A 50-year vision for the wildlife and natural habitats of Hertfordshire

A Local Biodiversity Action Plan

Prepared by Herts & Middlesex Wildlife Trust April 1998
Revised and reprinted by the Biodiversity Partnership March 2006

hef
Hertfordshire Environmental Forum

www.hef.org.uk

Contents

		Page
Foreword and acknowledgements		i.i
Introduction		
Chapter 1	Introduction	1.1-1.4
Chapter 2	Geology	2.1-2.2
Chapter 3	Habitat and species review and evaluation	3.1-3.15
Habitat action plans		
Chapter 4	Woodland	4.1-4.32
Chapter 5	Wetlands	5.1-5.29
Chapter 6	Heathland and acid grassland	6.1-6.20
Chapter 7	Neutral grassland	7.1-7.14
Chapter 8	Chalk grassland	8.1-8.12
Chapter 9	Farmland	9.1-9.22
Chapter 10	Urban	10.1-10.27
Species action plans		
Chapter 11	Water Vole	11.1-11.6
Chapter 12	Common Dormouse	12.1-12.7
Chapter 13	Natterer's Bat	13.1-13.4
Chapter 14	Otter	14.1-14.4
Chapter 15	Tree Sparrow	15.1-15.4
Chapter 16	Bittern	16.1-16.6
Chapter 17	Stone-curlew	17.1-17.4
Chapter 18	Song Thrush	18.1-18.3
Chapter 19	Great Crested Newt	19.1-19.7
Chapter 20	Chalkhill Blue	20.1-20.4
Chapter 21	Grizzled Skipper	21.1-21.5
Chapter 22	Stag Beetle	22.1-22.3
Chapter 23	White-clawed Crayfish	23.1-23.4
Chapter 24	Great Pignut	24.1-24.4
Chapter 25	Cornflower	25.1
Chapter 26	River Water-dropwort	26.1-26.4
Chapter 27	Pasqueflower	27.1-27.4
Generic action plan		
Chapter 28	Generic actions	28.1-28.2

The future

Chapter 29	The way forward and implementation	29.1-29.4

Glossary, abbreviations and acronyms

Chapter 30	Glossary, abbreviations and acronyms	30.1-30.9

Bibliography

Chapter 31	Bibliography	31.1-31.2

Appendices

Chapter 32	Appendix 1 – Unimproved grasslands in Hertfordshire	32.1
	Appendix 2 – Habitat restoration potential	32.2
	Appendix 3 – NVC communities	32.3
	Appendix 4 – Criteria for habitat and species evaluation	32.11

List of tables

3.1	Evaluation of habitats within Hertfordshire	3.3
3.2	Evaluation of species within Hertfordshire	3.6

List of maps

3.1	Key biodiversity areas in Hertfordshire	3.14
4.1	Major ancient woodland complexes	4.23
5.1	A necklace of wetland habitats	5.21
6.1	Existing heathland sites in Hertfordshire	6.4
6.2	Core areas for heath and acid grassland restoration and re-creation in Hertfordshire	6.11
7.1	Distribution of key neutral grasslands and core areas	7.4
8.1	Distribution of key chalk grasslands and core areas	8.4

Additional Action Plans

Chapter 33	Black-necked Grebe	33.1-33.4
Chapter 34	Purple Emperor	34.1-34.7

Foreword

In 1998, as Hertfordshire's response to the national biodiversity planning process, a 50-year vision for the wildlife and natural habitats of Hertfordshire was prepared on behalf of the Hertfordshire Environmental Forum by Herts & Middlesex Wildlife Trust. This represented the first Biodiversity Action Plan for the county and was one of the earliest to be produced in England. It identifies those habitats and species which are a priority for conservation action and provides a valuable source of information on the county's natural assets.

In 2002, a Hertfordshire Biodiversity Officer was appointed and a review of the achievements against the targets identified within the action plans was undertaken. Progress was variable, with wetlands work considerably advanced, whilst other plans were less successful. During 2005/06, a review of the original habitat and species action plans, focussing solely on the objectives, targets and actions, was undertaken, led by the Biodiversity Officer and supported by the various leads of the species and habitat action plans. Additional species action plans were developed for Purple Emperor and Black-necked Grebe and an action plan for Traditional Orchards is nearing completion.

To help focus our activities during the next five years, the Biodiversity Action Plan is being relaunched by the Hertfordshire Biodiversity Partnership to incorporate the revised habitat and species action plans. This relaunch is timely, given the imminence of the East of England Plan, the increasing concerns about climate change and the need to seek biodiversity protection and gain within new planning frameworks. It is intended that this plan form the framework for action by the Biodiversity Partners, local authorities, businesses and the many voluntary groups associated with wildlife conservation across the County.

Judy Adams

Chair of the Biodiversity Partnership Group
(Hertfordshire Environmental Forum)

March 2006

hef
Hertfordshire
Environmental
Forum

www.hef.org.uk

Acknowledgements

Particular thanks must go to Graham White, who prepared the initial Biodiversity Action Plan on behalf of the Herts & Middlesex Wildlife Trust in 1998 for the Hertfordshire Environmental Forum. At that time many people contributed comments and ideas, in particular colleagues from the Hertfordshire Biological Records Centre, local authorities, nature conservation organisations, English Nature and the Environment Agency, as well as a large number of individuals. As the bulk of the document remains unchanged, everyone who contributed to its production is thanked.

A large team of people were involved in revising the individual habitat and species action plans and thanks must go to the habitat and species working groups. Special thanks are due to the action plan leads:

Tony Bradford, Joan Dixon, Jack Fearnside, Liz Goodyear, Graham Goodall, Martin Hicks, Pauline Holmes, Tim Hill, Jenny Jones, Ian Mather, Andrew Middleton, Ellie Minns, Andrew Palmer, Anita Parry, Sarah Postlethwaite, Jez Perkins, Jim Terry and Alison Washbrook.

For the design of the revised Biodiversity Action Plan, photos were used with kind permission from:

Les Borg, Michael Clark, Alec Cooper, Joan Dixon, Clare Gray, Herts & Middlesex Wildlife Trust Image Library, Tim Hill, Andrew Middleton, Peter Oakenfull, Darin Smith (Herts & Middlesex Wildlife Trust Image Library), Peter Wakely/English Nature and Phil Vines.

In addition, the work of many volunteer recorders over the years, whose dedication and commitment has enabled us to appreciate and understand the county and its wildlife, is gratefully acknowledged.

Funding for the production of the revised Biodiversity Action Plan was generously given by the Hertfordshire Environmental Forum (HEF).

Designed by LTD Design Consultants, London

1 Introduction

1.1 What is biodiversity?

'*Biodiversity is all living things, from the tiny garden ant to the giant redwood tree. You will find biodiversity everywhere, in window boxes and wild woods, roadsides and rain forests, snow fields and sea shore'* (*Biodiversity: The UK Steering Group Report*, 1995).

Biological diversity (biodiversity) is the variety of life. Not only is it the whole range of plant and animal species but also the local variations found within these species.

Why is biodiversity important?

The intricate network of ecosystems, habitats and species comprising biodiversity provides the support systems that sustain human existence. It provides many of the essentials of life – oxygen, water, food, clothing, health and relaxation. This value extends from the spiritual benefits to be gained from contact with nature, to the economic potential of wild species for new sources of food or medicines. The natural world enriches the quality of our lives through tourism, leisure and daily contact with wildlife. The wild ancestors of many of our major crops such as wheat and barley, provide genetic material which can provide resistance to crop diseases and help reduce the need for pesticides. Wetland habitats act as natural pollution filters, buffer the effects of flood and drought, and reduce soil erosion.

However, human activities continue to deplete biodiversity at an ever-increasing rate. In the UK we have lost over 100 species this century, with many more in danger of disappearing, especially at the local level. This is ultimately against our own interests. Our future requirements are uncertain. If we continue to degrade what remains of our natural resources we will dangerously reduce the planet's capacity to support not only wildlife but also people. The maintenance of biodiversity is a key test of our ability to maintain a healthy natural environment and long-term sustainability.

1.2 The convention on biological diversity

The Rio de Janeiro 'Earth Summit' in 1992 was, in part, a response to the growing awareness of the importance of the global environment and a wide recognition of the continuing loss and damage. The United Kingdom was one of over 150 countries from around the world which signed the Convention on Biological Diversity. With each country required to produce a plan of action, this now provides the basis for international co-operation to maintain the world's biodiversity. Article 6a of the Convention requires signatory countries to:

'develop national policies, plans or programmes for the conservation and sustainable use of biological diversity'.

The UK Government published a *UK Biodiversity Action Plan* in January 1994. Its stated aim is:

'to conserve and enhance biological diversity within the UK'.

At the launch of the Action Plan the Prime Minister announced that a Biodiversity Steering Group would be established. This group, with representatives drawn from key statutory and non-statutory organisations, would take the process forward. It published a detailed report, *Biodiversity: The UK Steering Group Report*, in December 1995. This report was subsequently endorsed by the Government and now sets the scene for future action.

The UK Steering Group Report

The report of the UK Biodiversity Steering Group sets out a detailed approach to conserving biodiversity in the United Kingdom. The report recognises that if biodiversity conservation is to be successfully implemented it requires a means of ensuring that actions are undertaken in an integrated manner. Key recommendations are as follows:

- the production of national habitat and species action plans;
- the establishment of a network of local records centres;
- the production of local biodiversity action plans; and
- the need to raise awareness of the importance of biodiversity conservation.

The Report includes draft national action plans for 14 key habitats and 116 of our most threatened species. It also proposes that a further 24 habitat action plans and 286 species action plans are prepared within three years. However, biodiversity action plans at the local level are seen as the means by which national targets can be transformed into effective action on the ground. Annex C of the Report, provided outline guidance of the production of Local Biodiversity Action Plans. More detailed guidance has now been produced in four Guidance Notes prepared by the UK Local Issues Advisory Group, on behalf of the Local Agenda 21 Steering Group and the UK Biodiversity Group.

1.3 A biodiversity action plan for Hertfordshire

The *Guidance for Local Biodiversity Action Plans – Guidance Note 1* sets out the functions of a Local Biodiversity Action Plan as:

- To ensure that national targets for species and habitats, as specified in the UK Action Plan, are translated into effective action at the local level.
- To identify targets for species and habitats appropriate to the local area, and reflecting the values of people locally.
- To develop effective local partnerships to ensure that programmes for biodiversity conservation are maintained in the long-term.
- To raise awareness of the need for biodiversity conservation in the local context.
- To ensure that opportunities for conservation and enhancement of the whole biodiversity resource are fully considered.
- To provide a basis for monitoring progress in biodiversity conservation, at both local and national level.

It is now necessary to put this into a Hertfordshire context. The Herts & Middlesex Wildlife Trust proposed the preparation of a Local Biodiversity Action Plan entitled *A 50 Year Vision for the Wildlife and Natural Habitats of Hertfordshire.* Following much discussion, this work was commissioned in early 1996 by the Hertfordshire Environmental Forum and the Hertfordshire Countryside Forum, with support from English Nature and The Environment Agency.

A 'Biodiversity Focus Group' consisting of key partners from the above fora was established to oversee the production of the *50 Year Vision*, with the Herts & Middlesex Wildlife Trust taking the leading role in writing the Plan and consulting amongst the key players.

1.4 Structure of the vision

The process of developing a local plan involves several distinct elements. Analysis and evaluation of the nature conservation resource resulting in detailed proposals for action within a specified time-scale is clearly a major part of the process. In parallel with this is the development of an effective partnership with key players, particularly land managers, to identify appropriate delivery and funding mechanisms. A third

component is monitoring of the effectiveness of the overall plan, including the extent to which targets are being achieved. Underlying all of the above is the requirement for an adequate database at the local level, integrated with the national biodiversity database.

A Local Biodiversity Action Plan is therefore both a product and a process. It is an ongoing process. The *Guidance for Local Biodiversity Action Plans – Guidance Note 1* states *'there is no single model for production of Local Biodiversity Action Plans which has to be followed in detail,'* but the main components are included in the following agreed objectives for the *50 Year Vision*:

a) To establish a plan partnership through identifying and consulting key partners in the process.

b) To produce an overview of our present knowledge of the biodiversity resource in the county.

c) To prepare a series of prioritised habitat action plans to guide work on protecting, restoring and re-creating a sustainable level of biodiversity in the county.

d) Within each habitat action plan to identify detailed targets reflecting both national and local importance for the first ten years.

e) To identify a list of priority species for the preparation of action plans. Concise target statements should be prepared for all chosen species.

f) Within each habitat and species action plan to identify delivery mechanisms and sources of finance and advice.

g) To publish the plan and implement the agreed programme of action.

h) To establish a long term monitoring programme to measure the effectiveness of the Plan in achieving national and local targets.

1.5 Relationship to other plans

There are a variety of plans, programmes and strategies contributing to nature conservation in the UK. Local Biodiversity Action Plans must be integrated with these existing procedures. They offer a new approach to conservation in two major ways. Firstly, they provide a framework for long term conservation of biodiversity by identifying priorities for action with clearly defined targets, capable of being monitored. Secondly, effective implementation depends on forging new broad-based voluntary partnerships capable of delivering programmes of action and ensuring their delivery.

It is hoped that the Vision will provide a framework for all nature conservation activity within the county, in particular assisting local authorities in the preparation of their own strategies and linking with current thinking on sustainability in the County Structure Plan review. The relationship of this new approach to existing procedures is explored below.

Local Agenda 21

The conservation of biodiversity is a crucial aspect of sustainable development and therefore Local Biodiversity Action Plans are an integral part of the Local Agenda 21 process. The broad-based partnerships involved in developing programmes of action should be closely linked to the process of public participation, involvement and ownership developed by Agenda 21.

Statutory Development Plans

The statutory planning process requires that full account is taken of nature conservation, in accordance with the statutory framework for safeguarding habitats and species under domestic and international law. The requirements are set out in *Planning Policy Guidance Note 9* (PPG9) on nature conservation, published in October 1994 – replaced by Planning Policy Statement

9: Biodiversity and Geological Conservation (published August 2005).

Statutory development plans have a vital role to play in the protection and safeguard of important habitats and species. Planning authorities are required to identify all areas designated under relevant legislation (e.g. Special Protection Areas (SPAs) under the Birds Directive (79/409/EEC), Special Areas of Conservation (SACs) under the Habitats and Species Directive (92/43/EC) and Sites of Special Scientific Interest under the Wildlife and Countryside Act 1981). Locally important non-statutory Wildlife Sites are also identified in Local Plans and policies relating to legally protected species also included.

Statutory development plans should also take a broader view of nature conservation than merely protecting important sites. Other land of conservation value and the provision of new habitats are also important. PPG9 states *'statutory and non-statutory sites, together with countryside features which provide wildlife corridors, links or stepping stones from one habitat to another, all help to form a network necessary to ensure the maintenance of the current range and diversity of our flora and fauna'*.

The development control process can secure management of conservation features through planning conditions and agreements. Government guidance makes it clear that nature conservation should be included in the surveys of local authority areas required under the Town and Country Planning Act 1990. The Hertfordshire Habitat Survey fulfils this requirement.

Local Biodiversity Action Plans link to the statutory planning process in two ways. Information generated by the local biodiversity plans can provide detailed information for revision of development plans, for example, the identification of Key Biodiversity Areas. In addition, the statutory planning process can make a major contribution to achievement of the Local Biodiversity Action Plan targets, through the mechanisms outlined above, and in particular through policies for site protection and enhancement and the creation of new habitats in appropriate locations.

Nature Conservation Strategies

Some local authorities have produced non-statutory Nature Conservation strategies which address a range of issues additional to those included in development plans, though sometimes they also serve as supplementary planning guidance.

Existing strategies include a description and evaluation of the wildlife resource, usually with a schedule of important wildlife sites. They also include policies for the protection and management of sites; policies to promote good practice, environmental education and community involvement and policies for the local authority itself to encourage beneficial management of its own land and 'greening' of the activities of different departments.

There is therefore potential overlap between Local Biodiveristy Action Plans and Nature Conservation Strategies. However, the target-led approach of the biodiversity plans results in detailed analysis of the resource and so improves existing strategies, as well as involving a wider range of partners which should benefit the long term effectiveness of the plan.

The *Guidance for Local Biodiversity Action Plans – Guidance Note 3*, recommends that 'future nature conservation strategies should be closely integrated with, and thereby benefit from, the Local Biodiversity Plan process and it may be, given time, that the latter process will supersede the more traditional nature conservation strategy approach in some areas. It will, however, be important for local authorities to include the range of policies currently included in Nature Conservation Strategies as part of such a combined approach.'

County Strategies

The *50 Year Vision*, forms one component of a suite of strategies being developed for Hertfordshire, through the umbrella Hertfordshire Countryside Strategy. As such, all these strategies must fully integrate with each other, including the Landscape Strategy, Geology Strategy, Woodlands Strategy and Archaeology Strategy.

2 Geology

2.1 Introduction

The geology of the county is the major factor determining its topography (the hills and valleys) and its soils. These, together with the climate, determine the natural vegetation and habitats which support the range of species and influence farming practices. The combination of all these results in the distinctive landscape of each part of the county.

The solid geology of Hertfordshire is relatively simple, being largely Chalk of the Cretaceous period, overlain in the south and east by London Clay. In the far north and north-west of the county are small areas of Gault Clay. Throughout much of the county, the superficial deposits which overlay the solid geology complicate the picture. These include the Clay-with-flints of much of west Hertfordshire, including the Chilterns dip slope; the boulder clay of central and east Hertfordshire; and the gravels of the Vale of St Albans and the river valleys.

2.2 Natural areas/joint character areas

Based on the precise geology and landscape, combined with wildlife and natural features, Hertfordshire can be divided into broad areas where similar features occur. Areas which share similar types of wildlife and natural features are termed 'Natural Areas'. Five Natural Areas have been identified in Hertfordshire. Within each broad Natural Area there may be more than one 'Character Area', where differences in the landscape are defined more precisely. These Natural Areas and Character Areas have been agreed through the English Nature/Countryside Commission Joint Character Map Programme. A summary description for the Natural Areas/Joint Character Areas covering Hertfordshire is provided below:

Chilterns: Within Hertfordshire the Chilterns extend from Tring to Hitchin and down towards Welwyn, St Albans and Watford. The area consists of rolling chalk hills, capped with Clay-with-flints superficial deposits. Within Hertfordshire the north-west facing steep chalk scarp slope only outcrops on either side of Tring, with the gentler south-east facing hills of the dip slope covering a much larger area. The Chilterns contain the most varied landscape in the county, with some of the best tracts of scenery and most hilly topography. Typically the area is well wooded and has a lack of standing water. The fields are generally large, with few hedges on the scarp or hill tops, but more hedges on the dip slope. Key habitats include ancient woodland, chalk grassland, chalk streams, neutral grassland and heathland.

London Basin: This area covers the whole of London and most of the surrounding river catchments which feed the Thames. Hertfordshire is solely within the Northern Thames Basin Character Area. The geology consists of mostly London Clay, overlain with other superficial sand and gravel deposits. The area has a complex topography, with many valleys cut into it, including major rivers feeding the Thames, such as the Lee and Colne catchments, as well as dry valleys. Within Hertfordshire, the eastern area is heavily wooded, the central area more open and the valley sides of the western area more wooded again. Field patterns are often small in the east, but larger in the west and along the river valleys. Pasture is the dominant land use to the east, while arable increases towards the west. Key habitats include ancient woodlands,

heathlands, neutral grasslands and the wetlands of the river valleys.

East Anglian Plain: This area covers a large part of east Hertfordshire, extends west to Stevenage and northwards throughout East Anglia to Norwich. The Hertfordshire section is wholly within the South Suffolk and North Essex Clayland Character Area. The geology consists of underlying Chalk with a covering layer of Boulder Clay over most of the area, though glacial sands and gravels are found along the river valleys. In the east the Boulder Clay is chalky but becomes more acidic to the west. The area is a plateau, broadly flat and dissected by river valleys, with an undulating topography. Arable farming is the dominant land-use, but hedges, isolated trees and woods give a wooded feel and the irregular field pattern still survives in places, despite large-scale hedge removal. Key habitats include unimproved meadows, river valley wetlands (including spring sources and grasslands) and scattered ancient woodlands.

East Anglian Chalk: This area runs north-east from the Chilterns, through Hertfordshire and south Cambridgeshire. The geology is largely Chalk, with some superficial deposits. The chalk hills are gentler than the Chilterns, and the landscape more open, as a result of being covered by the Anglian ice sheet. Fields are generally large and there are few hedges or woodlands. Arable farming is the dominant land-use with small areas of pasture, particularly close to villages. Key habitats include chalk grasslands and arable margins.

West Anglian Plain: This area only occurs at the northernmost tips of the county within the Bedfordshire & Cambridgeshire Claylands Character Area. The geology is Gault Clay forming an open clay plain, with isolated outliers of chalk, though none of these are present in Hertfordshire. Field pattern is generally of large rectangular field surrounded by straight enclosure hedges. Some fields retain evidence of old ridge and furrow patterns. Land use is generally mixed arable and pasture with little woodland. Key habitats include neutral grasslands.

Individual habitat action plans refer to these Natural Areas, with key sites listed by Natural Area. The Natural Areas also provide a basis for identifying key areas and sites for prioritising actions, particularly through the identification of Key Biodiversity Areas (see Chapter 3).

3 Habitat and species review and evaluation

3.1 Introduction

While all our local habitats and species are of value, in that they form the components of Hertfordshire's biodiversity, some are a greater priority for conservation. This is either because a high proportion of the national or European total of a particular habitat is found in the area, because they are rare or because they are declining and under threat. This *50 Year Vision* considers the whole range of habitats found in the county, under seven generic habitat action plans:

Woodlands
Wetlands
Heaths and acid grassland
Neutral grassland
Chalk grassland
Farmland
Urban

However, due to both ecological needs and resource constraints, targets and actions must be prioritised. The following section reviews the habitats and species of conservation concern found in the county, evaluates their relative importance and identifies priorities for action.

