also be found in close association with reedbeds.

RIVERS AND STREAMS

Rivers and streams may support a great variety of National Vegetation Classification communities, and these are too numerous to list.

UPLAND HEATHLAND

Throughout Cumbria the predominant upland heathland National Vegetation Community is H12 *Calluna vulgaris*-*Vaccinium myrtillus* heath, but transitions to H18 *Vaccinium myrtillus*-*Deschampsia flexuosa* heath occur on the higher Lake District Fells. H9 *Calluna vulgaris*-*Deschampsia flexuosa* heath is much more sparsely represented and is more typical of the Pennines. H21 *Calluna vulgaris*-*Vaccinium myrtillus*-*Sphagnum capillifolium* heath occurs characteristically on steep overhanging gill edges, often with a northern aspect. M15 *Scirpus cespitosus*-*Erica tetralix* wet heath and occasionally M16 *Ericetum tetralicis* wet heath is associated with flatter land and in the Lake District is characteristically found on the more gently sloping western fells.

UPLAND MIXED ASH WOODLAND

- W8 *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* Woodland
(ash - field maple - dog's mercury)
- W8d *Hedera helix* (ivy) sub community
- W8e *Geranium robertianum* (herb robert) sub community
- W8f *Allium ursinum* (wild garlic) sub community
- W8g *Teucrium scorodonia* (wood sage) sub community
- W9 *Fraxinus excelsior* - *Sorbus aucuparia* - *Mercurialis perennis* woodland
(ash - rowan - dog's mercury)
- W9a Typical sub community
- W9b *Crepis paludosa* (marsh hawk's beard) sub community
- W13 *Taxus baccata* woodland (yew)

UPLAND OAK WOODLAND

In terms of the National Vegetation Classification this habitat comprises primarily W11 - *Quercus petraea* - *Betula pubescens* - *Oxalis acetosella* woodland and the more acid W17 *Quercus petraea* - *Betula pubescens* - *Dicranum majus* woodland.

Elements of other woodland communities may be also present within the stands, for example where flushes occur.

The wet woodlands encompass seven major NVC community types, W1 to W7. These represent the variation in woodland type depending on soil type, slope and hydrological regime. Management may also influence the community type.

1. W1-W3 - willow woods

The types W1, W2 and W3 are mainly woods of willow species on ground that has a permanently high water table. This includes lakeshores, river floodplains, swamps and fens. They are a major component of open water-terrestrial transitions. The ground flora is extremely variable and can include species more typical of drier situations. However, the following are characteristic of one or more of these communities.

Common reed	Hemp agrimony
Water mint	Marsh bedstraw
Bottle sedge	Bogbean
Water horsetail	Bog stitchwort

2. W4 - birch and purple moor-grass woods

This woodland type is found on moist, peaty soils. In Cumbria it is often found on raised mires and on peat-filled hollows within other woodland types. Birch dominates the canopy although other species such as willows, ash, hazel and bird cherry may be present. Purple moor-grass and *Sphagnum* mosses are characteristic of the ground layer. However, other species may be present including ferns, bramble, common sedge, angelica and marsh willowherb. In south-west Cumbria a few of these woods have royal fern.

3. W5 - alder - tussock sedge woods

These are woods of waterlogged organic soils which are moderately eutrophic. In Cumbria they are found on fen peats, river valley floodplains and basin mires where there is a strong influence from base-rich water.

Alder dominates the canopy with perhaps willows, birch and small amounts of other tree and shrub species. The ground layer is usually dominated by greater tussock sedge or lesser pond sedge. Associated species include opposite-leaved saxifrage, nettle, meadowsweet, valerian and water mint.

4. W6 - alder - nettle woods

This is a community of moist, eutrophic soils. In Cumbria this type is characteristic of the floodplains of lowland river channels where there is substantial deposition of silt and organic matter by floods.

Alder dominates the canopy with some willow, ash and shrubs such as elder and blackthorn. Nettles are usually abundant on the ground with other species including bramble, butterbur, cleavers and broad buckler-fern. Stands of the community often appear 'disturbed' because of the effect of winter flooding and deposition of flood debris.

5. W7 - alder - ash - yellow pimpernel woods

This is the major woodland community of moist mineral soils in the wetter parts of northern and western Britain. In Cumbria it is characteristic of woodland flushes and streamsides. However, it is also found along lakeshores, on hill ground with generally impeded drainage and associated with wetlands and fens on ground where there is no great tendency for accumulation of peat.

The canopy usually consists of alder, ash, birch and willows in variable amounts with in some stands alder being dominant. Species of drier ground may also be present, for example, oak and sycamore. The shrub layer can include hazel, bird cherry, blackthorn and guelder rose.

The field layer is enormously variable depending on grazing, past management, and ground conditions. The following are characteristic of one or other of the sub-communities.

- | | |
|--------------------|---------------------------|
| Meadowsweet | Yellow pimpernel |
| Angelica | Marsh thistle |
| Remote sedge | Pendulous sedge |
| Creeping buttercup | Lady fern |
| Soft rush | Tufted hair-grass |
| Common valerian | Opposite-leaved saxifrage |
| Reed canary-grass | Broad buckler-fern |

APPENDIX 8:

Relationship between UK BAP Broad Habitats, UK BAP Priority Habitats and EC Habitats Directive Annex I Habitat Types.