3.2 Review of habitats and species

3.2.1 Habitat audit

A total of 37 Broad Habitat Types have been identified in *Biodiversity: The UK Steering Group Report*. The following are found in Hertfordshire:

Broadleaved and Yew woodland
Planted coniferous woodland
Lowland wood pasture/parkland
Boundary features
Arable
Improved grassland
Unimproved neutral grassland
Unimproved acidic grassland
Unimproved calcareous grassland
Lowland heathland
Grazing marsh
Fens, carr, marsh, swamp and reedbed
Standing open water
Rivers and streams
Canals
Urban

Within these Broad Habitat Types, the Steering Group Report identifies 38 Key Habitats, which are a UK priority for action. Costed action plans have been prepared for 14 of these and will be prepared for the other 24 by the end of 1998.

Table 3.1 identifies the habitats of conservation concern within Hertfordshire. These include all the UK Key Habitats present locally, as well as other habitats which are of conservation concern in Hertfordshire because they are locally threatened, locally rare, characteristic of the local area or locally popular.

3.2.2 Species audit

Table 3.2 identifies the species of conservation concern found in Hertfordshire. This list is based on the best data available. Though not full, this data is comprehensive enough to undertake a meaningful audit, from which priorities for action can be drawn. The species list includes the following:

- Any species of UK priority, as identified in the Steering Group Report, for which action plans have been or will be written. Nationally, this includes over 400 species on the *short* and *middle lists*.

- Species on the UK *long list* in the Steering Group Report. If species found locally are not on the *long list* but meet the criteria, they should also be included.

- Other species which are of conservation concern by virtue of being locally threatened, locally rare, characteristic of the area, or locally popular.

Table 3.1 – Evaluation of habitats within Hertfordshire

See Appendix 4 for explanation of terms.

Habitat	**Extent criteria**					**Quality criteria**			
	UK priority	Local decline	Proportion in local area	Local rarity	Local threat	Fragmented/ restoration	Important for key species	Viability	Local distinctiveness
Lowland Beech woods	Key		Significant	Scarce	Direct and indirect	Fragmented (extendable)	Key species	Viable	
Oak-hornbeam woods			Highly significant	Scarce	Direct and indirect	Fragmented (extendable)	Key species	Viable	Distinctive
Ash-maple woods				Rare	Direct and indirect	Fragmented (extendable)	Key species	Viable	
Lowland parkland	Key			Rare		Fragmented (fixed area)		Viable	
Ancient species-rich hedgerows	Key	Declining		Common	Direct	Continuous (extendable)	Key species	Viable	
Cereal field margins	Key			Common	Direct	Continuous (extendable)	Key species	Viable	
Lowland hay meadow	Key	Stable		Rare	Indirect	Fragmented (extendable)		Potentially viable	
Unimproved neutral grassland		Declining		Scarce	Direct	Fragmented (extendable)	Key species (local)	Viable	
Lowland acid grassland	Key	Declining		Rare	Direct	Fragmented (extendable)	Key species	Potentially viable	
	UK	Local decline	Proportion in	Local rarity	Local threat	Fragmented/	Important for key	Viability	Local

Habitat	**Extent criteria**					**Quality criteria**			
	priority		local area			restoration	species		distinctiveness
Lowland calcareous grassland	Key	Declining		Rare	Indirect	Fragmented (extendable)	Key species	Potentially viable	
Lowland heathland	Key	Declining		Rare	Direct and indirect	Fragmented (extendable)		Potentially viable with AG	
Floodplain grazing marsh	Key			Rare	Direct	Fragmented (extendable)	Key species	Potentially viable	
Fens	Key			Rare	Direct and indirect	Fragmented (fixed area)			
Reedbed	Key			Rare	Direct	Fragmented (extendable)	Key species	Potentially viable	
Marsh				Rare	Indirect	Fragmented (extendable)		Potentially viable	
Swamp				Rare	Indirect	Continuous (extendable)		Viable	
Carr				Rare	Indirect	Fragmented (extendable)			
Spring sources				Rare	Indirect	Fragmented (fixed area)			
Eutrophic standing waters				Rare	Direct and indirect	Fragmented (extendable)	Key species	Viable	
	UK	Local decline	Proportion in	Local rarity	Local threat	Fragmented/	Important for key	Viability	Local

Habitat	**Extent criteria**					**Quality criteria**			
	priority		local area			restoration	species		distinctiveness
Lowland rivers		Stable		Scarce	Indirect	Continuous (fixed area)	Key species	Viable	
Chalk rivers	Key		Significant	Scarce	Indirect	Continuous (fixed area)	Key species	Viable	Distinctive
Urban		Stable		Scarce		Fragmented (extendable)	Key species	Viable	

Table 3.2 – Evaluation of species in Hertfordshire

See Appendix 4 for explanation of terms.

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Mammals						
Brown Hare	Short list	Stable	Common			
Dormouse	Short list	Decline	Scarce	Direct		Flagship
Otter	Short list	Decline	Scarce	Indirect	Outlying	Keystone
Pipistrelle	Short list	Decline	Common			
Water Vole	Short list	Decline	Common	Indirect		Flagship
Badger	Long list	Stable	Common			
Brandt's Bat	Long list					
Brown Long-eared Bat	Long list					
Common Shrew	Long list		Common			
Daubenton's Bat	Long list		Common			
Fallow Deer	Long list	Stable	Common			
Hedgehog	Long list	Stable	Common			
Leisler's Bat	Long list					
Natterers	Long list					
Noctule	Long list		Common			
Pygmy Shrew	Long list					
Roe Deer	Long list	Increasing	Scarce			
Serotine	Long list					
Stoat	Long list	Stable	Common			
Water Shrew	Long list		Common			
Weasel	Long list	Stable	Common			
Whiskered Bat	Long list					
Birds						
Bittern	Short list	Stable	Rare	Direct	Outlying	Keystone
Grey Partridge	Short list	Decline	Common	Indirect		Flagship
Skylark	Short list	Stable	Common	Indirect		
Song Thrush	Short list	Stable	Common	Indirect		Flagship
Stone-curlew	Short list		Extinct (1981)			
Bullfinch	Middle list	Stable	Common			
Corn Bunting	Middle list	Decline	Common	Indirect		

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Linnet	Middle list	Stable	Common			
Nightjar	Middle list	Rapid decline	Rare	Direct	Outlying	
Reed Bunting	Middle list	Stable	Common			
Spotted Flycatcher	Middle list	Stable	Common			
Tree Sparrow	Middle list	Rapid decline	Common	Indirect		
Turtle Dove	Middle list	Stable	Common			
Barn Owl	Long list	Rapid decline	Common	Indirect		
Blackcap	Long list	Stable	Common			
Blue Tit	Long list	Stable	Common			
Chiffchaff	Long list	Stable	Common			
Coal Tit	Long list	Stable	Common			
Common Crossbill	Long list	Rapid increase	Scarce			
Common Tern	Long list	Rapid increase	Common			
Cormorant	Long list	Rapid increase	Scarce			
Dunnock	Long list	Stable	Common			
Fieldfare	Long list		Common			
Gadwall	Long list	Rapid increase	Common			
Garden Warbler	Long list	Increase	Common			
Goldcrest	Long list	Increase	Common			
Goldfinch	Long list	Stable	Common			
Grasshopper Warbler	Long list	Rapid decline	Common	Indirect		
Great Spotted Woodpecker	Long list	Rapid increase	Common			
Great Tit	Long list	Stable	Common			
Greenfinch	Long list	Stable	Common			
Green Sandpiper	Long list		Scarce			
Green Woodpecker	Long list	Rapid increase	Common			
Grey Wagtail	Long list	Rapid increase	Common			
Hawfinch	Long list	Decline	Common			Typical
Hobby	Long list	Rapid increase	Common			
House Martin	Long list	Stable	Common			
Kestrel	Long list	Increase	Common			
Kingfisher	Long list	Rapid increase	Common			Flagship
Lapwing	Long list	Stable	Common			

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Lesser Spotted Woodpecker	Long list	Increase	Common			
Lesser Whitethroat	Long list	Rapid increase	Common			
Little Ringed Plover	Long list	Rapid increase	Common			
Long-eared Owl	Long list	Decline	Scarce	Indirect		
Mallard	Long list	Stable	Common			
Marsh Tit	Long list	Stable	Common			
Meadow Pipit	Long list	Stable	Common			
Mute Swan	Long list	Stable	Common			
Nightingale	Long list	Rapid decline	Scarce	Direct		Flagship
Nuthatch	Long list	Rapid increase	Common			
Pied Wagtail	Long list	Stable	Common			
Pochard	Long list	Decline	Scarce	Indirect		
Redshank	Long list	Stable	Common			
Redwing	Long list		Common			
Reed Warbler	Long list	Stable	Common			
Ringed Plover	Long list	Rapid increase	Scarce			
Sand Martin	Long list	Decline	Common	Direct		
Sedge Warbler	Long list	Stable	Common			
Shoveler	Long list	Rapid increase	Scarce			
Siskin	Long list	Rapid increase	Scarce			
Snipe	Long list	Decline	Common	Direct		Keystone
Sparrowhawk	Long list	Rapid increase	Common			
Swallow	Long list	Stable	Common			
Tawny Owl	Long list	Stable	Common			
Treecreeper	Long list	Stable	Common			
Tufted Duck	Long list	Rapid increase	Common			
Water Rail	Long list	Rapid decline	Scarce	Direct		
Wheatear	Long list		Extinct (1954)			
Whitethroat	Long list	Stable	Common			
Willow Tit	Long list	Stable	Common			
Willow Warbler	Long list	Stable	Common			
Woodcock	Long list	Decline	Common	Indirect		
Wood Warbler	Long list	Decline	Common	Indirect		

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Yellowhammer	Long list	Stable	Common			
Amphibians and reptiles						
Great Crested Newt	Short list	Decline	Common	Direct		Keystone
Adder	Long list		Extinct			
Common Frog	Long list		Common	Direct		
Common Toad	Long list		Common	Direct		
Grass Snake	Long list		Common			
Palmate Newt	Long list		Scarce	Direct		
Slow Worm	Long list		Common	Direct		
Smooth Newt	Long list		Common	Direct		
Fish						
Bullhead	Long list	?	Common			
Invertebrates						
Stag Beetle	Short list	Stable	Scarce	Direct	Outlying	Flagship
High Brown Fritillary	Short list		Extinct (1977)			
Marsh Fritillary	Short list		Extinct (1950)			
Pearl-bordered Fritillary	Short list		Extinct (1978)			
Silver-spotted Skipper	Short list		Extinct (1959)			
Vertigo moulinsiana	Short list	?	?			
White-clawed Crayfish	Short list	Rapid decline	Common	Indirect		Flagship
Adonis Blue	Middle list		Extinct (1959)			
Brown Hairstreak	Long list	Rapid decline	Rare	Direct		
Duke of Burgundy	Long list	Decline	Rare	Direct		
Chalkhill Blue	Long list	Stable	Scarce		Outlying	Flagship
Silver-washed Fritillary	Long list	Rapid decline	Rare	Direct		
Small Blue	Long list	Rapid decline	Rare	Direct		
Grizzled Skipper		Rapid decline	Scarce	Direct		
Ashfordia granulata	Long list	?	?			
Ena montana	Long list	?	?			

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Roman Snail	Long list	Decline	Common			
Oxyloma sarsi	Long list	?	?			
Plants						
Ephemerum cohaerens	Middle list	?	?			
Thatch Moss	Middle list	?	Scarce		Localised	
Seligeria paucifolia	Middle list	?	?			
Weissia sterilis	Middle list	?	?			
Corn Cleavers	Middle list	Rapid decline	Rare	Indirect		
Cornflower	Middle list	Rapid decline	Rare	Indirect		
Red Hemp-nettle	Middle list		Extinct (poss.)			
Shepherd's Needle	Middle list	Decline	Common	Indirect		Typical
Tower Mustard	Middle list		Extinct			
Bluebell	Long list	Stable	Common			Flagship
Broad-leaved Spurge	Long list	Stable	Scarce			
Burnt-tip Orchid	Long list	Stable	Rare			
Corn Buttercup	Long list	Rapid decline	Scarce	Indirect		
Corn Gromwell	Long list	Rapid decline	Scarce	Indirect		
Corn Parsley	Long list	Stable	Rare			
Greater Broomrape	Long list	Stable	Rare			
Ground Pine	Long list		Extinct (1974)			
Ivy-leaved Water-crowfoot	Long list	Decline	Rare	Indirect		
Narrow-fruited Corn Salad	Long list	Decline	Scarce	Indirect		
Pasqueflower	Long list	Rapid decline	Rare	Direct	Outlying	Flagship
Pheasant's-eye	Long list		Extinct (prob.)			
River Water-dropwort	Long list	?	Scarce	Indirect		Typical
Spotted Cat's-ear	Long list	Stable	Rare			
Stinking Goosefoot	Long list		Extinct (prob.)			
Stream Water-crowfoot	Long list	?	Common	Indirect		Typical

	Criteria					
Species	**UK priority**	**Local decline**	**Local rarity**	**Local threat**	**Position in range**	**Local distinctiveness**
Great Pignut		Decline	Scarce	Direct	Localised	Flagship
Green-winged Orchid		Rapid decline	Rare	Direct		
Petty Whin		Decline	Scarce	Direct		
Snake's-head Fritillary		Stable	Rare	Direct		

3.3 Evaluation of habitats and species

3.3.1 Habitat priorities

Evaluation of the habitats listed in Table 3.1 leads to the following priorities for Hertfordshire being identified.

1. Key habitats, of which there is a significant proportion of the UK resource in Hertfordshire. We have a special responsibility for these and are therefore a priority for action.

Chalk rivers
Lowland Beech woods

2. Key habitats which have declined in the recent past or are still declining locally. These habitats are directly threatened and must therefore be a priority for action.

Ancient species-rich hedgerows
Lowland acidic grassland and lowland heathland (combined in Herts)
Lowland calcareous grassland

3. Key habitats which are locally rare and/or threatened and therefore require conservation action.

Lowland hay meadow
Floodplain grazing marsh
Fens
Reedbeds
Cereal field margins

4. Local habitats which Hertfordshire has a significant proportion of the UK resource and therefore a wider responsibility for, or habitats which are locally distinctive and important in defining the character of the local natural environment.

Oak-hornbeam woods

These priority habitats must be targeted for immediate action as part of the seven generic habitat action plans included in this *Vision*. This does not mean that action should not occur on other habitats, which may also be important for particular species, under threat or have social value, but this should not be to the detriment of priority habitats.

3.3.2 Species priorities

Evaluation of the species in Table 3.2, results in the following priorities being identified for Hertfordshire.

1. UK priority species (short or middle lists), where Hertfordshire can contribute to achievement of the national targets, because the species are characteristic of the area.

Brown Hare
Otter*
Water Vole*
Grey Partridge
Song Thrush*
Bullfinch
Linnet
Spotted Flycatcher
Turtle Dove
Stag Beetle*
Thatch Moss
Cornflower*
Dormouse*
Pipistrelle
Bittern*
Skylark
Stone Curlew*
Corn Bunting
Reed Bunting
Tree Sparrow*
Great Crested Newt*
White-clawed Crayfish*
Shepherd's Needle
Corn Cleavers

2. Species which are locally rare, declining, threatened and are either high profile and/or locally distinctive.

Natterer's Bat*
Nightingale
Water Rail
Kingfisher
Palmate Newt
Brown Hairstreak
Chalkhill Blue*
Grizzled Skipper*
Corn Parsley
Long-eared Owl
Pochard
Hawfinch
Snipe
Small Blue
Duke of Burgundy
Silver-washed Fritillary
Corn Buttercup
Corn Gromwell
River Water-dropwort*
Narrow-fruited Corn Salad
Great Pignut*
Green-winged Orchid
Ivy-leaved Water Crowfoot
Pasqueflower*
Petty Whin
Snakes-head Fritillary

The above species marked with an asterisk have Species Action Plans included in the *Vision*. Where appropriate, additional species action plans should be written for the other species, many of which are referred to under the relevant habitat action plans.

3.4 Key Biodiversity Areas

3.4.1 Introduction

An additional way of prioritising conservation action is to identify concentrations of important habitats and species. Such areas may be termed 'Key Biodiversity Areas'. This concept of Key Biodiversity Areas is evolved from English Nature's 'Prime Biodiversity Areas' and Natural Areas (see Chapter 2).

Within each Natural Area there may be a number of Prime Biodiversity Areas. These typify the Natural Area and contain concentrations of key habitats and species. For example, within the Chilterns Natural Area, a cluster of high quality chalk grasslands and associated beech woodland may form a Prime Biodiversity Area.

Because Natural Areas are based on geological, topological, ecological and landscape distinctions, they do not correspond with administrative boundaries. However, the Prime Biodiversity Area concept can be applied to an administrative area such as Hertfordshire, which contains several Natural Areas. When used in this context the term 'Key Biodiversity Area' is frequently used. They are defined as:

Areas within an administrative unit that support the greatest diversity of species and the greatest extent and highest quality of semi-natural habitat.

3.4.2 The value of identifying Key Biodiversity Areas

In order to conserve and enhance biodiversity, conservation management should broadly seek to reverse the loss of semi-natural habitat that has occurred across the UK. This should go beyond merely maintaining the existing landscape features and aim to enhance them through restoration and creation of habitats, together with a reduction in fragmentation by linking, buffering and expanding.

Key Biodiversity Areas (KBAs) offer the greatest potential for a targeted and holistic approach to the restoration of habitats characteristic of the administrative unit. KBAs not only represent priority areas for conserving the existing biodiversity resource, but also provide the best opportunity for maintaining and creating large areas of quality habitat. There will usually be a significant wildlife resource, often as a cluster of sites, and therefore the potential to manage the adjacent land in a way that enlarges and links these sites. It should be noted that some KBAs might have inherently low biological diversity; but which support unusual communities of species that do not occur elsewhere. The London Clay grasslands of southern Hertfordshire may be seen as a good example of this.

The benefits of the Key Biodiversity Area approach include:

- Large areas of linked semi-natural habitat will support a greater variety of habitats and a greater numbers of species, in larger populations.

- Dispersed and wide-ranging species, which are difficult to conserve as isolated populations in small areas, will be able to establish viable populations.

- Genetic diversity within species is less likely to be eroded in the larger populations that can exist in large areas of linked habitat.

- Hectare for hectare, large areas tend to be cheaper to manage than small ones.

- Management by natural processes may be more possible.

- The effects of extreme conditions, including climate change, are less likely to lead to local extinctions of species.

3.4.3 Identifying Key Biodiversity Areas in Hertfordshire

A rigorous methodology for identifying Key Biodiversity Areas, based on full data on the distribution and extent of semi-natural habitats and notable species, has not at this stage been developed in Hertfordshire. While the habitat data is now largely known from the Hertfordshire Habitat Survey, information on notable species awaits updating of the Recorder database by the Hertfordshire Biological Records Centre (HBRC). The local records centre clearly has a central role in biodiversity conservation in maintaining the biological database. Adequate resourcing will be required to allow it to perform this function.

However, provisional KBA's can be identified by looking at the known habitat data. Thirty potential Key Biodiversity Areas have been identified in Hertfordshire. These are listed below with brief descriptions. Their location is also shown on Map 3.1.

1. **Therfield Heath/Coombe Bottom** – chalk grasslands

2. **Sandon/Green End** – chalky boulder clay woodlands and meadows

3. **Clothall/Wallington/Weston** – chalky boulder clay woods and meadows

4. **Reed** – chalky boulder clay woodlands and meadows

5. **Cokenach Estate** – chalky boulder clay woodlands

6. **Scales Park/Meesden/Beeches Wood** – chalky boulder clay woodlands and meadows

7. **Hiz Valley Catchment (Ickleford/Oughton Head/ Purwell)** – wet meadows and fens

8. **Hexton/Pirton/Great Offley** – chalk grasslands

9. **Great Offley/Preston/Knebworth** – oak-hornbeam woodlands

10. **Cottered/Ardeley/Benington** – oak-hornbeam and ash-maple woodlands and meadows

11. **Patmore Heath/Upwick Green** – heath, grasslands and woodlands

12. **Wellpond Green/Westland Green**

13. **River Ash Valley** – woodlands and wetlands

14. **Stort Valley** – grasslands and wetlands

15. **Lea Valley** – wetlands

16. **Rib Valley** – wetlands and woodlands

17. **Lower Mimram/Lower Beane/Bramfield Plateau** – wetlands and woodlands

18. **Broxbourne Woods/Hatfield Park** – oak-hornbeam woodlands, grasslands and heaths

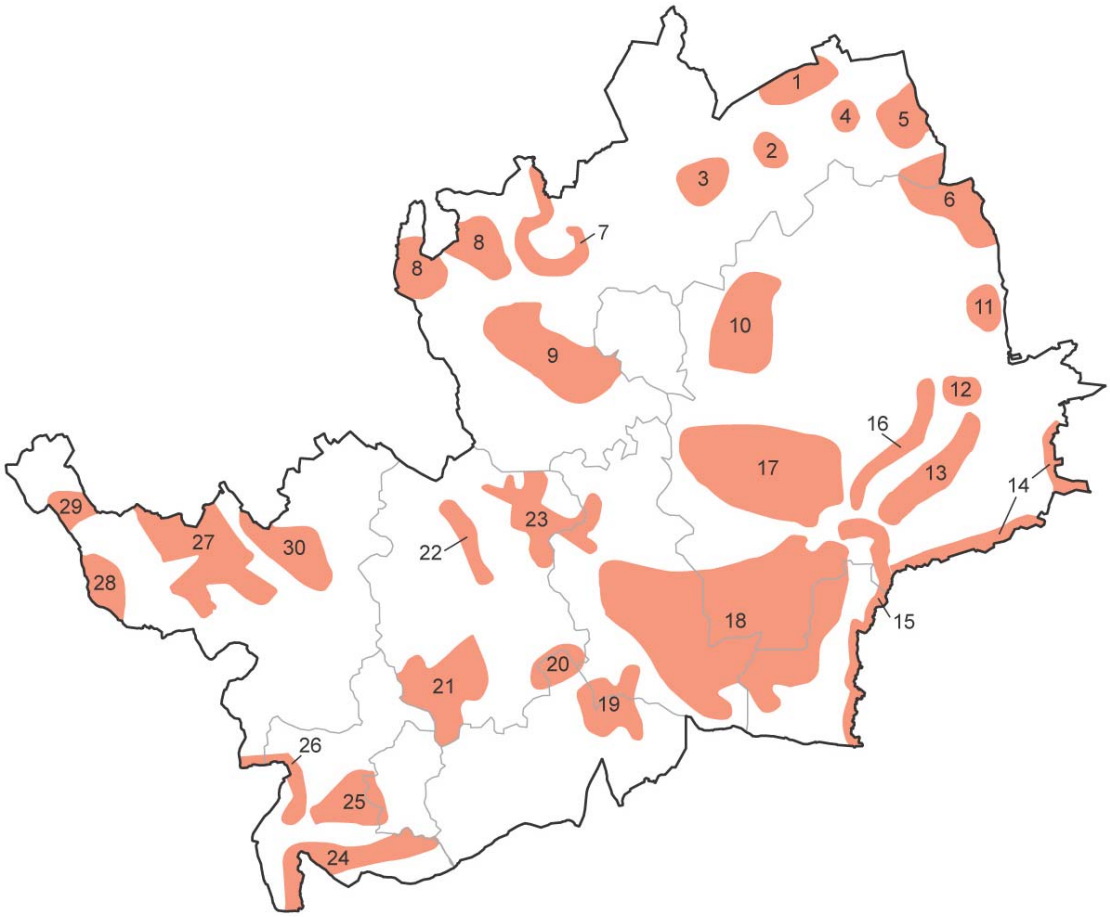
19. **Mymmshall/Water End** – woodlands

20. **Upper Colne Valley** – wetlands and heath

21. **Bricket Wood/Moor Mill** – wetlands, woodlands and heath

22. **River Ver/Gorehambury** – wetlands and woodlands

23. **Upper Lea Valley** – wetlands, woodlands and heath



Map 3.1 – Key Biodiversity Areas in Hertfordshire

24. **Mid-Colne Valley** – wetlands (gravel pits) and grasslands

25. **Whippendell Woods and surrounds** – woodlands, grassland and wetlands

26. **River Chess Valley** – wetlands, grasslands, woodland and heath

27. **Ashridge/Berkhamsted Common/Aldbury** – beech woodland, heath, chalk grassland

28. **Tring Park/High Scrubbs** – beech woodland, chalk grassland

29. **Tring Reservoirs** – wetlands

30. **Upper Gade Valley** – wetlands, grasslands and woodland

The concept of targeting 'Key Biodiversity Areas' for prioritised conservation action is common to most, if not all, of the following habitat action plans. Because they represent concentrations of important habitats, many of the above named areas will be highlighted as priority areas in more than one habitat action plan.

However, further work is needed to better define these areas, particularly in terms of scarce species. This must be a priority action, to enable the most efficient use of available resources.

3.5 Setting local targets

The above audit and evaluation procedure has identified a short-list of habitats, species and Key Biodiversity Areas for which conservation action is a priority in Hertfordshire. The individual habitat and species action plans in the following chapters use this short-list to set targets and identify actions.

Targets in the action plans have been set using the following guidelines (Guidance for Local Biodiversity Action Plans – Guidance Note 4):

a) Targets must be realistic but ambitious; setting targets that are appropriate to maintain or restore the natural character of an area, and contribute an appropriate proportion of the national target for each given feature;

b) Targets must be measurable to enable progress to be evaluated subsequently and success or failure recorded;

c) Targets must be set against clear timescales, and milestones should be included towards long-term objectives;

d) Targets should be based on best available data. Targets may not always be based on fully comprehensive data, but this must not be a barrier to setting targets;

e) Targets should be set in the context of the whole biodiversity of the county. Targets for many species will overlap with habitat targets and there should therefore be a clear relationship between habitat and species targets. This is particularly important when considering links between habitat and species management regimes and when looking at potential changes in land use or habitat creation schemes.

Finally, the guidance stresses that targets need not be limited by the apparent lack of financial resources and should therefore be set on the basis of their appropriateness to Hertfordshire and its features, and not on current resource availability.

4 Woodland habitat action plan

4.1 Woodland habitats

4.1.1 Summary

Woodlands, as the natural vegetation cover of most of the UK, are our richest wildlife habitats. They often contain the greatest numbers as well as many of our rarest and most threatened species. Woodlands are important for most forms of wildlife, from trees and shrubs to mosses, lichens and fungi, and from mammals and birds to beetles, slugs and moths.

Trees and woodlands are highly valued by people for the many benefits that they have provided in the past and continue to do so today. They provide timber for house building and construction; wood for furniture and tools; fuel for heating and cooking (more so in the past); food from berries and nuts; and paper. Trees help to filter out pollution and act as a carbon sink, perhaps helping to offset some of the effects of global warming. People have long had strong emotional attachments to trees and woodlands, perhaps because of their large size and long lifespan giving them an air of permanence. They often feature prominently in folklore, language and literature. They are an obvious feature helping to define many landscapes as well as forming an essential aesthetic component of human settlements, in gardens, streets and parks. Woodlands are also popular for a wide range of recreational activities.

4.1.2 Woodland ecology

4.1.2.1 Natural woodland

In the absence of human interference, woodland would be the natural habitat type across most of the lowland soils and landforms found in the United Kingdom, developing as a result of the natural process of succession. Since human colonisation of the British Isles began after the last ice age, approximately 5500-6000 years ago, clearance of the 'wildwood' for agriculture and settlements has progressively occurred. The area of woodland had declined to about 5% by the First World War but has since increased. Today approximately 9% of the UK land surface is wooded, usually in small, fragmented blocks. This is a significantly lower land cover compared with most other European countries, where woodland usually accounts for at least 20% of the land area.

None of the woodland present today is completely natural, it all having been modified by human intervention to a greater or lesser extent. We therefore have no examples of what a natural woodland ecosystem in the UK would have looked like. However, by looking at more natural woodlands elsewhere in continental Europe and by reference to historical evidence, it is likely that it would have been very different to much of the woodland seen today.

It is thought that the natural woodland ecosystem would have consisted of a variety of successional stages from open glades through scrub to a high forest canopy. A high proportion of very large trees would have been present. These features would have been in a constant state of flux responding to natural processes such as storms, floods, fires and grazing by large herbivores, such as deer, wild cattle, wild boar and beavers. New glades would be created naturally while others grew up into mature forest. Wild herbivores would have been hunted by top predators such as Wolves and Brown Bear. Large areas of woodland would have been dark and damp and contain very large quantities of dead wood with the variety of trees, shrubs and ground flora reflecting the natural geology, soil characteristics, hydrology and other natural processes.

In spite of no truly natural woodland remaining in the UK and although only a fraction of the former woodland cover remains, our woodlands of today often retain many natural characteristics. These are best seen in what is referred to as 'ancient semi-natural woodland'.

4.1.2.2 Woodland definitions

Ancient semi-natural woodland: This is woodland which has been continuously present on the same site since at least 1600 AD and which retains a largely natural and locally native species composition, which has developed in response to natural factors such as soil type and hydrology. **They are an irreplaceable natural asset.**

Ancient replanted woodland (ancient woodland sites): This is woodland which has been continuously present since 1600 AD, but where the locally native species mix has been replaced by planted trees, usually fast growing conifers and exotics. Valuable semi-natural features are often retained along rides and boundaries.

Secondary woodland: This is woodland which is self-sown on ground that has been unwooded and usually farmed for a period since 1600 AD. They may contain a large proportion of locally native species, though often have a naturalised and exotic species element to them.

Plantations: These are woodlands which have been entirely planted by humans on ground which has been unwooded for a period since 1600 AD. Many are of recent origin (last 100 years) and most are mixed containing a narrow range of fast growing exotic species, as well as native species such as oak, ash and beech. Historical planting was often carried out for landscape reasons or to encourage sporting interests, particularly on the large estates.

4.1.2.3 Ancient semi-natural woodland

Ancient semi-natural woodlands are usually the richest in wildlife, because of their long continuity of woodland cover, which in some cases may go back to the original wildwood. This continuity of woodland cover has enabled many specialised woodland species with poor powers of dispersal to survive. These woods therefore not only contain the greatest variety of woodland species, but also often contain many species which can not survive in the generally open landscape now found and are therefore rare.

Many species of plant are slow colonisers of new woodland and therefore depend on a long continuity of woodland cover. These in turn can be used as indicators of ancient woodland. The Ancient Woodland Inventory for Hertfordshire, published by the then NCC, included a list of 100 ancient woodland indicator species applicable to SE England, i.e. those that are most commonly associated with ancient woodland, as well as the inventory of ancient woodland sites.

A good quality ancient semi-natural woodland, will not only contain a diverse mix of trees, shrubs, flowers and lower plants, but will also have a varied structure, with a mature canopy, areas of dense shrub layer and open glades or paths. A diverse structure provides more habitats for a wider range of species, including plants, birds and invertebrates. A quality ancient woodland will also have a large amount of both fallen and standing dead wood. These each provide habitat for their own wide ranging community of saproxylic species (dead wood feeding and decomposing organisms) and allow the natural processes of decay and nutrient recycling to occur. Other important habitat features found in woodlands include streams and ponds, with those in woodlands often having their own unique assemblage of associated species and retaining a relatively natural structure and hydrology.

Ancient semi-natural woodlands retain a variety of trees, shrubs and ground flora which reflect the natural geological, soil and hydrological conditions. Typical tree species locally include; Pedunculate and Sessile Oak *Quercus robur* and *Q. petraea*, Hornbeam *Carpinus betulus*, Beech *Fagus sylvatica*, Ash *Fraxinus excelsior*, Wild Cherry *Prunus avium*, Silver Birch *Betula pendula*, Alder *Alnus glutinosa* and Willows *Salix spp.* Locally found shrubs include Hazel *Corylus avellana*, Field Maple *Acer campestre*, Hawthorn *Crataegus monogyna*, Dogwood *Cornus sanguinea*, Sallow *Salix capraea* and Holly *Ilex aquifolium*.

This natural mix of trees and shrubs, and the woodland structure, will often have been modified in the past to favour more economically valuable species. In other cases, successional changes brought about by human influences, such as the decline of lime and elm will have influenced woodland composition. However, these cultural influences often provide their own interest, demonstrating how nature responds to human management.

Other important features associated with ancient woodlands which need protection and management are Woodland Archaeological Features such as woodbanks and dell holes.

4.1.2.4 Management systems

Major management practices which have influenced ancient woodlands include **coppice**, **high forest**, and **wood pasture** systems. Recently, minimum intervention has become more widespread, though mainly from neglect except within nature reserves.

Coppicing and associated ride management maintains a varied early successional woodland structure by continuously creating open space, through harvesting of the shrub understorey on a rotation of 5-25 years, depending on the use to which the wood is put. This management and the associated ride management ensures that open areas, which provide the ideal conditions for many sun loving invertebrates and butterflies in particular, are continually created. Active ride management also helps to link coppice areas to each other and to adjacent habitats such as unimproved grasslands.

The value of coppice woodlands is largely in the early successional species associated with the open space and dense shrubby 'young growth' habitats. Mature woodland habitats are generally lacking or very limited. These particularly include wildflowers, butterflies and other invertebrates and scrub loving birds. In Hertfordshire, flowers such as Bluebell *Hyacynthoides non-scripta*, Primrose *Primula veris*, Wood Anemone *Anemone nemorosa* and violets *Viola spp.* are typical. A wide range of invertebrates, including many woodland butterflies, most notably the fritillaries, are associated with the open space provided by this management system. The development of a thick shrub layer about 5-6 years into the coppice cycle, provides ideal conditions for many breeding birds including Nightingale *Luscinia megarhynchos* and for the Dormouse *Muscardinus avellanarius*, which requires a dense interconnecting shrub layer to maintain its preferred arboreal habit. The areas of permanent open space along rides are also often important as refuges for meadow species lost due to changes in the wider countryside.

Coppicing maintains a high species diversity through providing regeneration opportunities for many species, in the large areas of permanent and temporary open space, a wide range of edge habitats and often also some limited mature wooded habitats in the form of standards or boundary pollards.

High forest management and the standards (mature trees) within a coppice-with-standards system produce timber. These standard trees are harvested on much longer timescales. High forest systems produce a more natural mature woodland structure, ressembling interior forest habitats and having a much greater potential for deadwood, but with less open space and 'young growth' habitats. This benefits woodland birds including Sparrowhawk *Accipiter nisus*, Hawfinch *Coccothraustes coccothraustes*, tits such as Coal Tit *Parus ater* and warblers such as Chiffchaff *Phylloscopus collybita* and Blackcap *Sylvia atricapilla*, as well as shade tolerant invertebrates such as the White Admiral butterfly, some spiders, molluscs and leaf miners.

Wood pasture was a management system which combined the production of wood and grazing. To successfully achieve this trees are pollarded (cut above browsing height), with cutting carried out on a similar length rotation to many coppice systems. This management results in trees growing to a very old age and developing large amounts of dead wood.

The interest of wood pasture is in the invertebrate and fungal species associated with the dead and dying wood of the pollarded, often veteran, trees, as well as the flora and associated species of the often unimproved grasslands or heaths found underneath the scattered trees. The mixture of mature trees and large amounts of open space is also important for some bird species and bats. Examples found locally of species associated with dead and dying wood include Britain's largest terrestrial beetle, the Stag Beetle *Lucanus cervus*, other beetle species such as the click beetle *Procraerus tibialis*, *Lymexylon navale*, *Platycis minutus*, *Prionychus ater*, *Quedius maurus*, *Rhizophagus oblongicollis* and *Xyloterus domesticus* and the slug *Limax cinereoniger*. Birds such as Lesser and Great Spotted Woodpeckers *Dendrocopos minor* and *D. major*, and Nuthatch *Sitta europaea* also favour over-mature trees.

Minimum intervention: Many woods have not been managed for 50-100 years. On nature reserves, this management option has often deliberately been chosen, though on many privately and publicly owned sites it has come about through the cessation of commercial management. These woods will eventually develop a more natural or 'old growth' structure, which ressembles high forest, though contains much larger amounts of deadwood. Open space will occur through natural disturbance such as windthrow and these gaps will then pass through the dense shrubby 'young growth' stage before becoming mature woodland. Some of these gaps may remain as open space for longer if grazing pressure is high. However, open space and 'young growth' stages are generally limited.

All of these management systems have influenced to a greater or lesser extent the natural woodland plant and animal communities. However, with regard to the natural assemblages of plants found within ancient semi-natural woodland, the National Vegetation Classification (NVC) recognises 19 woodland and six scrub communities. In Hertfordshire today, 15 of these NVC communities can be found and are described in Appendix 3.

4.1.2.5 Veteran trees

Dead and decaying wood, particularly rot holes and heart wood, associated with biologically mature veteran trees, is a very important habitat, supporting more than 200 species of beetles, of which over 60 are Red Data Book species (that is rare or threatened). In addition, dead and decaying wood supports many flies and moths whose larvae live in the wood or under loose bark, bees and wasps that nest in wood, as well as centipedes, woodlice and springtails amongst others. Vast numbers of fungi species and micro-organisms are also associated with this habitat and smaller but significant numbers of lichens, mosses and liverworts.

Veteran trees, whether they be within woodlands or set in more open parkland or remnant wood pasture habitats, are the richest trees for these saproxylic (dead wood feeding and decomposing) fungi and invertebrate species, due to their rot holes, decaying heart wood and dead and dying branches. For trees to develop a significant quantity and quality of dead wood they need to be at least 150 years old. The most valuable trees are often hundreds of years old and are the oldest trees found in the countryside and towns.

4.1.2.6 Scope of this Action Plan

With reference to habitat types identified in 'Biodiversity the UK Steering Group Report', this action plan relates mainly to Broadleaved and Yew Woodland and Lowland Wood Pastures and Parkland, though does also consider aspects of Planted Coniferous Woodland.

This action plan concentrates on our irreplaceable ancient semi-natural woodland (ASNW) and replanted ancient woodland sites as the types of woodland which harbour most of the local woodland biodiversity resource. Consideration of the future of Hertfordshire's woodlands will however include recent secondary woodland and plantations. River valley wet woodlands (or carr) are considered in the wetlands habitat action plan (chapter 5).

Economic aspects of woodlands are considered in the Hertfordshire Woodland Strategy, while the Hertfordshire Landscape Strategy considers their role in the landscape. Historical ecology and archaeological features are considered in the Hertfordshire Archaeological Strategy. This action plan is meant to complement these other strategies.

4.2 History of ancient woodland in Hertfordshire

Historical evidence suggests that by Roman times the lowland countryside was largely open with few large blocks of woodland remaining. With the loss of large areas of woodland and the hunting to extinction of most large wild herbivores and all top predators, naturally functioning woodland ecosystems were lost from Britain. Without very large areas of woodland, all the natural stages of woodland development and the wide variety of species naturally dependent on these will not occur.

This is the situation in the modern landscape, where woodlands are generally very small and fragmented. Today woodland covers approximately 15000 ha in the county (Hertfordshire Habitat Survey), which represents only about 9% of the land surface, about the national average. The overall level of woodland cover has not changed significantly over the previous few centuries.

However, this century has seen some significant changes in the nature of the woodland resource, particularly with regard to the ancient semi-natural woodlands, which are generally the richest in wildlife. Historically, the ancient woodland resource of Hertfordshire was managed mainly under either coppice or wood pasture systems. There appears to be a distinct divide between the south and west of the county, where many commons and larger woodlands have developed from a wood pasture origin, and the north and east of the county, where most woodlands are of coppice origin.

From the last century onwards, new management systems have been superimposed on these traditional systems. Many woodlands in west Hertfordshire were converted to beech high forest for the furniture industry. In other parts of the county woods have been converted to oak high forest. Game rearing within woodlands increased across much of the county to provide field sports.

Although many plantations originate from the late 18th and the 19th centuries, it is only this century that large-scale replacement of ancient semi-natural woodlands began. Earlier plantations were usually planted on open ground, sometimes linking up existing ancient blocks of woodland.

However, during the 20th century, forestry practices changed dramatically. This was mainly in response to changes in government policy in the aftermath of World War I, aimed at securing a greater level of self-sufficiency in timber production. It also coincided with a decline in the markets for wood products from traditionally managed ancient woodlands.

The establishment of the Forestry Commission in 1919 marked a shift away from using timber and wood from local, usually semi-natural, woodlands, to using introduced, fast-growing conifer species. Though the large scale purchase and planting of land which affected other parts of Britain did not occur in Hertfordshire, the Forestry Commission also encouraged private estates and landowners to adopt the new species mixes and forestry techniques through advice and generous grants and tax incentives.

This change in forestry practices resulted in many ancient semi-natural woodlands being cleared and replanted with conifer species. This century 44% of the ancient woodland area has been replanted as conifer or broadleaved plantations and 480 ha destroyed completely. There was also significant felling of mature trees during both World Wars, which has affected the structure of many woodlands. Only 3.3% (5410 ha) of Hertfordshire is now occupied by woodland on ancient sites greater than 0.25 ha, with only 2% (3280 ha) of this semi-natural. There is also an unknown area of ancient woodland on sites less than 0.25 ha, though this is likely to represent only a small proportion of the total. The remainder of the woodland resource is secondary woodland (naturally established since 1600) or new plantations on open ground.

The 44% loss of ancient semi-natural woodland this century has resulted in the decline in many species which depend on a long continuity of woodland cover, particularly plants, fungi and invertebrates.

Other species have declined not only as a result of the loss of ancient semi-natural woodlands, but also as a result of changes in management of the remaining woodlands. Examples include the Dormouse, Nightingale and butterflies such as the Silver-washed Fritillary *Argynnis paphia* and Purple Emperor *Apatura iris*. Other butterflies have become extinct in the county as a result of these changes, notably the Pearl-bordered Fritillary *Boloria euphrosyne* (date of extinction 1978), Small Pearl-bordered Fritillary *Boloria selene* (1960), High Brown Fritillary *Argynnis adippe* (1978) and Wood White *Leptidea sinapis* (1976) (Sawford, 1987).

The major change in management responsible for the above declines and extinctions was the decline of the traditional coppice and wood pasture management systems. Coppicing declined from the late nineteenth century onwards, as a result of changes in the rural economy. Other changes which

have also contributed to the decline of these species was the loss of unimproved grasslands (detailed in Chapters 5 to 8) associated with woods.

The cessation of coppicing resulted in the unchecked growth of the shrub canopy. This first resulted in the loss of the open space required by the butterflies and eventually also the conversion of the dense shrub layer to high forest and the loss of suitable conditions for scrub species such as Nightingale and Dormouse.

The changes to the ancient wood pastures which have resulted in a decline and loss in their associated wildlife, are linked as with coppicing, to the changing rural economy. From the late eighteenth century onwards, much former common land in the south and west of the county, including large areas of wood pasture, was enclosed. Much of this has developed into high forest whether through neglect or management, and may now superficially more resemble secondary woodland. These changes have resulted in a loss of the associated habitats, often open unimproved grassland or heath and the species associated with these. At the same time, neglect of the pollarded veteran trees has resulted in many now being top heavy and collapsing.