UK Broad Habitat (listing all UK Broad Habitats)	UK Priority Habitats (listing Key Habitats that occur in Cumbria - ? = presence to be confirmed)	EC Habitats Directive - Annex I types (+ = priority in the Directive) (Listing those that occur in Cumbria)
TERRESTRIAL		
Broadleaved, mixed and yew woodland	Upland oakwood	Old oak woods with Ilex and Blechnum in the British Isles
	Upland mixed ashwoods	Tileo-Acerion ravine forests +
		Taxus baccata woods +
	Wet woodlands	Bog woodland +
	Lowland wood pastures and parkland*	
	(Cumbria BAP also contains plans for: scrub communities other than juniper; and a separate species plan for juniper)	
Coniferous woodland		
Boundary and linear features	Ancient and/or species-rich hedgerows	
Arable and horticulture	Cereal field margins	
Improved grassland	Coastal and floodplain grazing marsh*	
Neutral grassland	Lowland meadows	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)
	Upland hay meadows	Mountain hay meadows (British types with <i>Geranium sylvaticum</i>)
Calcareous grassland	Lowland calcareous grassland	Semi-natural dry grassland and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)
	Upland calcareous grassland	Semi-natural dry grassland and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)

UK Broad Habitat (listing all UK Broad Habitats)	UK Priority Habitats (listing Key Habitats that occur in Cumbria - ? = presence to be confirmed)	EC Habitats Directive - Annex I types (+ = priority in the Directive) (Listing those that occur in Cumbria)
		Species-rich <i>Nardus</i> grassland, on siliceous substrates in mountain areas (and sub- mountain areas in continental Europe)
	(Cumbria BAP contains a plan for vegetation associated with lead mine soil (Calaminarian Grassland))	
Acid grassland	Lowland dry acid grassland	
	Purple moor-grass and rush pastures	Molinia meadows on chalk and clay (Eu-Molinion)
Bracken		
Dwarf shrub heath	Lowland heathland	Northern Atlantic wet heaths with <i>Erica tetralix</i>
		Dry heaths (all subtypes)
	Upland heathland	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
		Northern Atlantic wet heaths with <i>Erica tetralix</i>
		Dry heaths (all subtypes)
		<i>Juniperus communis</i> formations on heaths or calcareous grasslands
Fens, marsh and swamp	Purple moor-grass and rush pastures	Molinia meadows on chalk and clay (Eu-Molinion)
	Fens (Cumbria BAP contains sub- categories: basin mires, valley mires, swamps and tall herb fens, and springs and flushes)	Alkaline fens
		Petrifying springs with tufa formations (Cratoneurion) +

UK Broad Habitat (listing all UK Broad Habitats)	UK Priority Habitats (listing Key Habitats that occur in Cumbria - ? = presence to be confirmed)	EC Habitats Directive - Annex I types (+ = priority in the Directive) (Listing those that occur in Cumbria)
		Alpine pioneer formations of <i>Caricion bicoloris atrofuscae</i> +
		Transition mires and quaking bogs
	Reedbeds	
Bogs	Lowland raised bog	Active raised bogs +
	Blanket bog	Blanket bog (active only)
Standing open water and canals	Mesotrophic standing waters	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> formations
	Cumbria BAP also contains a plan for oligotrophic standing waters and for standing waters on marl.	Oligotrophic waters containing very few minerals of Atlantic sandy plains with amphibious vegetation: <i>Lobelia</i> , <i>Littorella</i> and <i>Isoetes</i>
Rivers and streams		
Montane habitats	Cumbria BAP contains a montane habitat plan	Alpine and subalpine heaths
		Eutrophic tall herbs
Inland rock	Limestone pavements	Limestone pavements +
Built up areas and gardens	Cumbria BAP plan=Cities, Towns and Villages	
COASTAL	Cumbria BAP Phase I contains a general coastal habitat plan, but Phase II will contain some of the more detailed categories listed below.	
Supralittoral rock	Maritime cliff and slopes (vegetated cliffs and lichen dominated cliffs)	Vegetated sea cliffs of the Atlantic and Baltic coasts
Supralittoral sediment	Coastal sand dunes	Embryonic shifting dunes
		Shifting dunes along the shoreline with <i>Ammophila</i> <i>arenaria</i> (white dunes)

UK Broad Habitat (listing all UK Broad Habitats)	UK Priority Habitats (listing Key Habitats that occur in Cumbria - ? = presence to be confirmed)	EC Habitats Directive - Annex I types (+ = priority in the Directive) (Listing those that occur in Cumbria)
		Fixed dunes with herbaceous vegetation (grey dunes) +
		Eu-Atlantic decalcified fixed dunes (<i>Calluno-Uliceae</i>)
		Dunes with <i>Salix arenaria</i>
		Humid dune slacks
	Coastal vegetated shingle	Perennial vegetation of stony banks
Littoral rock	<i>Sabellaria alveolata</i> reefs	Large shallow inlets and bays**
		Reefs
Littoral sediment	Coastal saltmarsh	Sandbanks which are slightly covered by sea water all the time
	Mudflats	Mudflats and sandflats not covered by sea water at low tide +
	Sea grass beds (<i>Zostera noltii</i>)	
	Sheltered muddy gravels ?	
Inshore sublittoral rock	<i>Sabellaria spinulosa</i> reefs ?	
	Tidal rapids	
Inshore sublittoral sediment	Saline lagoons	
	Sublittoral sands and gravels	
Offshore shelf rock		
Offshore shelf sediment		
Continental shelf slope		
Oceanic seas		

Key

* Complex habitats that cannot be assigned to a single Broad Habitat.

** Complex occurring in more than one Priority Habitat.

APPENDIX 9:

Further Reading

Below is listed books, articles, reports, scientific papers and other printed material that is of general relevance to the species and habitats featured in the Cumbria BAP. It is not intended to be exhaustive; indeed the emphasis is on general or standard texts. Items related to individual habitats and species are grouped together:

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