Other historic woodland features which locally have survived to the present day, but which may no longer be found in ancient woodlands, include a large number of veteran trees, particularly pollards, found in parkland. This parkland may have been developed from original wood pasture or may have been developed from open agricultural land in the eighteenth and early nineteenth centuries. The future of veteran trees and associated species is very much in the balance in the modern landscape, due to neglect and management practices.

Other locally important historic features include ancient green lanes and trackways. These often retain veteran trees as well as a remnant ancient woodland flora. These too are under threat in the modern landscape, due to removal or intensive use. Many hedgerows represent linear remains of ancient woodlands. Hedgerows are considered in Chapter 9.

4.3 Ancient woodland – current status, trends and threats

4.3.1 Current status

Of the 15000 ha of woodland in Hertfordshire, 3280 ha is ancient semi-natural woodland over 0.25 ha and a further 2130 ha is plantation on ancient woodland sites (Report of the State of Hertfordshire's Environment, Hertfordshire Environmental Forum, 1992). The remainder is a mixture of recent and older secondary semi-natural woodland and coniferous and broadleaved plantations on formerly open ground. The exact area of wood pasture in the county is unknown, though there is 600 ha of parkland.

There are three major types of woodland found in the county which correspond closely with the landscape and Natural Areas (NA) identified in the English Nature/Countryside Commission joint character map. These major woodland types each include one or more of the NVC communities described in Appendix 3 and are described further below:

Oak-hornbeam: The woodland type most typical of Hertfordshire are the oak-hornbeam woodlands of the south and east of the county, typically found on the London clay and other geological deposits of the London Basin NA. They are also found further north in the county, particularly on the decalcified boulder clay around Stevenage. **NVC community W10**.

Key sites: Broxbourne Woods complex (includes SSSI, NNR and proposed SAC), Knebworth Woods SSSI, Northaw Great Wood SSSI, Sherrardspark Wood SSSI, Wain Wood SSSI.

Ash-maple: In the north and east of Hertfordshire, the woodlands are dominated by ash-maple types on the tills (chalky boulder clay) of the East Anglian Plain NA, though few of any size remain. **NVC community W8**.

Key sites: Great Hormead Park SSSI, Northey Wood, Reed Wood, Cokenach woodlands, Clothall Wood, Bush Wood.

Beech: In the west of the county in the Chilterns NA, on the clay-with-flints of the dip slope and the chalk of the scarp, beech woods of various descriptions are dominant, largely as a result of planting from the later eighteenth century onwards. **NVC communities W12, W14, W15**.

Key sites: Ashridge SSSI (part), Tring Woodlands SSSI, High Scrubbs, Whippendell Woods SSSI.

Throughout all the character zones identified in the county, where conditions are suitable, the various wet woodland types occur. In the southern half of the county, particularly in the Thames basin, oak-birch woodlands (NVC community W16) can also be found on the most acid, often gravelly soils.

Hertfordshire has a particular responsibility for oak-hornbeam woodlands, with a large proportion of the national total. These are listed on Annex 1 of the EU Habitats Directive and part of the Broxbourne Woods complex is a proposed Special Area of Conservation (SAC), under the directive.

The Beech woods of west Hertfordshire, whether on the chalk or clay-with-flints of the Chilterns, are also listed on Annex 1 of the Habitats Directive, giving a wider responsibility to maintaining the ecological value of these woodlands. Lowland beech woods have been identified as a key habitat in the UK Steering Group Report.

The major former **wood pasture** sites and important **parklands** occur mainly in the southern half of the county. These are largely of value for their veteran trees and associated species. For example it is known that some trees at Panshanger are approaching 1000 years old and there are over 500 Hornbeam pollards at least 250 years old at Knebworth Park.

Key wood pasture sites: Ashridge SSSI (part), Broxbourne Woods (part), Northaw Great Wood SSSI (part, including Cuffley Camp), Hatfield Home Park and Millwards Park, Knebworth Woods (part), Symondshyde Great Wood.

Key parkland sites: Panshanger Estate, Sacombe Park, Brocket Park, Stagenhoe Park, Knebworth Park, Broxbournebury Park, Youngsbury Park.

Examples of key woodland species found in Hertfordshire, are listed below, with the reasons why they are important species.

Bluebell – The species which forms the major component of the ground flora of many of the oak-hornbeam and ash-maple woods in Hertfordshire. Although seen as common locally and throughout the UK, it is important because it is estimated that the UK holds 20% of the world population of this species (*Biodiversity Challenge*, 2nd edition, 1995).

Coralroot Bittercress – A species which has one of its major national strongholds in the Chilterns dip-slope beechwoods and Hertfordshire holds a high proportion of the national population.

Common Dormouse – A secretive inhabitant of mixed broadleaved woodland with a dense understorey and hedgerows, this species requires a wide variety of trees and shrubs to provide a regular food supply throughout the summer period. It is thought that populations have generally declined throughout its range and the species has become extinct from seven counties this century. Hertfordshire is within this species UK range. The Dormouse is listed on Annex IVa of the EC Habitats Directive (EC/92/43), Schedule 5 of the Wildlife and Countryside Act 1981 and Appendix 3 of the Bonn Convention. A national and local species action plan (see chapter 12) has been prepared for this species.

Bats – All 14 species of bat found in the UK are protected under both Annex IVa of the EC Habitats Directive and Schedule 5 of the Wildlife and Countryside Act (1981). Nine species are found in Hertfordshire, they are; Pipistrelle, Noctule, Natterers, Brown Long-eared, Daubenton's, Serotine, Leisler's, Brandt's and Whiskered. A local species action plan has been prepared for the Natterers Bat (see chapter 13).

Hawfinch – A shy and elusive inhabitant of mature woodlands, favouring Hornbeam, Beech and Wild Cherry. Hertfordshire is one of the national strongholds of the Hawfinch. However, nationally the species has declined by 25-49% (*Biodiversity Challenge*, RSPB, 1995) and this decline has also occurred locally. The Hawfinch is listed in the Amber list (of moderate

concern) in the RSPB's *Birds of Conservation Concern*.

Stag Beetle – A large conspicuous beetle of woodland, parks and gardens, though in Hertfordshire it is predominantly found in parks and gardens. The larvae live in decaying wood, often in roots and stumps and take 3.5 years to mature. It used to occur throughout England and south Wales, but now appears to be restricted to southern England. In Hertfordshire it is known mainly from the south-east of the county, particularly the Broxbourne Woods complex. Following widespread concern at this decline, the Stag Beetle is listed in Annex II of the EC Habitats Directive (EC/92/43) and Appendix III of the Bern Convention. A national and a local species action plan (see chapter 22) have been prepared.

Silver-washed Fritillary – The largest UK species of fritillary butterfly. Its preferred habitat is open semi-natural woodland. The species has declined throughout its range in southern and western Britain and in Hertfordshire declined by 75% when comparing pre-1970 and post-1970 records (Sawford, 1987). It is thought that it has declined further since 1987 (T. James, Pers. Comm.). The decline is however less than for the other fritillary species, probably because it is more tolerant of shade.

Woodlands also play an important role in other aspects of our natural and cultural heritage, particularly in their influence on the landscape and also for their archaeological records.

The county's ancient woodlands, wood pastures and long-standing secondary woodlands often contain many important archaeological remains. The issues surrounding woodlands and their history in Hertfordshire and their relation to archaeology are explored more fully in the Hertfordshire Archaeology Strategy.

The pattern of woodlands in the county and the differences in species composition make a significant contribution to the landscape variations now seen. The beechwoods which now characterise the Chilterns being one example with the largely treeless landscape of the East Anglian heights being another. The Hertfordshire Landscape Strategy explores these relationships further.

4.3.2 Trends

The isolation of woodlands within the surrounding countryside has been a major trend, with the links to other semi-natural habitats largely lost. Woodlands and unimproved grasslands used to be linked with hedgerows providing the wooded link through the open countryside and woodland rides and glades providing an unimproved grassland habitat within woodlands. The loss of these links, affecting both wooded and grassland habitats is one of the most serious ecological losses which has occurred through the intensification of land management and is responsible for the decline of many species which require both wooded and open habitats.

The modern trend of replanting after felling, often with non-native stock, rather than relying on natural regeneration is a major threat to the genetic diversity of local woodlands. The expansion of introduced species has also become an increased threat.

The increase in access to the countryside has affected all major woodland blocks and is now being encouraged more than ever. This increases pressure on woodlands particularly through disturbance. In some areas intensification of game rearing is modifying the woodland habitats. There is also an increasing demand for insensitive recreational pursuits such as war games. The incorporation of woodland into other uses such as golf courses has become common, resulting in the loss of management continuity.

Finally, external changes in climate such as global warming and droughts, the effects of pollution and the effects of lowered water tables are already having a major influence on woodlands and are likely to have greater influence in the future.

Ancient semi-natural woodland is now largely protected through statutory controls on felling and forestry operations, and through local planning policies. Although the area of ancient woodland can not increase, the overall area of woodland has recently started to increase slightly. This is due to the encouragement given to woodland planting through various initiatives and grant schemes including the Woodland Grant Scheme, Farm Woodland Premium Scheme and recently the establishment in south

Hertfordshire of the Watling Chase Community Forest, where a locational supplement for woodland planting is also available.

Since the 1980s, the Woodland Grant Scheme in particular has encouraged the planting of broadleaves, even as part of coniferous plantations. It also encourages the management of existing woods for a variety of uses including timber production, recreation, landscape and nature conservation. Replanting of ancient semi-natural woodlands with conifers is however no longer permitted.

The Forestry Authority has recently produced an excellent draft Forestry Standard, which once adopted will help to improve the environmental standards in all forestry operations.

4.3.3 Threats

Loss of ancient semi-natural woodlands is no longer such a major issue affecting the woodland resource of Hertfordshire, though the continued attrition of woodlands resulting from the loss of their economic role is a concern. However, the remaining ancient woodlands and the species they contain, particularly those dependent on a long continuity of woodland cover, are still under threat. The major threats can be summarised as:

- the small size and isolation of woodlands
- lack of woodland structure
- changing management practices
- potentially damaging species
- environmental changes e.g. climate change, pollution
- recreation.

4.3.3.1 Small size and isolation

This is perhaps the major threat to the remaining ancient woodlands and their wildlife. In Hertfordshire, 75% of the wooded area occurs in fragments under 10 ha, while 40% of all woodlands are less than 1 ha. The generally small woodland size and the isolation resulting from the loss of connections between semi-natural woodlands and grasslands in the wider countryside, has resulted in populations of characteristic woodland flora and fauna becoming confined to particular sites. Such isolation increases the chances of small populations becoming locally extinct, in response to local factors such as woodland management and population fluctuations or wider issues such as climate change as a result of global warming. Once extinct, they are then unlikely to colonise from other sites.

Species which are particularly vulnerable to adverse external influences are those associated with the generally darker and damper conditions of the woodland interior. Many such species are already likely to have become extinct due to the original forest clearances, but those that survived will be adversely affected by the increase in light, drying out and other changes associated with small woodlands. These 'edge effects' are increased in small woodlands, as the surrounding area has a proportionally greater influence on the woodland habitat. This is demonstrated by recent studies on breeding woodland birds and the effects of noise, particularly from adjacent roads. These studies showed that breeding success and density of territories was far higher in the centre of woodlands, away from the disturbance. It is therefore important to retain large woodlands and encourage the expansion of small copses.

4.3.3.2 Lack of structure

A second threat is the lack of structure in many woodlands. This effect is often exacerbated in small woodlands, where all successional stages may not be represented continuously. The wide range of natural growth phases from open glades to over-mature woodland and dead wood typically found within natural forests often does not occur in small woodlands. This can result in the loss of suitable habitat conditions for plants and animals with specialised requirements, which may then become locally extinct. **The species which are most vulnerable to this threat are those associated with open glades or old veteran trees and dead wood.**

4.3.3.3 Management practices

A third threat to ancient woodlands and woodland wildlife, is the change in forestry management practices which has occurred this century. Many of these issues have begun to be addressed through the publication of Good Practice Guidelines by the Forestry Authority and English Nature and new UK Forestry Standard, which is currently in draft. There

are two very different issues relating to management. The first is the past cessation and the possible future re-introduction of traditional management practices, such as coppicing, in ancient woodlands. The second is the intensification of management associated with modern forestry practice.

Traditional management – coppicing: A large proportion of the woodlands in Hertfordshire which were formerly managed as coppice or coppice-with-standards, are no longer managed either commercially or for conservation.

The loss and decline of many open glade species associated with coppicing has already been detailed (see Section 4.2). The decline in many of these high profile species, has resulted in the re-introduction of coppicing being promoted as a generally desirable form of conservation management.

The Forestry Authority's Woodland Grant Scheme can support the management of ancient coppice woodland for timber, amenity and conservation. Organisations such as the National Small Woods Association and Herts County Council are also actively promoting management. Many woodland management initiatives promote coppicing as a method of producing 'environment friendly' charcoal, to replace imported charcoal from tropical forests. In addition, many conservation organisations, including the Herts and Middlesex Wildlife Trust have re-introduced coppice regimes to formerly coppiced woodlands for the benefits to wildlife.

However, while the re-introduction of coppicing, as one part of a programme of woodland conservation management, can be beneficial in some woodlands, it will not always be an appropriate form of management. Coppicing provides a harsh environment for many woodland plants and animals, which may increase with less intensive woodland management. The key features provided by coppicing are a continuous supply of the early successional open glade and dense shrub habitats. However, active coppicing prevents the establishment of mature canopy woodland conditions and limits the amount of old dead and dying wood, both key features of a varied woodland ecosystem. An increasing problem is that of deer damage to regrowth, potentially affecting the profitability and even success of this management. The wildlife benefits of any large-scale re-introduction of coppicing to the woodlands of Hertfordshire, as part of a concerted effort to produce charcoal or other woodland products, will therefore need to be carefully considered.

Traditional management – wood pasture/parkland: Although many large woodlands and commons in south and west Hertfordshire were formerly managed as wood pasture, today only remnants remain and these are not actively managed. Many former wood pastures are now part of a high forest woodland, while others are part of formal parklands. Although the species associated with the open wood pasture habitat will have been lost or become much reduced, the veteran trees have often survived. If managed as high forest the veteran trees may have been removed. Even where they have survived, perhaps in unmanaged woodland, they are likely to be top heavy and in danger of collapsing. In parklands the veteran trees have often survived but have usually been tidied up for safety reasons, often to excess, thereby removing the valuable dead and dying wood. In other cases the veteran trees may be neglected and in danger of collapsing. In both former wood pasture and parkland situations, there is often a lack of replacement old trees to provide the continuity of habitat required by the specialised species of old wood.

Modern forestry: The replanting of ancient semi-natural woodland with conifers or non-native broadleaves is no longer permitted. However, commercial management of ancient woodlands for hardwood timber can pose a threat to the biodiversity of these woodlands. While continuation of management has probably contributed to the survival of these woodlands, aspects of modern intensive management can result in a decline in their conservation interest.

Management for a timber crop will **prevent trees from reaching biological maturity** and so prevent the accumulation of the vital dead and dying wood resource and the particularly important large diameter dead wood. This will often be further compounded by the tidying up which occurs to remove dead wood as potential sources of disease, though lop and top does provide a small resource for some species.

A second, if more subtle threat arising out of modern practices is **the replanting of woods after felling**. Though native tree species may be specified, the source of these will often be from other regions of the country or from abroad. For beech and oak this is a greater threat, because an EU Directive on Forest Reproductive Material restricts the use of seed sources other than from approved stands. The use of non-locally derived stock results in the dilution of the genetic make up of woodlands. For the conservation of the genetic components of biodiversity in local woodlands, greater emphasis should be placed on natural regeneration or the use of trees derived from local seed sources.

Commercially managed woodlands, if not of a varied age structure, will often have a lack of open space and early successional stages, resulting in the potential loss of specialist species of these habitats.

Another threat associated with modern practices is the **over-tidying of old trees throughout the countryside and urban areas, resulting in a loss of valuable dead wood habitat**. The work is done in the name of safety, but is often carried out to excess. Areas owned by public authorities, whether woodlands or parks, are often the most over-managed, but the problem also occurs on private land (see chapter 9 for further discussion).

4.3.3.4 Potentially damaging species

The fourth major potential threat to woodlands in the county concerns the impact of individual key species on the functioning of a woodland ecosystem. In particular, the increasing numbers of deer, grey squirrels and rabbits as potential inhibitors of natural regeneration, and the increasing abundance of some trees such as Sycamore and Sweet Chestnut resulting in changes in woodland composition.

Deer: Three species are found in Hertfordshire, Fallow, Muntjac and recently Roe have also colonised the county. Deer are a natural component of our woodlands but Roe Deer are the only native species found in the county. Today, deer have no natural predators and are generally increasing in numbers, particularly Muntjac. They have increased to the point, where they are causing economic damage to forestry. In addition, increasing evidence now suggests that the current numbers are causing ecological damage to woodlands, particularly by inhibiting regeneration.

Too many deer cause damage in several ways; browsing (eating the leaves and shoots of trees), grazing the ground flora, bark stripping (for food), and tree fraying by rubbing newly grown antlers to clean them of velvet. If there are more deer present than a habitat can support, this also results in a less healthy deer population.

Any future increase in the area of woodland in the county may result in further increases in the deer population in the absence of any management, as the area of suitable habitat increases.

Grey Squirrels: This species was introduced to Britain in the last century and has rapidly colonised most of the island. The species is omnivorous, but the major threat it poses to woodlands is through it's bark stripping activities. This damage is as a result of both feeding and social behaviour. While this species can undoubtedly be a serious pest to forestry, much less is known about it's ecological impact. There is now some evidence to suggest that Grey Squirrels may have long-term ecological impacts, for example, by preventing the regeneration of Hazel, due to its liking for green nuts. However, further research is still required on the ecological effects of this species.

Rabbits: On a local scale, a large rabbit population may inhibit regeneration by grazing seedlings and ground flora. Rabbits may also kill young trees by stripping bark, however, the effects of rabbits will generally be localised, though can be severe.

Tree species: The following species are a concern, particularly where they occur in ancient semi-natural woodlands; Sycamore, Sweet Chestnut, Rhododendron, Cherry Laurel, Turkey Oak, Norway Maple and some conifers which are now self sown.

Sycamore and Sweet Chestnut, although both introduced to Britain, have become established in many woodlands and are increasing. Sycamore, only invades old woodlands slowly, unless large clearings are made, while Sweet Chestnut is spreading fast in many old woods on light acid soils. Much conservation effort has been spent in removing both these species, but particularly Sycamore, from ancient woodlands.

However, both species are now fairly well established and should the rises in temperature predicted from global warming occur, then both are likely to increase further. A re-assessment of their threat is therefore required.

Rhododendron can rapidly become established in woodlands and the other species also have potential to spread if not controlled. However, less is known about how much of a threat these other species are, since they distribution is generally localised and they are usually present in small numbers.

4.3.3.5 Environmental changes

The fifth potential threat to the woodland biodiversity of Hertfordshire is the impact of wider influences such as climate change and pollution. Though it is not possible to predict future climatic changes with certainty, a rise in temperature and changing precipitation patterns are predicted and will encourage changes in the species composition of woodlands. For example, increasing drought stress will certainly threaten epiphytic mosses and lichens and invertebrates dependent on damper conditions.

Increasing acidification from air pollution will result in changes in soil chemistry and a reduction in species-richness, notably amongst the ground flora, mosses and lichens.

There is already evidence of these changes in Hertfordshire, with the spread of bracken since the 1930s, the decline in calcareous flora and a general reduction in species-richness, including ancient woodland bryophytes in woods in SE Herts (T. James, pers.comm.).

4.3.3.6 Recreation

The final threat to woodlands, concerns increasing recreational use of woodlands. Increased public access to the countryside is desirable but brings numerous problems. Almost all large woodlands in the county have public access, which is becoming increasingly formalised, resulting in more extensive and continuous disturbance to breeding birds and species such as badgers. Public access may also cause trampling damage to ground flora, erosion and result in increased rubbish dumping, particularly on the urban fringe. Other urban fringe problems include vandalism and fire. Management regimes can be disrupted, further threatening the economic return and therefore value of woodlands to landowners. Demands for safety management can result in the loss of valuable deadwood habitats. In response to this, public access needs to be well managed and in some areas may need to be limited if such problems are to be avoided.

4.4 The future for woodlands in Hertfordshire

4.4.1 Ancient woodland

The major issues currently affecting ancient woodlands in the county are therefore the type of woodland management and the small size and fragmented nature of the resource. These woodlands, though only accounting for just over a quarter of the county's woodland, harbour the vast majority of woodland species. To conserve local woodland biodiversity, the remaining ancient woodlands in the county must be put under appropriate management regimes.

4.4.1.1 Management

To cater for the wide range of woodland species, each ancient woodland or group of ancient woodlands needs to have a continuity of all stages in the woodland succession, from open space to deadwood. This over-riding aim is likely to be best achieved through a combination of management approaches, including limited intervention, active conservation management (including 'traditional management'), and sustainable commercial management whether as high forest or coppice.

4.4.1.2 Encouraging more natural woodland

In the largest woodland complexes, this may be achieved through natural processes such as storms, disease and natural regeneration. **A policy of limited intervention, encouraging natural processes and undertaking management which complements and works with the natural processes should be sought in a few of the major ancient semi-natural woodland complexes in Hertfordshire.**

The adoption of this policy will require a different approach to woodland conservation, based on understanding, restoring and managing key ecological processes rather than managing habitats. The two major natural processes which will influence local woodlands are **windthrow** and the levels of **grazing**.

Windthrow creates gaps in the woodland canopy thereby allowing natural regeneration of the woodland. It also results in the death of trees and therefore the creation of deadwood and the process of decay and nutrient recycling. It is the most important natural disturbance in local woodlands.

Levels of grazing, particularly by deer species, are the other key natural process in management of local woodlands. In moderate numbers they contribute to the natural functioning of the woodland, though in greater numbers begin to cause damage by inhibiting regeneration of woody and herbaceous species. This threat is considered in section 4.4.6 on species issues.

In large limited intervention woodlands there may also be a role for looking at other potential grazing animals, such as semi-wild cattle, ponies and pigs. Mixed grazing regimes are an important part of more natural woodlands elsewhere in Europe. The establishment of mixed grazing regimes at low intensities should be investigated as a more natural way of managing these woodlands. For example, rather than provide open space by felling glades or rides, grazing will help provide and maintain the woodland open space.

Another potential advantage of this approach would be achieved through combining the management of surrounding grasslands with the woodland management. In this way, more natural gradations (ecotones) between habitats could be created rather than abrupt edges that characterise the modern man-made landscape. Such gradations are recognised as being of great value to wildlife and are mimicked in much current conservation management. However, there are many practical problems with grazing woodlands and controlled grazing may only be appropriate in a very few cases.

If encouraging more natural woodland, the type of natural woodland and the management approach needed to establish this must be decided at the outset.

Two different types of natural woodland can be aimed for (Peterken, 1996):

(1) **'Present natural woodland'** comprising those locally native species now present on the site and any others which colonise naturally. Future conservation would include limited intervention to prevent non-locally native species from establishing.

(2) **'Future natural woodland'** comprising all native, naturalised and planted species now on the site and any others which might colonise by natural regeneration in the future. Future species composition would not be managed.

In most ancient woodlands, the 'present natural' approach will be the most appropriate, building on the existing features of conservation value. However, an example of at least one 'future natural' woodland would be valuable to scientifically study the effects of non-locally native species on Hertfordshire woodlands.

Even with a change of management philosophy placing greater reliance on natural processes, there will remain important habitat features which may require management to maintain their biodiversity interest (this is recognised in the vision of *limited* not *non* intervention woodland). Limited intervention woodlands are important for 'old growth' and mature woodland habitats, but some intervention is desirable to increase habitat diversity and protect key woodland features.

There are many management decisions which need to be made before a more natural approach is adopted in any woodland. An important issue is whether to let the woodland become more natural straight away, or whether to undertake management to create more natural components such as gaps and dead wood before letting natural processes take over. Influencing the starting point for more natural woodland, may also include re-introducing keystone species, such as grazing animals or a particular tree species.

The approach to natural disturbance is also critical, because a totally natural disturbance regime is not possible in our modern cultural landscape. While windthrow is a key feature of more natural woodlands, there may be a need to remove windthrown trees near paths or boundaries. In smaller areas such as those possible in Hertfordshire, there is considerable risk that the woodland may, by chance, miss the effects of high winds or disease for decades. There may then be a need to simulate disturbance by artificially killing, felling or winching over trees to create gaps.

Other important issues include choosing the boundaries of a more natural woodland, determining appropriate grazing levels, deciding whether a buffer zone is required and controlling visitor numbers.

Overall, an approach to woodland conservation based on more natural woodland is best in well-wooded districts, naturally disturbed woodland such as floodplain forests, or areas with very little ancient woodland.

The above discussion, sets out some of the general issues surrounding more natural woodland, but how does this relate to Hertfordshire?

In a well-developed county such as Hertfordshire there are only a few opportunities for extensive areas of more natural woodland. Such woodland has to cover large areas (ideally, at least 100 ha) to enable the natural processes to function effectively. Therefore locally, they would also beneficially include restored ancient replanted woodlands, secondary woodland and new woodlands developed preferably by natural regeneration, but also by planting.

The four major woodland complexes in Hertfordshire, which are among the most important for biodiversity and do potentially lend themselves to a more natural management approach are as follows:

1. Ashridge area;

2. Part of the area from Broxbourne Woods to Hatfield, including Wormley Wood and Northaw Great Wood;

3. The Knebworth Woods complex and

4. The Whippendell Woods complex.

Other potential examples include Sherrardspark Wood and a few medium sized woodlands such as Harmer Green Wood.

However, in the short-term, this approach is only likely in those woodlands owned by public bodies or

conservation organisations. In the longer term, it may require strategic acquisition by these bodies to establish more natural woodlands in the other areas.

The approach taken in each woodland will have to be developed through the production/revision of site management plans. The issues of restructuring or not, grazing, levels of public access and buffer zones should be addressed at this stage. One issue which does merit a little further discussion is grazing by semi-wild cattle, ponies and pigs.

While windthrow and controlled grazing by wild deer populations can easily play a more important part in the future development of these woodland complexes, the establishment of more natural grazing regimes based on mixed large herbivore populations is more problematic. The use of mixed large herbivore populations is probably only a realistic option in the short-medium term at Ashridge and Northaw Great Wood, are surrounded by areas of pasture and are developed from wood pasture and so have a history of grazing and open space within the woodland. Even in these woodlands introduction of such grazing is subject to several practical problems such as securing boundaries (fencing is very costly), conflicts with public access and control of stock numbers.

The future more natural development of all these woodlands under the influence of windthrow and grazing would also provide a valuable baseline for monitoring and understanding natural processes in local woodlands. Such knowledge of natural processes would be invaluable in developing more natural conservation and commercial management practices.

Overall, the development of such large scale ‘more natural’ limited intervention woodland would provide one of the greatest opportunities for woodland biodiversity in the future, particularly related to ‘old-growth’ woodland, dead wood and conditions produced by more natural grazing. However, considerable research will be required to achieve this.

4.4.1.3 Managed woodlands

Most ancient woodlands in Hertfordshire are too small and isolated to rely on natural processes to provide the whole range of successional stages. Expansion of these woods is a priority and is considered in later sections. A management-based approach is essential in these woodlands. Management can be designed to simulate the variety produced by natural processes, particularly the structural diversity provided by open space and young growth. Management can also provide a sustainable resource of timber and wood products. Management may be solely for conservation, or more likely, developed as part of commercial forestry or game management, but conservation should always be considered a primary objective.

In large ancient woodlands, where a limited intervention approach is not possible or desirable, the aim should be to achieve a zoned management approach as is set out in section 4.4.7. Such an approach, adopting a variety of management regimes, can ensure the greatest diversity of habitats and woodland successional stages, as well as achieve economies of scale. The exact management options will depend on the individual wood(s), but commercial high forest and coppice management can be combined with conservation management, including smaller limited intervention areas.

Most ancient woodlands in Hertfordshire are however too small to adopt such a zoned approach. One of the following management systems is likely to dominate, though which one will depend on the past management history of the woodland, economic factors and social considerations.

4.4.1.4 Management systems

Whichever management system is chosen, it is essential to maintain continuity of management, particularly in small, isolated woods, because many species are not very mobile and in the modern fragmented landscape the links between habitats have been lost limiting opportunities for re-colonisation.

Coppicing: As already noted, a majority of ancient woodlands in the county were formerly managed by coppicing, though many have not been coppiced for several decades. A key question facing conservation and forestry managers is should a wide scale return to coppicing be promoted?

The benefits of coppicing can be summarised as follows. Coppicing provides a diversity of habitats and supports many species dependent on open space or

'young growth' woodland stages. It has also often ensured the survival of a locally native mix of tree and shrub species, largely present in their natural patterns and therefore has historic ecological value. It shows the history of the human link with and influence on nature, and so has cultural and social values as well as nature conservation values. Finally, coppicing also has scientific value as a long-term demonstration of sustainable resource utilisation.

The biodiversity benefits of a large-scale return to coppice management are questionable. Species may be associated with coppice woodlands, but it is open space or dense shrubby habitats which they require, not the management system per se. If we are to see a recovery in those which have declined as a result of the cessation of coppicing, then it is these habitats which we must seek to provide in woodlands, either by coppicing or by incorporation of these features in other management systems.

In deciding to re-introduce coppicing, the balance of pros and cons will depend on the species found in each woodland and their habitat requirements, which will often relate to the age at which the wood was last coppiced. It is generally recognised that re-introduction of coppicing is only successful in woodlands which have been coppiced in the last 50 years and where areas of open space are still present. These factors ensure that the typical species of open space and 'young growth' which would benefit from coppicing are still present within the woodland.

Coppicing is also best promoted in areas containing small (generally less than 20 ha), isolated woods, where other management systems such as high forest are not sustainable.

The final consideration is whether coppicing is economically sustainable. The two major products in the future will be firewood and charcoal. There are now several initiatives nationwide to produce charcoal. There are also other initiatives to encourage management of small woods, which include schemes to help find markets, such as 'Woodlots'. The recent efforts to promote local charcoal and firewood production should be further developed. However, it is likely that some economic incentives, currently not available, will be required to establish such production as a sustainable long-term business, particularly with the importation of cheap charcoal from abroad and the generally saturated firewood market. It may be that this could be based around an increased density of timber trees within the coppice, with grant systems permitting planting at very low density, with the coppice and natural regeneration providing a nurse crop.

However, coppicing should be promoted in those ancient coppice woodlands worked in the past 50 years where it will have some biodiversity benefits and is commercially sustainable. One of the few good potenital areas in Hertfordshire is around Hertford Heath, including the woodlands owned by the Local Authorities, Haileybury College and Forest Enterprise. In many woods coppicing will not be a viable commercial proposition or desirable ecologically. Therefore future management is likely to focus on converting former coppice to high forest systems.

High forest: High forest management has been practised in some woodlands, particularly the Chilterns beechwoods over a long period. However, it represents a major change to the majority of woods in the county which are former coppice. When carrying out such management it will be essential to maintain or re-create the important open space and dense shrubby habitats which coppicing provides as part of the management system, through networks of rides and glades. It is also essential to retain some deadwood and over-mature areas.

A further desirable trend for ancient semi-natural woodlands, is the development of alternative commercial management systems to the currently favoured clear felling and replanting methods based around **continuous cover** (**'close to nature'**) methods. The continuous cover systems involve either uneven aged felling **by selection or group selection** methods or even aged **shelterwood** methods.

The selection methods only remove individual or small groups of trees at a time from areas of 0.1-0.3 ha, though perhaps up to 0.5 ha if shade intolerant species are being encouraged. The shelterwood system can be either regular or irregular and involves developing the new crop under the shelter of the old crop, some of which is retained after the first fellings. This may be done across a whole wood (regular) or by following patches of advanced regeneration (irregular). In all of the above systems the aim of felling is not only to

produce timber but also to encourage natural regeneration and better growth in retained trees.

Some of the advantages of such systems are considered further in section 4.4.4 on plantations. Selection systems are most appropriate for woods dominated by shade tolerant trees, in Hertfordshire, Beech and Hornbeam. Shelterwood systems can maintain an existing mix of species, including shade intolerant species such as oak.

However, these systems require skill to implement successfully and there is still a lot of scepticism among the forestry profession. One way to start to overcome this is through the establishment of demonstration sites on publicly owned sites, such as Hoddesden Park Wood.

4.4.1.5 Reasons for management

Conservation management: This will be aimed at working with natural processes and maintaining woodland biodiversity. It has generally mimicked the good bits of traditional systems to produce the desired habitats or communities or to create the conditions for particular species. However, in the future, as well as the traditional approaches, there is also likely to be a role for new techniques developed through research and through monitoring of more natural woodlands, particularly to conserve the favoured habitats of key species.

Conservation management is essential to protect the following processes, habitats and features, which cannot be fully accommodated even in a sustainably managed commercial woodland (after Peterken, 1996):

1. Unmanaged stands which allow the development of natural woodland.

2. 'Old-growth' and mature stands, with old, large trees and much deadwood.

3. Mature habitats, such as the native stands on ancient woodland, with their asociated soils, ground vegetation and dependent fauna, which have been fairly stable for centuries.

4. Mosaics of woodland and other semi-natural habitats, interacting naturally.

5. Native mixtures of trees and shrubs, regenerating naturally.

6. Existing diversity, which favours most vulnerable species.

7. Traditional management and associated habitat conditions.

8. Historic features such as earthworks and the patchwork of rides and glades.

9. Specific treatments designed to favour rare and other vulnerable species which are not in the attractive groups of flowering plants, butterflies, birds and other vertebrates.

10. Conditions for long-term ecological research into natural processes.

11. Freedom of access within unmanaged stands.

Management purely for conservation is only likely to occur in nature reserves or publicly owned woodlands. However, this is complementary to sustainable commercial forestry and even in commercial woodlands there is a need to retain key nature conservation features. In most woodlands the motive for any management will be economic, therefore it is essential to ensure that commercial management is sustainable (including with respect to nature conservation), particularly in ancient woodlands.

Commercial management: It is likely that conservation work in many woodlands will only be paid for if a commercial return is also derived from a wood, either from timber or sporting management. Timber management will follow either a high forest or coppice system. If ancient semi-natural woodlands are managed commercially, either for timber or coppice or for recreation, then it is essential that the environmentally sound practices set out in the recently published *UK Forestry Standard* (FA 1997), *Forestry Guidelines* (FC 1990-95) and *Forestry Practice Guides 1-8 on semi-natural woodlands* (FC 1994), are adopted.

The following aspects are particularly important for nature conservation:

- **At the very least, 10% of each ancient semi-natural woodland or group of woodlands over 20 ha, either as whole woods or parts of larger woods, should be managed under a limited intervention regime.**

- **Natural regeneration should ideally be encouraged as the method for restocking.**

- **Should natural regeneration not prove possible, planting should ideally only use trees grown from locally derived seed sources, to conserve local genetic variations. If such seed is not available British seed must be used. Planting should reflect the semi-natural stand-type.**

- **At least 4 standard trees per hectare should be retained to biological maturity to ensure a continuous supply of dead and dying wood. Ideally, specific important trees should be identified through survey prior to management.**

- **Up to 10-20% of woodland area should be open space, based around rides, glades, water features and existing open semi-natural habitats.**

- **Dead trees should not be removed unless dangerous.**

- **Dead branches should not be removed from important old trees or trees to be retained to biological maturity unless they are dangerous or present a risk to health.**

- **Only the minimum work necessary to make a tree safe should be carried out and some of the felled timber should be left on site.**

- **At least one mature dead tree per hectare should exist, and where it does not a large tree should be killed in a situation where it poses a no risk to the public and provided this will not result in the loss of other important species.**

4.4.1.6 Restoration of replanted ancient woodland

About a fifth of the woodland in Hertfordshire is replanted on former ancient semi-natural sites. Such sites often retain elements of the former more natural communities, particularly in any areas which were not cleared and along rides. On many of these sites only part of the wood was cleared leaving part as ancient semi-natural woodland.

These ancient replanted sites often have considerable potential for the restoration of a more natural woodland, particularly where areas of ancient semi-natural woodland are in close proximity. This increases the potential for colonisation by ancient woodland specialist species. To conserve remnant ancient woodland species in these woods, **they should be returned to a more natural broadleaved woodland community, based on the appropriate NVC woodland communities, at the end of the current cropping cycle. Important features of former management such as pollards and open space should also be included**.

Restocking such woodlands should where possible be based around **natural regeneration**, though this is only likely to be practicable where there is an adjacent ancient woodland seed source and where there is no intention to continue commercial forestry. In many cases, planting is likely to be the only practicable method of restocking. However, even where this is the case, some use should be made of natural regeneration to encourage a more natural and varied woodland. **Planting should only use trees from locally derived seed stock** and should be done in such a way as to resemble as closely as possible the NVC woodland communities for the soils. Such planting is also acceptable where the aim is to replace oak and beech which has been planted in ancient woodlands in the past, though again natural regeneration is favoured.

A priority area for such an approach is the Broxbourne Woods complex and a plan has recently been developed for most of the woods in this complex through the Countryside Management Service Wildwoods Project. This is summarised in the case study in section 4.4.7.

In order to achieve restoration of these ancient woodlands, it is likely that economic incentives or direction from the Forestry Authority will be required to ensure it happens.

4.4.1.7 Balance between management types

Overall it is likely that of the 5000 ha approximately of ancient woodland left in the county, about 10% could be managed as more natural woodland reserves in three or four large blocks. Approximately 25% could be managed under coppice regimes producing charcoal, firewood or pulp, with the remaining 65% managed as high forest.

It is estimated that of the total ancient woodland, 30% could be managed primarily for conservation by public authorities or conservation bodies, including the more natural woodland and areas of both coppice and high forest. The other 70%, mostly in private ownership, would be managed commercially, but with nature conservation as an integral part of the management system.

4.4.2 Wood pasture/parkland

There are no active wood pastures remaining in Hertfordshire and restoration of the traditional system is not practical. However, grazing in future limited intervention woodlands, particularly those which were formerly wood pasture, such as Ashridge, would contribute to maintaining key features such as the open space. Likewise, continuation or reintroduction of grazing in parklands is also important for many invertebrates associated with the old trees, whose adult stages require the nectar sources present in the open space. The key component of these habitats is however the veteran trees.

Conservation of the veteran trees associated with parkland and former wood pastures is a priority. In order to achieve this, a properly funded strategy is urgently required to identify the important trees through survey of key sites, to develop management programmes for these key sites and important individual trees and to ensure the provision of future veteran trees.

Survey: Surveys of the value of veteran trees are essential, but time consuming due to the difficulty in identifying the key species groups such as lower plants, fungi and invertebrates associated with them. For example, a survey of Panshanger Park took 16 days.

Management: Specific management must be carried out to ensure a continuity of dead and decaying wood, because even by planting replacement trees now, there will be a 200 year gap between these future parkland trees and the existing trees, many of which may not last that long unless actively managed.

Methods of managing individual veteran trees (which are often pollards) include **re-pollarding, propping up trees and surgery to extend the life of the tree**. Because of the age of many of the veteran trees, pollarding is now very difficult. Success varies from species to species with Hornbeam being relatively easy to pollard and Beech very difficult. However, the general principle is to avoid re-pollarding and to concentrate on extending the life of existing veteran trees through minimal surgery and providing new pollards and veteran trees for the future. In order to provide a continuity of old deadwood on a site, it may even be necessary in some circumstances to kill a large tree to speed up the natural decay process.

A further management issue is that of over-tidiness in the treatment of mature trees. This is discussed further in chapter 10, particularly in reference to urban parks, but also applies to trees in the countryside and on nature reserves. The following good practice guidelines must be adopted in the management of all mature and veteran trees:

- **Dead trees should not be removed unless dangerous.**
- **Dead branches should not be removed from important old trees or trees to be retained to biological maturity unless they are dangerous or present a risk to health.**
- **Only the minimum work necessary to make a tree safe should be carried out and some of the felled timber should be left on site.**

Planting: Planting of a new generation of future veteran and pollarded trees is essential to replace the existing trees. An active programme of planting new trees in parklands and starting new pollards in these parks and in relic wood pastures should commence immediately.

4.4.3 Secondary woodland

Some secondary woodland has developed over a long period, 200 hundred years or more. If it developed in an area with a large amount of ancient woodland, it may have acquired considerable conservation interest. One such example is Sailor's Grove, near Bayfordbury, where a woodland has developed since the late 18th century across an ancient banked trackway. In such woodlands, it is important that conservation principles are generally given an equal weighting to commercial considerations, with important ancient features being protected and managed sympathetically.

Much secondary woodland is, however, of more recent origin, having developed in the last 150-200 years. Such woodlands, unless immediately adjacent to a rich ancient woodland, are unlikely to have been colonised by many specialised woodland species. There is therefore greater scope in such woodlands for commercial woodland management to be developed. However, good practice conservation principles should still play a part in any woodland management, since all the woodlands in the county make a contribution to the biodiversity resource.

Naturally developing secondary woodlands of long-standing are of ecological interest and a selection should be chosen and allowed to develop naturally. A selection of important more recent scrub successions should also be selected. These will provide an important resource for the study of ecological processes. Examples of suitable woods include part of the Whippendell Woods complex, part of Oxhey Woods and Pryors Wood nature reserve, near Stevenage. Examples chosen should cover all woodland types found in the county.

4.4.4 Plantations

The large area of plantation woodland in the county is where commercial timber production should continue to be concentrated. However, even these woodlands, which represent a large proportion of the local woodland resource, contribute to the county's woodland biodiversity. Good practice conservation guidelines, as set out in the UK Forestry Standard, should therefore be included as part of all forestry operations. These include management of buffer zones around woodland streams, provision and management of open space and 'young growth' habitats, protection and management of ancient features and allowing a proportion of trees to grow to biological maturity to provide a deadwood resource.

Methods of production based on clear felling and replanting conflict with natural processes and are not the most beneficial for woodland biodiversity. Some species will use clear felled areas, the return of the Nightjar to Hertfordshire being a good example. However, 'close to nature' continuous cover forestry systems which work more closely with natural processes and maintain a more natural and constant wooded environment are generally more favourable from the biodiversity point of view and are more publicly acceptable.

Other advantages of such systems include, more stable deer populations, less threat from some forestry 'pest' species, less cost in obtaining the next generation of trees (if natural regeneration is good), less damage to watercourses than under clear felling and a regular supply of timber. There are some disadvantages too, however, further research into the development of these systems should ensure that these can be overcome.

Conifer plantations will continue to be managed by clear felling and planting, but even here there is scope for a more varied woodland. For example, Forest Enterprise (the managing arm of the Forestry Commission) have already begun restructuring their plantations to improve the diversity of age ranges. However, for broadleaved or mixed plantations, the development of continuous cover forestry systems should be promoted, where economically realistic. These are based around selection, group selection or irregular shelterwood systems. However, it may be that in Hertfordshire the scope for such systems is limited by forestry economics in the short term, though there is real potential in the beechwoods of the Chilterns and also in some oak and oak-hornbeam woodlands.

In the longer term it has been predicted that it could be possible for up to 50% of woodland to be managed under such systems. However, for such an uptake, there will need to be a change in the way that woodlands are viewed economically. At present much forestry is based around treating the woodland as a

'cash crop'. Continuous cover forestry implies viewing woodlands as a 'permanent investment' which provides a regular 'interest payment' in the form of timber.

4.4.5 New woodland creation

In order to reduce the threats to the future of specialist woodland species and ancient woodlands, the area of woodland and the size of individual woods needs to be increased dramatically. However, the location of new woodland will be as important as the quantity if significant benefits for biodiversity are to be achieved.

In the Government Rural White Paper, on the future of the English countryside, the government endorsed a target of doubling the area of woodland in England over the next 50 years. However at present, the incentives for woodland planting through the combined Woodland Grant/Farm Woodland Premium Scheme are insufficient to encourage extensive new planting in Hertfordshire. In future there will therefore need to be increased support for the establishment of new woodlands.

Any significant increase in woodland cover will only come about if there is also economic value to landowners. Most new woodlands will therefore have to produce good quality timber, though establishment of new woodlands to provide game cover will also be an attractive option to some landowners.

Other current initiatives aimed at increasing the area of woodland include the 12 Community Forests and National Forest established in England through the Countryside Commission. In south Hertfordshire, the Watling Chase Community Forest has been established as one of the twelve.

The key principles in any expansion of the local woodland resource is the need to build upon the existing resource, through expansion, linking and

Case study – Watling Chase Community Forest

The Community Forest covers an area of 72 square miles between Watford, St Albans, Hatfield, Potters Bar, Barnet and Harrow, of which about 45 square miles are in Hertfordshire. A Forest Plan has been prepared with wide consultation amongst local authorities and organisations, local landowners and the wider population. The Forest plan was adopted in 1995 and has a vision of increasing the area of woodland within the Forest area from 8% to 30%, by 2024.

The plan includes a series of policies covering all aspects of creating a community forest, including community involvement, landscape, agriculture, forestry, nature conservation and recreation and provides a blueprint for turning the vision into reality. The aim is to create a mixture of larger areas of 'forest', small woods, open spaces and well-managed hedgerows and parkland trees on the urban fringe. Other aims include promoting education and recreation, management of existing woodlands and investigating the possibility of re-establishing traditional markets for woodland products and employment. This is to be achieved through partnership action by co-ordinating the action of countryside organisations and public authorities working in the area and through targeting advice and grant aid to landowners. The Countryside Commission and the Forestry Authority view Community Forests as priority areas for receiving grant aid.

However, the voluntary approach adopted for achieving action in the Community Forest areas is also limited by the levels of grant available, which do not encourage landowners to commit themselves to long-term woodland creation. Woodland is often view by landowners as 'sterilisation' of agricultural land and the long-term commitment involved in tree planting does not fit into European agricultural policies which seem to change on an annual basis.

The Community Forest area is also important for the creation of new heathlands (Chapter 6) and new neutral grasslands (Chapter 7). There is therefore a need for a strategic approach to habitat creation and restoration, with key areas for each habitat type identified.

buffering. Establishment of new woodland adjacent to existing woodlands, particularly ancient woodlands, provides the greatest opportunities for colonisation by woodland species, particularly those which are slow colonisers and require a long continuity of woodland cover. The new woodland will also have the benefit of buffering ancient woodlands from surrounding land uses, such as the influence of roads, or agricultural chemicals. This will also lessen the 'edge effects' on the woodland and so enhance the habitat for species dependent on the darker and damper conditions of the woodland interior. The final principle concerns linking together fragmented woodlands to create a larger area of wooded habitat. **However, new woodland should not be created on sites with an existing nature conservation interest.**

Natural regeneration is the ideal method of establishing new woodlands, as it creates a more natural and varied woodland of greater value to wildlife. Expansion of ancient woodlands, in particular, should occur by natural regeneration. However, to achieve a substantial increase in woodland cover and particularly where timber production is an aim, many new woodlands will be planted. Again the principles of using locally derived planting stock and planting in mixes resembling the natural communities appropriate to the soils and geology, should be applied to achieve the greatest benefits for local woodland biodiversity. Some natural regeneration should also be included in planting schemes to help diversify the woodland. New woodland should therefore be broadleaved, rather than conifers, though the use of conifer nurse crops may help establishment and provide an interim financial return.

The recent launch of the 'Trees of Time and Place' initiative, which includes Community Forests, BTCV and ESSO among the partners, is promoting the principle of using locally derived planting stock. It is encouraging local residents to collect seed from approved local sources, plant them in small nurseries and grow them on to trees. There is also a need for professional nurseries to grow local planting stock.

While all ancient woodlands would benefit from expansion, there are existing important concentrations of woodlands which should be prioritised for the creation of new woodlands. These are south-east Hertfordshire between Hoddesdon, Hatfield and Potters Bar; the Chilterns dip slope, including the woodlands west of Watford and the woodlands west of Stevenage (see map 4.1).

Two additional priorities include the Watling Chase Community Forest area and to expand ancient woodlands accessible from the urban areas to lessen the recreational pressures that these suffer.

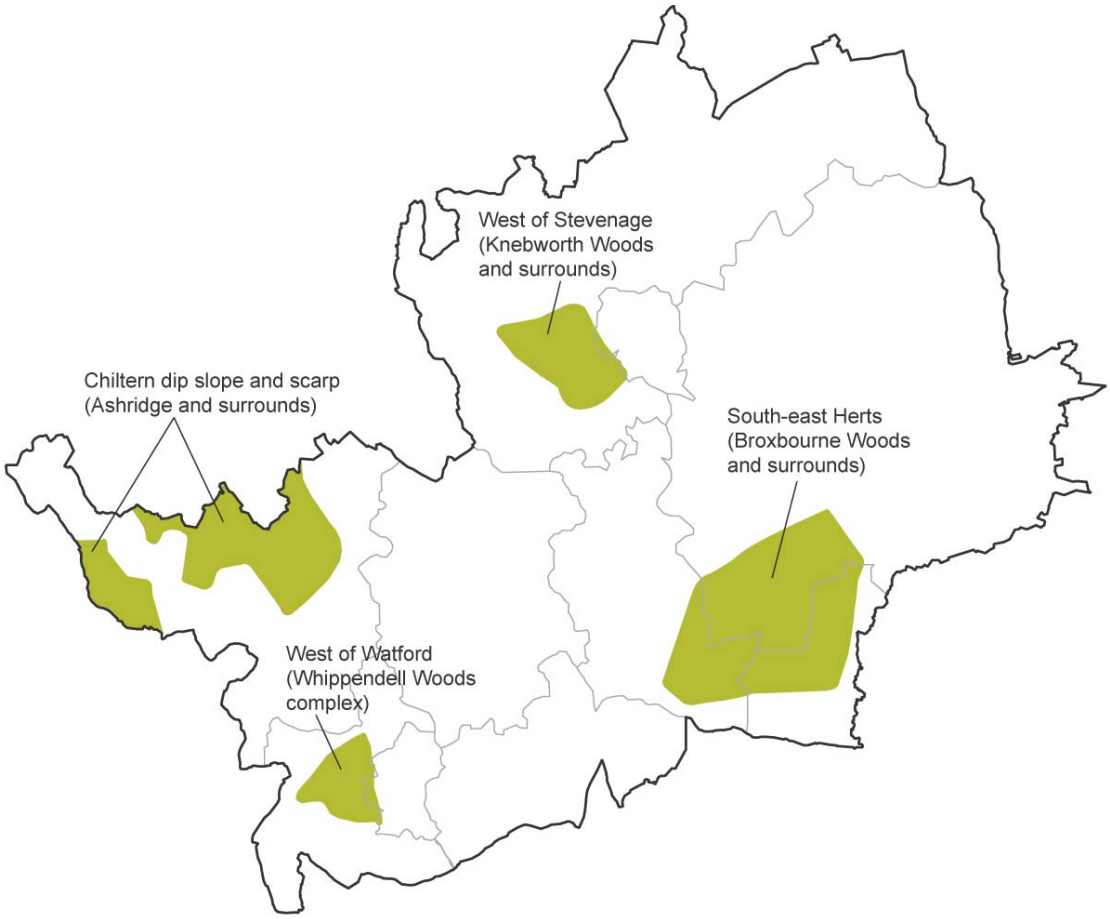
4.4.5.1 Planting proposals

Maps highlighting priority areas for woodland planting (and areas to be avoided) should be developed. These will identify the areas where the creation of new woodlands would be of most value and therefore where grants should be targeted. The guidelines for location of new woodland in the UK Forestry Standard must be adopted. These stress the need to **avoid planting on sites of existing nature conservation value**, as well as considering the landscape and archaeological implications.

4.4.6 Species issues

Deer – The deer populations present in the county need managing if the threat they pose to woodland biodiversity and timber interests, is to be countered. Further research is required into the levels and dynamics of the county's deer populations, in order to be able to develop effective management programmes, but some level of control is inevitable. Because of the wide-ranging nature of deer populations across both woodland and farmland habitats, effective management will of necessity require the co-operation of neighbouring landowners. **The establishment of Deer Management Groups covering all the major deer populations in the county should be promoted.** Exact methods of control chosen will depend on each case, however, a variety of options, including culling, habitat management to limit damage and fencing will be required. Further research into such methods is ongoing, but culling will be the major method. The deer culled should be used as a sustainable supply of venison.

Grey Squirrels – While further research on the ecological effects of Grey Squirrels is still required before widespread control is advocated, management of the existing populations will be essential in areas where new woodland is created. Again a co-operative approach to management will often be required on



Map 4.1 – Major ancient woodland complexes

adjoining landholdings. Research is ongoing into other effective control methods in addition to the currently used poisoned hoppers, which are not publicly acceptable.

Rabbits – Control of Rabbits is likely to be essential where new woodlands are being created by planting or natural regeneration. As with management of other species, a co-ordinated approach will often be required by landowners.

Tree species – A county-wide policy on the various species mentioned in section 4.3.3 and their presence within ancient woodlands needs to be produced. A policy of eradication is unlikely to be practicable or desirable for all species. However, the damaging effects of Rhododendron and Cherry Laurel dictates the adoption of an eradication programme from ancient woodlands. Norway Maple, Turkey Oak and some self-sown conifers are generally not well established in ancient woodlands at present and could therefore be successfully removed. None of these species should be planted in ancient woodlands.

Both Sycamore and Sweet Chestnut are, however, well established and are likely to naturally increase with potential climatic changes. They could therefore be considered to be naturalised species. A decision should be made on whether both species are to be fully accepted as naturalised species or whether, as at present, control to varying extents is undertaken on a site-by-site basis. In the meantime, the current pragmatic site-by-site approach to control should be continued. Neither species should be deliberately planted in ancient semi-natural woodlands, especially if they are not already present in the woods.

4.4.7 A strategic approach

4.4.7.1 County woodland strategy

Hertfordshire County Council produces a woodland strategy for the county, which is currently being revised (autumn 1996). This covers the general principles and policy guidelines for management of all aspects of the woodland resource, including nature conservation, timber production, recreation and access, woodland creation, landscape, archaeology and education and aims to promote sustainable multi-purpose forestry. The basis of the strategy should be the maintenance and enhancement of the woodland biodiversity resource of the county.

The strategy should include the targets set out in this habitat action plan. It should also identify the priority areas and woodlands for developing management zone plans, for establishing new woodland, for recreation and timber production.

The strategy should also promote specific initiatives aimed at improving the management of the county's woodlands, particularly marketing of local small woodlands and their products. The development of a local charcoal initiative is one such example.

4.4.7.2 Management zone plans

A combination of different management regimes, including minimal intervention and 'close to nature' timber production and coppicing, is likely to be required to ensure that individual or groups of woodlands can maintain their associated biodiversity.

Woodland management zone plans should be developed for woodland complexes over 100 ha. Such a strategic approach, will often result in different woodlands or parts of individual large woodlands being zoned, for one or more uses such as conservation, recreation or forestry. Zoning enables conflicts, such as between conservation features sensitive to disturbance or trampling and public access, to be separated. This ensures that management is co-ordinated to achieve multi-purpose forestry objectives and to maximise the opportunities for woodland biodiversity.

Ensuring the continuity of management from one generation to the next is also important. Woodland management typically occurs over a period longer than a human lifespan and the reasons for carrying out work can be forgotten. All management and the reasons for it should therefore be explicitly recorded.

The priority woodland complexes for adopting such an approach should be the major ancient semi-natural woodland complexes of Broxbourne Woods (already in preparation – see below) and surrounds, Ashridge and Tring woodlands, Knebworth Woods and surrounds and the Whippendell Woods complex.

Case study – Broxbourne Woods complex

The Countryside Management Service have recently written a management zone plan for seven of the woodlands in this complex, covering an area of 320 ha and four different owners. The woodlands range in size from 10 to 120 ha and include both ancient semi-natural woodland and ancient replanted woodland. They include the Wormley Wood – Hoddesdon Park Wood SSSI, NNR and proposed SAC.

The overall objective for this zone aims for mixed use sustainable forestry, with conservation, timber production and recreation being catered for. A large part (120 ha) of the proposed SAC is to be left as a minimum intervention zone. The other ancient semi-natural woods will be mainly managed on an irregular shelterwood (continuous cover) high forest system to produce quality timber, with small areas of coppice.

The areas of ancient replanted woodland with conifers are at various stages of growth. The plan aims to revert all of these plantations to broadleaved oak-hornbeam stands by the end of the current cropping cycle and to eventually achieve a 'normal' varied forest structure. The long-term aim is to manage all these new oak-hornbeam woods on an irregular shelterwood forestry system.

The plan also includes proposals for ride management, management of the important woodland streams and riparian zones through the complex, management of the ancient woodbanks, deer control, and provision for dead wood. Management of the rides will be linked to public access.

An additional proposal is to set up a Forestry Authority approved local seed stand which will produce seeds with the local genetic makeup for use in regeneration of the woodlands, where natural regeneration is insufficient.

Finally, by considering the individual woods as one zone, economies of scale can be made when selling timber and maintenance contracts.

4.5 A vision for woodlands

In 50 years time, the area of woodland in Hertfordshire will have been increased from the existing 15000 ha (9% of the county area) to approximately 20000 ha (12% of the county). Woodland expansion will occur in all areas of the county, but will particularly be concentrated in the following areas:

- South-east Hertfordshire
- Chilterns dip slope
- Woodlands west of Stevenage
- Watling Chase Community Forest (where 30% woodland cover will be achieved)
- Adjacent to existing ancient semi-natural woodlands, particularly where accessible from urban areas.

The overall woodland resource will be managed for a variety of objectives, including conservation, recreation and timber production, with multi-purpose woodland management standard practice. Zoning strategies will ensure that management of the woodland resource achieves the maximum benefit for each major objective. Management zone plans will have been drawn up for all woodland complexes greater than 100 ha in size.

All 3280 ha of ancient semi-natural woodland will be managed sympathetically, with conservation being a primary objective. Key areas containing large blocks of ancient semi-natural woodland will be managed as limited intervention woodland, with natural processes being encouraged. A reasonable balance would be 10% of the ancient woodland area managed as limited intervention, 25% as coppice and 65% as high forest, depending on timber markets.

All 2100 ha of replanted woodland on ancient sites will have been or be in the process of being restored to locally native broadleaved woodland.

All relic wood pasture sites and parklands will be sensitively managed, to ensure a continuity of veteran and pollarded trees and all veteran trees in the county will be protected and managed sensitively.

Important old species-rich and early successional secondary woodlands will be managed with conservation given priority over other management objectives. Key examples will be allowed to develop naturally.

Sustainable forestry as set out in the UK Forestry Standard will be practised in all woodlands. Commercial forestry production will have begun to move towards 'close to nature' ('continuous cover') management systems largely based around locally native tree species. Plantation forestry will, however, continue to account for a significant proportion of timber production.

Coppicing will be restored to ancient woodlands last coppiced after 1945, where this will have biodiversity benefits. In addition, the coppice products will be supplemented by the establishment of new coppice woodlands in traditionally coppiced areas, specifically to produce wood to supply 'environmentally sensitive' local charcoal, firewood and to ensure a sustainable market.

Key woodland species, such as deer and squirrels, will be managed on sustainable principles recognising their important ecological role and ensuring that they do not cause unacceptable damage to woodland biodiversity.

Woodlands, both ancient and more recent, will continue to provide a valued recreational for the local population. Access will be increased, but well managed, to meet the needs of many different users by providing a wide spectrum of opportunities from informal to more formal activities and to protect sensitive areas.

Educational objectives will be included in the management of all publicly owned woodlands. Visitors will be informed about the reasons for different woodland management regimes and the wildlife, landscape, cultural, historical and economic value of woodlands.

An expanded woodland resource will be highly valued as a wildlife, recreational, educational and timber resource. The necessary economic conditions

to establish and manage this multi-purpose resource will be in place, thereby ensuring the future for woodlands and woodland biodiversity in Hertfordshire.

4.6 Ten year targets

To protect and prevent any further loss or damage to ancient woodlands.

To have 50% of the woodland area and 75% of the ancient woodland area managed sensitively in line with the UK Forestry Standard by 2010.

To have undertaken a feasibility study on the creation of large limited intervention woodlands within the county.

To have begun the restoration of at least 500 ha of ancient replanted woodland to the appropriate local woodland type.

To have begun the establishment of 1200 ha of new woodland.

To ensure all parkland and former wood pasture sites containing veteran trees are under sympathetic management regimes.

4.7 Woodland Action Plan

Objectives, actions and targets

Lowland mixed deciduous woodland

Objective 1: To prevent loss and damage to all ancient and native woodland

Target: Develop identification and monitoring system for ancient woodland by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
W/A/1.1	Identify programme of LDF reviews and contribute	2005	Annual Report	WSO	HBRC, HMWT, LA's, EN
W/A/1.2	Ensure policies protecting ancient and native woodlands are incorporated into local plans	2005	Annual Report	WSO	LA's, HMWT, HBRC
W/A/1.3	Seek to protect ancient and native woodlands through the development control process and monitor	2005	Annual Report	WSO	HMWT, HBRC, EN, LA's
W/A/1.4	Identify five suitable woodlands for LNR designation	2005	2006	HMWT	EN, LA's
W/A/1.5	Designate one LNR per year	2007	Annual Report	HMWT	EN, LA's
W/A/1.6	Monitor felling licence approvals	2005	2007	HMWT	FC, HBRC, LA's

W/A/1.7	Record and monitor the condition of 10 ancient woodland and native woodland Wildlife Sites annually	2005	Annual Report	WSO	All
W/A/1.8	Monitor national developments in respect to damage by deer	2005	Annual Report	DI	All

Objective 2: To ensure that all existing ancient woodland are maintained and enhanced through appropriate management

Targets: a) Management plans are in place by 2010
b) All woodland SSSIs are in favourable condition or unfavourable recovering condition

Action code	Action	Target start date	Target end date	Lead partner	Other partners
W/A/2.1	Produce an accurate map of all ancient woodlands in Hertfordshire on GIS including ecological site classification		Achieved	HBRC	EN, FC
W/A/2.2	Audit all ancient woodland owned or managed by public bodies, local authorities and nature conservation organisations, to assess whether they have appropriate management plans in place and implemented	2005	2007	WSO	All
W/A/2.3	Identify all ancient woodland wildlife site owners/managers	2005	Annual progress Report	WSO	WT, CMS, NT, HMWT, FWAG
W/A/2.4	Provide management advice and opportunities for grant funding to all ancient woodland wildlife site owners/managers	2005	Annual progress Report	WSO	WT, CMS, NT, HMWT, FWAG, CCB
W/A/2.5	Provide advice to owners/mangers with an aim to developing a coordinated management programme to reduce damage by deer, following national guidance	2005	2008	DI	All
W/A/2.6	Bring into favourable condition 95% of all woodland SSSIs	2005	2010	EN	Landowners

Objective 3: To restore ancient replanted woods to semi-natural conditions

Target: Areas targeted for restoration to have restoration plans in place by 2020

Action code	Action	Target start date	Target end date	Lead partner	Other partners
W/A/3.1	Identify areas targeted for restoration (i.e. those areas which will respond best and where owners are in favour)	2005	2008	FC	All partners and woodland owners
W/A/3.2	Provide management advice on restoration and the availability of grants to all owners/managers of the targeted areas.	2008	2010	FC	CCB, CMS, HMWT, WT
W/A/3.3	Devise and implement system to record the extent of restoration (generic action G23)	2005	2008	FC	All
W/A/3.4	Report annually on restoration work carried out	2008	Annual progress report	FC	CMS, HMWT, WT

Lowland wood pasture and parkland

Objective 4: Protect and maintain through appropriate management the current extent and distribution of wood-pasture, parkland and veteran trees

Target: All identified parkland wood pasture and veteran trees sites to be sensitively managed by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
W/A/4.1	Ensure the recognition and protection of sites and veteran trees through local plans	2005	2010	HBRC	All
W/A/4.2	Seek to protect veteran trees through the development control process	2000	Annual progress Report	HBRC	EN, HMWT, LA's
W/A/4.3	Maintain veteran tree database and distribution on GIS and promote its use	2004	Annual progress Report	HBRC	All
W/A/4.4	Disseminate a veteran tree management leaflet to landowners and managers of all veteran trees (on database) to encourage sensitive management and provision of new veteran trees for the future	2005	2010	WSO	All
W/A/4.5	Identify and map the current extent of wood pasture and parkland in the County	2005	2006	HBRC	All

W/A/4.6	Identify key wood pasture and parkland sites	2006	2007	HBRC	All
W/A/4.7	Provide management advice on the development of long-term management plans on key sites and re-establish suitable grazing where appropriate	2007	Annual progress Report	CMS	All

Objective 5: Raise awareness of woodlands and biodiversity to key target audiences such as landowners, land managers and the general public

Target: Hold one publicity event/guided walk and a training workshop annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
W/A/5.1	Organise a minimum of one public event on NNR Broxbourne Woods annually	2005	Annual Report	CMS	All
W/A/5.2	Organise a minimum of two guided walks in a woodland in Hertfordshire annually	2005	Annual Report	HMWT	CCB, CMS, WT, NT
W/A/5.3	Organise one woodland conservation workshop for land managers every two years	2005	Annual Report	HMWT	CCB, CMS, FC
W/A/5.4	Achieve at least two articles on woodlands in Hertfordshire media annually	2005	Annual Report	HMWT	All
W/A/5.5	Produce leaflet and disseminate/website showing publicly accessible woodland in Hertfordshire	2005	2010	HCC	All
W/A/5.6	Undertake a feasibility study of having Forest Schools in Hertfordshire	2005	Annual Report	HMWT	All
W/A/5.7	Create a woodland discovery trail at Pryors Wood Nature Reserve	2007	2009	HMWT	LA's

Relevant Action Plans

Hertfordshire Plans

Common Dormouse; Natterer's Bat; Stag Beetle; Purple Emperor; Tree Sparrow; Grizzled Skipper

National Plans

Lowland beech and yew woodland; lowland wood-pasture and parkland; lowland mixed deciduous woodland

Abbreviations (Partners)

CCB – Chilterns Conservation Board
CMS – Countryside Management Service
DI – Deer Initiative
EN – English Nature
FC – Forestry Commission
FWAG – Farming and Wildlife Advisory Group
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
HWF – Herts Woodland Forum
LA's – Local Authorities
NT – National Trust
WSO – Wildlife Sites Officer
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)
WT – Woodland Trust

Contact:
The Lead for this plan is the Herts Woodland Forum
Joan Dixon
Email: joan@greatgroves.co.uk

5 Wetlands habitat action plan

5.1 Wetland habitats

5.1.1 Summary

The term 'wetland' covers a diverse range of habitats. Within Hertfordshire alone this includes rivers, streams, springs, water-cress beds, ponds, lakes, reservoirs, sewage works, marshes, fens, swamps, wet grassland and carr woodland. These wetlands are hugely important for both wildlife and people. Many of the wetlands of Hertfordshire, especially open waters, have been created by human activity. In fact, all wetlands within the county have been influenced by human activities to some degree. In many cases this is due to the range of benefits they have provided. Over the centuries wetlands have supplied food, drinking water, power, transport and leisure opportunities as well as their natural purifying and flow regulating functions.

All wetlands are characterised by the presence of water; static or flowing. Differences are based on the degree of wetness, flow rates, the underlying geology, water chemistry and historical management. This first section describes the main forms of wetland habitat. However, it should be recognised that there are considerable overlaps as one habitat grades into another. For example, a floodplain wetland may include river, open water, marginal swamp, fen and carr, all in close proximity. A floodplain grassland may simply be described as wet grassland or it may merge into fen or neutral grassland habitats. The close association of these habitat types will be evident within this plan.

5.1.2 Wetland ecology

Rivers, streams and springs

Rivers and the corridors of land through which they flow are a major wildlife resource of critical importance to wetland habitats. Most of the county's wetlands lie within these river corridors. Rivers are not only important for the wildlife they directly support within the channel but also for the influence they exert, from spring source to floodplain, on the plants and animals of adjacent habitats. Unconstrained rivers spill onto floodplains and inundate habitats on a regular basis, allowing the development of wet grassland, marsh, swamp, fen and carr woodland. These natural functions of river systems bring huge benefits to human society.

However, few rivers have not been physically altered by human activities. Engineering works with the aim of reducing problem flooding or improving land drainage can also have serious adverse environmental effects, leading to degradation both of the main channel and adjacent habitats. Such works tend to hydrologically isolate the river from its floodplain habitats. Rivers relatively unaffected by these activities are a particularly valuable wildlife resource.

The key characteristic of river and stream habitats is that they have flowing water, transferring minerals and nutrients from the source to the depositional site. River habitats can be remarkably diverse and include such wide-ranging features as springs, seepages, brooks, bournes, meanders and ox-bows. When relatively unmanaged they are dynamic systems and have a diverse and continually changing physical structure with pools, riffles, eroding banks, secondary channels, backwaters and fringing marsh. River channels in their natural condition vary widely in form from straight to meandering and braided (multi-channel). Several factors control the physical processes within rivers and hence their structure. These include volume of water, flow rate, amount and type of sediment and the bedrock. Channel size and form is determined partly by flood peak flows, which affect erosion and channel-shaping sediment transport. Rivers have been described as belonging to one of three zones in terms of these processes. The upper or *source* area is the main sediment production zone, characterised by valley slopes impinging directly on to the river channel. In the middle or *transfer* zone the river redistributes

sediment from upstream. Here the river typically has a wide floodplain. Estuaries form the lower or *depositional* zone. The range of substrates found within the upper two zones, together with the hydrology and water chemistry, determine the habitat characteristics of the river.

The mosaic of features found in rivers and streams supports a diverse range of plants and animals. In-channel riffles are spawning areas for fish while gravel bars are important for specialised invertebrates such as some beetles and spiders. Eroding banks provide nesting sites for birds such as Kingfishers. Backwaters are important for fish, birds, invertebrates and amphibians as well as plants. Rivers and streams often provide a wildlife corridor link between fragmented habitats in an intensively farmed landscape.

Rivers may also be classified on the basis of their plant communities. In Hertfordshire all are typically lowland rivers with low altitudinal sources, low gradients and fine/rich substrate. These lowland rivers are subdivided, with both chalk and clay river types being present in Hertfordshire.

Chalk rivers have a characteristic plant community, often dominated in mid-channel by Water-crowfoot and Water Starwort. They have low banks which support a range of water-loving plants. All chalk rivers are fed from groundwater aquifers, producing clear waters and a generally stable flow and temperature regime. Most have 'winterbourne' stretches in their headwaters. These often run dry in late summer because of a lack of rainfall recharge to the aquifer, in some cases exacerbated by over-abstraction. There are approximately 35 chalk rivers in the UK, ranging from 20 to 90 km in length. The majority of the European resource of chalk rivers is found in southern England (Biodiversity: the UK Steering Group Report).

Clay rivers are more prone to fluctuating water levels and typically have deep silty sediments. Characteristic plants include Arrowhead and Yellow Water-lily.

Open water

Open waters include all freshwater systems comprising standing water or waters lacking any dominant flow. The immediate associated wetland habitat is also included and there is much cross-reference to the sections on swamp, marsh and fen, wet grassland and carr woodland.

The range of open water habitats in the UK includes lakes, ponds and ephemeral pools with a wide range of both natural and human origin, as well as gravel pits, reservoirs, sewage treatment lagoons and floodplain wetlands such as backwaters and temporary flood pools. Natural open waters are relatively common in the uplands but scarce in lowland England, where the majority of such habitats are of human origin.

The wide range of open waters makes a significant contribution to national biodiversity and reflects their various origins, functions and management. Open waters can be remarkably rich in plant and animal life. However, many sites fail to reach their natural potential due to such factors as pollution, lack of water and poor management. Some open waters are important for human use, for example, water supply, power generation and recreational activities such as angling and sailing. Those open waters that fulfil their biodiversity potential may well perform such functions better and more economically than habitats which have been degraded.

Certain open water habitats have suffered large losses or reductions in biodiversity. Floodplain wetlands have particularly suffered due to the impoundment of rivers, severing their hydrological links with the floodplain – vital to the open waters dependant on such a water supply. Smaller open waters have also suffered; between 1880 and 1993 the number of ponds in Britain declined by 75% from an estimated 1.3 million to 375,000. By contrast, some open waters of a different kind have been created, notably reservoirs, gravel pits and garden ponds. Although this will not compensate for the losses, if managed sympathetically such waters can make a significant contribution to biodiversity.

Fen, marsh and swamp

Fens, marshes and swamps consist of a range of similar habitats, all largely transitional between open water and dry land. Fens develop where water-logged conditions with a low oxygen concentration persist throughout the year, promoting the accumulation of organic matter and the formation of peat. Water level

management, to ensure occasional flooding, and water quality are important in determining their conservation value. Fens tend to be base-rich and have moderate to high levels of nutrients. They are particularly characteristic of areas with chalk or chalky boulder clay.

Swamp is characterised by the water table at or above ground level for most of the year and has a relatively poor floral diversity often dominated by a single species of tall fen vegetation, such as Common Reed, sedges or Greater Reedmace. Swamps characteristically have wet peaty sub-soils, composed of decaying plant remains.

Marshes form on a mineral substrate where water levels are at, or close, to the soil surface in summer and rise above ground level in winter. The term 'fen' is frequently used generically to cover all these related habitats.

All fens inevitably change as the decaying remains of the vegetation build up and the land dries, allowing a more terrestrial community to develop. They are usually maintained at this successional stage by grazing or cutting and in the past were important in the agricultural scene.

Swamps, marshes and fens are widely distributed throughout the UK but the majority of sites are small. An estimate of the total area of all fens is not currently available. However, reedswamp dominated by Common Reed is a scarce habitat in the UK. A recent survey estimated the national total to be around 5,000 hectares. It is estimated that between 1979 and 1993 reedswamp in the UK has declined by 5-10%.

The National Vegetation Classification (NVC) recognises a large number of associated swamp, marsh and fen communities. In Hertfordshire at least 15 different community types are likely to be represented (see Appendix 3).

Wet grassland

Wet grasslands are to be found where groundwater levels are close to, but not permanently at, the surface and where the grassland is affected by seasonal flooding. They form the typically flat permanent grasslands and fen meadows of river valley floodplains, often with a network of water filled ditches containing standing water. Such sites are typically flooded during winter and spring but can dry out considerably during the summer. Wet grasslands have been created by people as part of a traditional livestock farming system, with grazing by cattle creating and maintaining a habitat rich in plants and invertebrates. Wet grasslands provide breeding habitat for wading birds such as Snipe and Redshank while winter floods can attract huge numbers of wildfowl.

The flora will depend on the exact degree of wetness and the management history. Such grasslands will often be comprised of mosaics of several neutral grassland communities grading to swamp communities on sites with higher all year water levels. The richer sites include some of our finest traditional hay meadows. With this range of possible plant communities there is considerable overlap between wet grasslands and other habitats. Thus the botanically rich habitats are described under the neutral grasslands action plan (see Chapter 7), those botanically poorer grasslands most associated with flood inundation are dealt with in this action plan.

The extent of wet grasslands in the UK is unknown although damp pastures dominated by Yorkshire Fog Grass, rushes and Tufted Hair Grass are widespread. Only around 2000 hectares of the more unusual Creeping Bent Grass and Marsh Foxtail dominated pasture are thought to exist. Although some wet grasslands are widespread, few areas are managed optimally and in general there has been substantial decline in the associated plants and animals.

Carr woodland

If natural succession in swamp, marshes or fens is allowed to continue, colonisation by shrubs and trees will occur to form a variety of woodland types. Where the key environmental factor remains the over-riding wetness of the ground they are dominated by Alder or willow trees and as a group they are often termed 'carr' woodlands. The floristic composition is determined by the degree of wetness, the nutrient status, the base-richness of the soils and past management. They often develop from swamp, fen, or marsh, but in time, such woodlands will themselves inevitably succeed to drier communities.

There is no estimate of the extent of carr woodland nationally although they are scattered or locally distributed with the best examples of species-rich communities found in East Anglia. Seven types of carr woodland are recognised nationally, four are present in Hertfordshire.

Scope of this Action Plan

With reference to *Biodiversity: The UK Steering Group Report*, this action plan covers five of the listed broad habitat types, namely: Rivers and Streams; Canals; Standing Open Water; Grazing Marsh; and Fens, Carr, Marsh, Swamp and Reedbed. The priorities for habitat conservation in Hertfordshire are evaluated in an earlier section of this document and are reflected within the Vision and Targets section of this plan.

5.2 History of Hertfordshire's wetlands

There can be little doubt that Hertfordshire is now drier than it has ever been. The lower stretches of most rivers, notably the Lee and Colne, would have supported extensive wetlands in the past. Areas of wild marshland, natural swamp and riverine forest were slowly reclaimed to damp floodplain pasture, hay and fen meadows, mainly by felling and grazing, but also by mowing, drainage, sedge cutting and other activities. Even until the last century most of the river valleys remained as seasonal grazing marshes (frequently flooding in winter), hay meadows, or wet woodland. The richness of these areas in plant and animal life can only be imagined.

Archaeological evidence shows that river valleys have been extensively used by humans. Widespread settlement along river valleys is known to have occurred back into prehistory. Early peoples obtained water and food from the river and used it as a route for communication and transport. Early attempts to control rivers are shown by millstreams, fishponds and initial attempts at canalisation. All the county's small rivers and streams had flourishing mills by the Middle Ages. Larger rivers such as the Lee provided a trade route into London. The importance of this trade route was such that the Lee Navigation Act was passed in 1739 and subsequently the canalisation of the lower Lea changed its character forever.

Watercress beds were established along many of the chalk streams, particularly on spring sources. Many were within a day's cart travel of London. The flooding of the river valleys was a desirable feature for many years, with winter flooding bringing fertilising silt to valley grasslands. These hay meadows were highly valued, providing winter feed for animals. It was only after the design of improved grass strains and artificial feeds that the system lost its economic value and a large decline in hay meadow habitat occurred as they were ploughed, re-seeded or lost to the developing aggregate industry. In some valleys, notably the Lee, Colne and Gade, this winter flooding was part of a carefully managed water meadow system. Some plants are characteristic of such systems.

Hertfordshire's rivers have undergone many changes over the years, the majority of which are seen as detrimental to their ecology, These changes still continue today. Past river 'improvements' for agricultural drainage and urban flood alleviation have led to a massive destruction of wetland habitats. Increased run-off of nutrients and silt can also occur when fields are ploughed to the river edge, and many rivers have been physically altered by straightening, deepening, widening or diverting. Long sections of the major rivers have been impounded for navigation. This includes the Lee and Stort navigations. In addition the Grand Union Canal passes down the west side of the county following the valleys of the Bulbourne, Gade and Colne from Tring to Rickmansworth. More recently, low flows in rivers during the summer months, widely suspected to be due to over-abstraction of water (and proved in some cases) has had serious effects. All these works have acted to severely reduce habitat diversity and more importantly to isolate rivers from their floodplains and associated wetlands.

The formerly extensive Boulder Clay marshes and fen meadows, rich in wild flowers and reminiscent of East Anglian Fens, are now restricted to a few sites, all

struggling to maintain their integrity. Improved drainage, over-abstraction of water, urban development and, most significantly, conversion to arable farmland have all reduced these wetland areas. The effect of all these has been a lowered ground water table over the last 100 years or so. It has resulted in a massive loss of wetlands, especially in central and southern Hertfordshire.

Carr woodland would have been managed in the past for its renewable resources of willow for baskets, alder for charcoal, water resistant poles and bark for tanning leather. Many were managed, often intensively, as osier or withy beds with carefully controlled water levels. The associated crafts such as basket making flourished in several areas. Today the equivalent is the cricket bat willow plantation, sadly often being the reason for the retention of the last remnants of more extensive wetlands but at the same time steadily drying it out.

Thus extensive wetlands are now a thing of the past. A study in the parish of Ashwell records wetland habitats as suffering more than any other, with no less than 41% of the wetland plants recorded in the parish now extinct. In this small part of Hertfordshire wetlands are now reduced to a few ponds and springs, some ditches and badly degraded streams (T James 1992).

Large areas of natural open water by and large vanished many years ago, lingering on in the form of seasonal flooding in river valleys. Ponds, long part of the agricultural scene, began a steady decline to less than 50% of the former total due to changes in agricultural practice. Early in the 20th century open water in Hertfordshire must have been at its lowest ebb.

All this paints a rather depressing picture but there are glimmers of hope. During the latter half of the 20th century there has been a steady increase in water-filled gravel pits and such pits are now a common feature of our larger river valleys. These pits have brought many wildlife benefits, largely by chance. The early stages of gravel winning with open habitats, muddy edges and gravel islands allowed many plants and animals of disturbed ground conditions to flourish. Such species may well have formerly been much more widespread when river systems were far more unpredictable. Birds such as Little Ringed Plover and Sand Martin may be the more obvious beneficiaries but a whole range of specialised invertebrates and plants have also benefited. The expansion of mineral workings has allowed an increase in marsh and swamp habitats in certain areas. Reedswamp is probably at its greatest extent for several centuries. Such sites also provide opportunities for leisure and recreation. Here then is a great opportunity to redress some of the balance and create new wetlands for both wildlife and people. However, with most major sites already worked for gravel and restored, any such opportunities will need to be grasped soon.

5.3 Wetlands – current status, trends and threats

5.3.1 Current status

Rivers and streams

The major river systems in Hertfordshire originate as chalk streams emerging along the foot of the dip slope of the Chilterns and flow south to feed into the lowland clay river systems of the Colne and Lee. To the north of the Chilterns a few small rivers drain into the Ouse system. A total of 1258 km of watercourse are marked on the latest ordnance survey map. However, the Hertfordshire Habitat Survey 1994-97 found that only 730 km had held water in the recent past.

Quantitative data on Hertfordshire's rivers are fragmentary, with the 1978 Nature Conservancy Council survey providing some information. Of the 240 kilometres of main river only about 20 are of good habitat quality. In addition, at least 70% of the total length of watercourse in the county was considered to be heavily degraded.

Chalk rivers are listed as a key habitat within ‘Biodiversity: The UK Steering Group Report’ and also support species, such as White-clawed Crayfish, which are listed on Annex II of the EC Habitats Directive. Few of Hertfordshire's rivers now retain their chalk stream characteristics. The combined effects of over-

abstraction, road and agricultural run-off and sewage effluent discharge has resulted in most rivers now suffering from low flows and over-enrichment from nutrients and pollution. A few stretches of relatively unpolluted chalk river do exist and are of high conservation importance. The characteristic species of our chalk rivers include the Stream Water Crowfoot and Water Starwort. The severely threatened White-clawed Crayfish hangs on in a few locations. Better areas are as follows:

The Mimram is one of the most natural rivers in the county, being least affected by abstraction and discharges. It is fed by chalk springs and flows mostly through agricultural land. Its middle and lower reaches (7 km) flow through several important wetland habitat complexes such as at Digswell, Tewinbury, Archers Green, Panshanger and Hertingfordbury. Another stretch between Kimpton Mill and Fulling Mill is also valuable (4 km).

The Chess has considerable wildlife value throughout its length (8 km), with clean water supporting an abundance of aquatic vegetation. Several good damp meadows, such as at Frogmore and Sarratt Bottom, can be found along the river.

The small chalk rivers flowing north through Hitchin are in general much degraded due to over-abstraction and urban development but the few remaining associated wetlands are of great importance. **The Purwell** perhaps remains least affected and has particularly valuable river corridor habitats through Hitchin (2 km). **The Oughton** still retains a characteristic flora where it flows through Oughtonhead Common (1 km).

In addition sections of the rivers **Ver** and **Gade**, although degraded to some extent, still have important wetland habitats within the river corridor.

Of the more typical stretches of lowland clay rivers few of Hertfordshire's rivers now show anything like natural features. The better reaches are as follows.

The water chemistry of the **River Lee** is heavily influenced by discharge of treated sewage effluent from Luton and Rye Meads. However, some stretches retain reasonable structure and associated flora, these are at Wheathampstead-Water End (3 km), Lemsford-Stanborough (3 km), Water Hall-Hertford (3 km) and Ware-Stanstead Abbots (2 km).

The Beane retains valuable features only in its lower reaches between Waterford and Hertford (4 km).

The Stort The canalised main river is now severely degraded but the backwaters retain much of value, with the Pishiobury loop of special significance. However, the river corridor remains a key wetland complex with many important individual sites, notably Hunsdon Mead, Sawbridgeworth Marsh, Thorley Flood Pound and Tednambury Marsh. These wetlands depend on water supply from the Stort and thus the entire stretch of river between Bishops Stortford and the confluence with the Lee (15 km) is important.

On most rivers artificial features such as weirs, millstreams and millraces have been constructed in the past. These are in general damaging to the river's natural character, alter the gradient of the river and may prevent movement of species. However, to a limited extent they may also add diversity to the river in a county which tends to lack similar natural features. Most Grey Wagtails in Hertfordshire nest on or by such features and ferns are also well represented in such situations.

Seasonal streams and swallow-holes

Seasonal streams and clay-based brooks are a feature of south-eastern Hertfordshire in particular. These small watercourses generally exhibit diverse channel structure with pools, riffles, banks and meanders. They are normally dry in summer but are frequently in spates during winter and spring. The best examples flow through the Broxbourne and Northaw woods complexes. Others are to be found scattered throughout the county, for example The Old Bourne near Ardeley. A particular feature of note is the development of swallow-holes, caused by water percolating through gravels to reach the chalk beneath. Notable examples (both SSSI's) exist at **Northaw Great Wood** and **South Mimms**, the waters of the latter reputedly rising at Chadwell Springs near Ware.

Springs

Springs in Hertfordshire derive from two basic origins. Chalk springs have a high pH, low suspended solids, low nutrient status and a stable low temperature. Such springs frequently form the beginnings of chalk streams. Some have multiple sources, forming a mosaic of stream and fen habitats. The best examples occur at Purwell Ninesprings, Oughtonhead and Tewinbury. Some chalk springs provide habitat for specialised coldwater invertebrates:

Ashwell Springs and Ashwell Quarry Springs These sites are important for flatworms, caddis-flies and stoneflies typical of cold waters and generally scarce in southern England.

Flush-line springs arise from the junction of impervious clay and overlying permeable substrates. They are most frequent in the east and south of the county in association with Boulder Clay or London Clay. Such springs often support a rich fen flora. Unfortunately few examples with the associated habitats remain intact. Those that do are of great importance. The best examples are at **Patmore Heath**, **Blagrove Common, Ridlin's Mire, Sandon Moor, Biggin Moor and Moorhall Meadows.**

Three sites show tufaceous deposits at the spring source, such sites are important for their moss community and can support an unusual floral community. Tufa springs are listed as a priority habitat in the EC Habitats Directive.

Hebing End Tufa Spring Ash woodland over calcareous tufa spring with Tussock Sedge and Opposite-leaved Golden-saxifrage.

Foulwells Calcareous spring with some tufa formation in grazed marshy grassland supporting scarce sedges and spike-rushes.

Trenchern Hills Spring sources within woodland.

Watercress beds

Watercress beds are a result of human activities and were frequently excavated in the area of chalk spring sources. Formerly quite extensive, active beds now survive only at Sarratt Bottom, Kimpton and Whitwell. Former watercress beds now managed to retain and enhance their characteristic wildlife importance are as follows. Both examples demonstrate community involvement in their management.

Lemsford Springs Long-established nature reserve with spring-fed lagoon management and a rich diversity of wetland species. Notable for wetland birds, especially important for Green Sandpipers.

Cassiobury Park Two sites, both under conservation management. An older area now succeeding to wet woodland and a more recently worked area of open lagoons.

Open water

In Hertfordshire it is estimated that there are currently 623 hectares of open water greater than 0.3 hectares in extent. All large areas are man-made. The range of open water habitats in Hertfordshire includes lakes, ponds, mill pools, gravel pits, reservoirs, sewage treatment lagoons and floodplain wetlands such as backwaters and temporary flood pools.

Ornamental lakes

The oldest man-made waters in the County are those associated with landscaped country estates, large old houses or agriculture. Broadwaters, where rivers flowing through estates have been widened to form a large water feature are frequent. These broadwaters resemble lakes more than rivers in their ecology. Examples occur at **Brocket Park**, **Woodhall Park**, **Panshanger Park** and **Hatfield Park**. Most are very poor ecologically, being heavily silted as a result of the slowing of the river flow and the margins frequently over-managed for sporting or other recreational purposes. Ornamental lakes are also scattered across the county but are particularly frequent in southern Hertfordshire. Good examples are found at **Bonningtons** and **St Paul's Waldenbury**. A number of ornamental lakes have been unmanaged for many years and are now heavily silted and/or over-shaded. They are in danger of being lost as they dry out.

Reservoirs

Although few in number, the eight water storage reservoirs in the county form a major percentage of the area total.

Tring Reservoirs (80 ha) A complex of four reservoirs built in the early 19th century to supply the Grand Union Canal. The reservoirs are designated as a SSSI on account of the breeding and migrant waterbirds, such as Grey Heron and Shoveler, aquatic flora and invertebrates. A wetland complex of open water with associated swamp, fen and carr habitats of great importance. The reservoirs are used for angling and shooting and attract high numbers of visitors.

Hilfield Park Reservoir (45 ha) Constructed in the early 1950s, Hilfield is fed with water from the chalk aquifer and thus supports abundant aquatic weed, including Stoneworts. A key site for migrant waterbirds with significant numbers of wintering and moulting duck such as Pochard and Gadwall. Designated a Local Nature Reserve, Hilfield is notable in that it remains undisturbed although pressure to permit leisure activities is mounting.

Aldenham Reservoir A redundant water supply reservoir now extensively silted and used for leisure activities, resulting in a very much degraded, although still important, nature conservation importance. It supports a rich aquatic flora and adjacent wet willow woodland.

Cheshunt Reservoirs Two small reservoirs, also now redundant, were built in association with the New River. Support wildlife of only minor importance.

There are also numerous farm reservoirs, many are poor in ecology but have potential for improvement.

Gravel pits

By far the largest number of open waters are the many water-filled gravel pits along the Colne and Lee Valleys. These extensive areas of gravel workings now support many of our larger wetland complexes. These areas consist of a matrix of open water, remnants of old marsh, fen and carr with new areas developing alongside.

Lee Valley

Cheshunt GP A complex of eight pits excavated between 1930 and 1970 now supporting a rich mosaic of open water, swamp and carr habitats. The open water is notable for aquatic weeds and waterbirds.

Amwell GP A 20 year old pit now managed as a nature reserve. Attracts significant wintering and breeding waterbird populations and is important for amphibians and Grass Snakes with huge numbers of Toads.

Other pits in the Lee Valley include **Broxbourne GP**, **Stanstead Abbots GP** and **Ware GP**.

Colne Valley

Stocker's Lake Nature Reserve An older lake dating back to the 1930s with many wooded islands and sub-surface gravel bars. A key wetland refuge for waterbirds in the lower Colne valley.

Tyttenhanger GP This complex of lakes is still currently being excavated but the open muddy margins attract many breeding waders.

Old Parkbury An old pit complex now largely infilled and suffering from drought and lack of management. However the small remaining lakes, willow carr and old meadow complex are of high value for invertebrates.

Other sites with some wildlife value include **Troy Mill GP, West Hyde GP, Pynesfield Lakes** and **Broad Colney Lakes**.

Other extraction lakes not in these valleys include the Cornwood Sanctuary at Westland Green, lakes at Bourne End in the Gade Valley, Pitstone Quarry and Kings Langley lake. Some of these sites are important because of highly calcareous waters.

Ponds

There is a distinct correlation between the distribution of ponds in Hertfordshire and the underlying geology. Not unexpectedly the greatest concentration of ponds occur on the impermeable Boulder Clays of the north-east and London Clay in the south rather than on the free-draining chalky soils of the west. In the past these

ponds contributed a variety of essential services to the rural economy, from a watering place for stock to fish-rearing ponds.

A map study in 1986 revealed that in just under one hundred years the total number of ponds in the county almost halved, from 7,007 in 1882 to 3,595 in 1978 (Herts County Council, 1987). Many were lost during the period 1955-85 as agricultural practices changed, particularly the change from pasture to arable. Currently 3086 ponds are shown on the Ordnance Survey maps while the Hertfordshire Habitat Survey 1994-96 found 2608 ponds. The condition of ponds is also declining. The 1986 survey (based on a sample of 730 ponds) revealed that 80% were in a poor condition. Only 3% supported a reasonable flora and fauna. The need for active pond management was one of the key recommendations to emerge from the study. Top ranking ponds included those at **Tykeswater Lake**, **Park Street GP**, **Bayford**, **Meesdon Green**, **Lamsden Common**, **Fishers Farm at Colliers End** and the **Cokenach Estate**.

In 1993 The Wildlife Trust re-surveyed 50 of the ponds identified in 1986 as being of the highest quality in order to try to assess any trends. Of these 50 ponds only two (4%) were found to be well managed, while, alarmingly, five (10%) had been destroyed. The remainder (86%) were either poorly or un-managed.

Ephemeral pools are a specialised but often neglected habitat. They support a characteristic plant and invertebrate community. Many species are scarce.

There are also an unknown number of ponds in suburban gardens, increasing in both number and conservation importance, especially for their amphibian populations. These are discussed under urban habitats (Chapter 10).

Other open waters

Finally, there are a number of miscellaneous man-made open waters including treatment lagoons.

Rye Meads sewage treatment lagoons A series of 17 shallow lagoons forming tertiary treatment of effluent. These highly nutrient-rich waters are highly significant for breeding and wintering waterbirds. They form an integral part of the large and rich complex of wetland habitat at Rye Meads SSSI.

Fen and marsh

About 114 hectares of fen or marsh habitats remain in Hertfordshire. The dividing line between these habitats and neutral/wet grasslands is often indistinct. Some of the best examples, but by no means all, are listed below. Calcareous fens are listed in the EC Habitats Directive, some sites in Hertfordshire may fall within this definition.

Rushy Meadow Unimproved fen meadow by Tring Reservoirs supporting several rare species.

Redbournbury Meadows Marshy grassland communities by the River Ver.

Oughtonhead Common/ Ickleford Common/ Purwell Meadows/ Purwell Ninesprings Examples of diverse fen meadow and marshy grassland habitats by the rivers Oughton, Purwell and Hiz.

Beane Marsh Rich fen and marsh communities by the River Beane.

Rye Meads/Silvermead Fen/mire communities in the River Lee floodplain.

Moorhall Meadow/Blagrove Common Examples of unimproved marshy grassland and fen meadow on poorly drained Boulder Clay.

Sarratt Bottom/Frogmore Meadows Good examples of alluvial meadows by the River Chess.

Water End Meadows Marshy grassland communities by the River Gade.

Ridlins Mire A small dome of peat and associated fen vegetation.

Blackfan Fen A remnant fen meadow on the outskirts of Welwyn Garden City.

Tewinbury/Singlers Marsh Marshy meadows by the River Mimram.

Standon Lordship/Braughing Meads Remnant fen habitats in the Rib Valley.

Thorley Flood Pound/Sawbridgeworth Marsh/Hollingson Meads Sites with diverse fen meadow, mire and marsh in the Stort Valley.

Swamp

Narrow bands of fringing swamp are found along most of our larger rivers and around many open waters and the total extent of this is unknown. However larger stands of swamp are rare in the County.

Reedswamp

Reedswamp is listed as a key habitat in *Biodiversity: The UK Steering Group Report*. In the early part of this century extensive reedswamp in Hertfordshire was known only at Tring Reservoirs. Since then the creation of gravel pits and the dereliction of grazed fen has allowed an expansion in certain areas. The total area of reedswamp (excluding narrow fringes) is estimated at no more than 12 ha. Key areas are as follows:

Tring Reservoirs Extensive reedswamp exists at Wilstone and Marsworth Reservoirs between the open water and carr woodland communities (3 ha).

Rye Meads Reedswamp derived from dereliction of grazing management in wet fen meadow. Also newly developed areas with associated carr around water-filled gravel pits (4 Ha). Also about 0.5 ha at the adjacent Rye House Marsh

Stanborough Reedmarsh Reedswamp derived from old cress beds adjacent to River Lee (2 ha). A remnant of a formerly more extensive reedmarsh and meadow system across land now occupied by Stanborough Lakes.

Purwell Ninesprings Reed and sedge swamp derived from increasingly wet fen meadow (0.5 ha)

Tewinbury Mixed reed and glyceria swamp with associated carr developed in old cressbed lagoon by the River Mimram (0.5 ha).

Cheshunt gravel pits Fringing reedswamp around several gravel pits but also some more extensive areas, notably North Met, Seventy Acres and Bowyers, much succeeding to drier communities (total 1 ha).

Smaller patches exist at **Sawbridgeworth Marsh, Silvermead, Broxbourne GP, Amwell GP, Burymead Springs, Oughtenhead Common** and **Bonningtons Lake**.

The expansion of mineral working along the river valleys this century has allowed an increase in reedswamp habitat to probably its greatest extent for several centuries. This is reflected in the current status of Bittern in Hertfordshire. This nationally threatened species (only 15 breeding pairs) is now a commoner winter visitor in the County (up to five) than at any time in recorded history. The current total area of reedswamp may now remain stable as new quarries continue to open. However, without extensive management and creation of new sites the long-term trend is for decline as succession to carr inevitably occurs and new gravel pit sites reduce.

Other single-species swamp

Extensive areas of single species swamp are, in general, scarce. However, good examples of sedge swamp occur at **Rye Meads**, **Thorley Flood Pound** and **Tednambury Marsh** while extensive areas of Reed Sweet-grass swamp exist at the **Withy Beds, Rickmansworth** and **Rye House Marsh**.

Wet grassland

The best remaining examples of wet grassland occur along the broader valleys of the Stort and Lee. There is much overlap between wet grasslands and fens or marshes. In general the wet grasslands dealt with here retain the characteristic landscape of seasonally inundated flat permanent grassland with intact ditch systems.

The major trend is of reduced incidence of flooding, so much so that few areas of wet grassland now exist. Although many grasslands remain within the river floodplains the vast majority are protected from flooding by artificially raised banks. These grasslands do not exhibit the typical flora or fauna of wet grasslands but do have the potential to be restored.

Where flooding does occur water is drained quickly from the land and none of the traditional wildlife of this habitat has more than a fleeting moment to exploit it. The habitat is at such a low ebb that the situation can only improve if positive conservation management to increase water levels is undertaken. The better intact sites are as follows.

Kingsmead (96 ha) A series of grazed flood meadows intersected by ditches. Although much degraded, the site still floods and a long list of scarce plants still exist.

Parndon Meads (10 ha) Regularly flooding pasture and ditch system but with negligible botanical value remaining.

A number of other floodplain sites continue to flood but are better described elsewhere. These include Rye Meads, Redbourn Meadows, Thorley Flood Pound (all fen and marsh) and Hunsdon Mead (neutral grasslands – hay meadows).

Carr woodlands

Carr woodlands are thinly scattered throughout Hertfordshire along the river valleys. Many of the richer examples have developed from fens of long-standing but the majority of carr is probably associated with margins of gravel workings in the lower Lee and Colne valleys. Excluding the stands of Alder associated with more extensive woodland (see Chapter 4 – Woodlands), the total extent of river valley carr is probably around 30 ha.

In Hertfordshire the Alder/Stinging Nettle and Willow/Marsh Bedstraw types (see Appendix 3) of carr woodlands are the most frequently encountered forms due to the high nutrient status and levels of disturbance over most of the county. However few, if any, sites are typical, reflecting human activity over the years. Where the influence of the chalk is stronger, mainly in the north of the county, sites might be expected to show a leaning towards the richer Alder/Tussock Sedge and Willow/Birch woodlands but never quite matching the richness of the typical sites. The more typical Alder/Stinging Nettle carrs are especially prevalent in the lower river valleys around gravel extraction sites.

The remaining areas of carr are largely unmanaged but not greatly threatened by destruction. However, a minority of sites are managed for their timber, a process that destroys the typical carr structure. In addition, some gravel pit sites are being managed with a misguided tidiness. The main trend is a steady change in community composition caused by increasing nutrient enrichment. This may originate as run-off from adjacent farmland or more directly from enriched river water flowing through the site. With our history of wetland destruction and over-abstraction of water combined with continuing enrichment, carr woodland sites will continue to be impoverished unless remedial action is taken.

Several key sites are associated with the chalk rivers of the north of the County.

Oughtonhead Mixed carr derived from fen habitats.

Purwell Ninesprings Wet alder wood showing little sign of over-enrichment. However past management has altered the stand composition and resulted in the loss of many characteristic species. Recent increases in water level have allowed spread of swamp species.

Folly Alder Swamp The narrow valley of the Ippollyts Brook south of Hitchin with associated spring sources supports one of the richest alder carrs in the county. Probably the best example of Alder/Tussock Sedge carr remaining, with as yet little sign of enrichment.

Ivel Springs An area of Almond Willow carr.

The River Mimram also has several areas of associated alder carr.

Tewinbury (1 ha) Alder carr with rich ground flora.

Panshanger (3 ha) Good stands of alder carr with associated flora and fauna, some damage from woodland management.

Hertingfordbury – Rich Alder woodland with long history of Alder and Osier management. Understorey rich in swamp species including frequent Tussock Sedge. Enrichment from run-off from adjacent housing plus general lowering of water levels has promoted changes to a more species-poor community.

The Lee Valley has isolated examples of carr down to Hertford but then considerable amounts below Ware associated with old gravel workings. The best examples are as follows.

Hertingfordbury (2 ha) Alder carr with moderate ground flora.

Stanborough (1 ha) Old willow carr in association with reedswamp.

Equally the Colne Valley has most carr associated with old gravel workings but some old osier beds do survive such as at the **Withy Beds** near Rickmansworth.

Stocker's Lake Nature Reserve (2 ha) Alder and willow carr around old gravel pit, supporting the largest heronry in the county and the rare Large Bittercress.

Other sites in the Colne Valley include **Pynesfield GP** and **Old Parkbury GP**.

Key species

With such a wide range of wetland habitat types it follows that the list of associated key species is extensive. The following list does not attempt to be comprehensive but merely highlights some examples relevant to Hertfordshire. It is drawn from species lists within the UK Biodiversity Steering Group Report with a selection of other species considered to be locally important by the Wildlife Trust.

Water Vole *Arvicola terrestris.* Typical of lowland wetlands, the Water Vole has undergone a significant decline in recent years (see Chapter 11).

Otter *Luta lutra.* Formerly widespread throughout the UK, Otters declined rapidly from the 1950s to the 1970s. A partial recovery is now underway. Became extinct in Hertfordshire in the 1970s and subsequently re-introduced (see Chapter 14).

Water Shrew *Neomys fodiens*. Thought to be widespread in wetlands, its precise distribution and abundance is unclear, but some local sites have large populations.

Pipistrelle Bat *Pipistrellus pipistrellus.* Although it remains the most abundant bat in the UK, it has undergone a significant decline in numbers. Recent evidence has split Pipistrelles into two distinct species, one is thought to frequent wetlands.

Bittern *Botaurus stellaris.* A nationally rare inhabitant of reedbeds. A significant population winters in Hertfordshire, notably the Lee Valley (see Chapter 16).

Shoveler *Anas clypeata.* Typical of larger open waters in Hertfordshire, several sites hold populations of national significance.

Snipe *Gallinago gallinago.* Formerly widespread in damp river valleys in Hertfordshire, the Snipe is now on the verge of extinction as a breeding bird locally.

Bullhead *Cottus gobio.* A typical inhabitant of chalk rivers.

Great Crested Newt *Triturus cristatus.* Although still quite widespread, the UK population is amongst the largest in Europe. Evidence of steady decline (see Chapter 19).

White-clawed Crayfish *Austropotamobius pallipes.* Typical of clean chalk and limestone rivers, the White-clawed Crayfish has undergone a significant decline. The UK is highly significant in a European context (see Chapter 23).

Desmoulin's Whorl Snail *Vertigo moulinsiana.* Restricted to long-established calcareous wetlands, this snail is known from a series of sites in a band from Dorset to Norfolk.

River Water-dropwort *Oenanthe fluviatilis.* A nationally scarce plant of clean, flowing rivers. Significant populations in Hertfordshire (see Chapter 26).

Stream Water-crowfoot *Ranunculus penicillatus.* The characteristic crowfoot of Hertfordshire's chalk rivers retaining reasonable in-channel habitat structure.

Southern Marsh Orchid *Dactylorhiza praetermissa.* A typical plant of wet meadows and marshes but now restricted to a handfull of sites locally. Suffering from loss of habitat and low water levels generally.

5.3.2 Trends and threats

The key issues on wetlands generally relate to either hydrology or management. Wetlands are now much reduced, fragmented and overall, drier. In the past drainage and direct destruction were the main problems. Nowadays water levels are still falling but the concern is with over-abstraction of water. Wetlands have always been popular areas for human leisure and recreational activities. These pressures continue to increase and now form a real threat to the biological integrity of many sites. The following issues are most relevant to Hertfordshire's wetlands today.

Low water levels

Low water levels are the primary threat to all forms of wetland and there is a widespread feeling that all wetlands, from rivers to ponds, have never before been so short of water. Any long-term lowering of water levels in any wetland, or reduced incidence or duration of flooding, can cause severe losses in biodiversity and changes in community composition. The main causes are over-abstraction of surface or groundwater, drainage and the continued impoundment of rivers, mainly for flood defence. Such problems are exacerbated during times of drought.

Groundwater abstraction has reduced the upper reaches of several rivers to a trickle in some summers, with the Beane, Bulbourne, Gade, Chess and Colne particularly affected. Winterbournes, which depend on high groundwater levels, flow even less regularly and springs become less vigorous. Recent remedial work on the Ver, when abstraction from a pumping station was sharply reduced, has amply demonstrated the beneficial effects.

Flood defence works have acted to separate the hydrological links between rivers and their floodplains. The reduced incidence of flooding in floodplain wetlands such as wet grasslands, fens and marshes is now a frequent problem. Recharge of groundwater from rainfall is also reduced. The general loss of wetlands and the concreting over of urban areas reduces the land's ability to soak up rainfall (see Chapter 10 – Urban).

Natural succession

There is an inevitable process of natural succession to scrub and woodland as wetlands accumulate organic matter and dry out. This results in an overall loss of species, especially if early successional stages are not regularly being re-created in compensation. **Carr development on fens and marshes is now commonplace where active management is absent and will cause a shift in wildlife value with the loss of species of earlier successional phases.** On fens in particular this is accelerated by cessation of traditional management practices. Natural succession is also evident around the county's open waters. Many ponds are now overshaded and dry. Many gravel pits in the Lee and Colne Valleys are now overshaded and almost engulfed by woodland in as little as 25 years after extraction. Vegetational changes during this period will be considerable; open waters surrounded by marsh and swamp will have changed to lakes with heavily shaded, eroded and bare banks. Although some species will benefit, many will not.

Lack of management

Wetlands such as fens are dynamic semi-natural systems which in general require management to maintain the typical communities and their associated species-richness. Without appropriate management (grazing, mowing, reedcutting, scrub clearance) natural succession will continue. However, unmanaged, derelict fen and swamp is important for several species (before they inevitably succeed to new habitats). In wet grasslands and fens the cessation of traditional ditch management has both reduced water availability and biodiversity. Riverside willow pollards that are not managed on a regular cycle will become top heavy and collapse (although this is a natural growth pattern of some species).

Poor management

Poor or inappropriate land and water management can lead to the degradation of habitats. Operations such as ditching, river straightening and dredging can all be damaging if carried out unsympathetically. Poor management includes over-cutting of fens or open water margins, suppressing aquatic flora. Pond management can frequently be well intentioned but ultimately damaging. By aiming for 'classical' but often

over drastic management – varying bank profiles, removal of shade and complete de-silting, the valuable and differing features of ponds can be destroyed. Ponds are frequently used as a dumping ground for all kinds of rubbish.

In carr woodlands planting of non-appropriate tree species and woodland management that prevents the natural woodland structure (the jumble of fallen, rotting and growing willows and Alders), reduce the value of the site. Tree planting, for example poplars or cricket bat willow plantations, on fen or wet grassland habitats inevitably leads to a degradation of a scarce resource. In other areas the general 'tidying' of carr woodlands is simply misguided.

Cultural eutrophication

Most wetlands in Hertfordshire are naturally eutrophic (nutrient-rich). **However, eutrophication beyond the natural process, usually as a result of human activities (cultural eutrophication), leads to a sequence of ecological change and is a major problem in Hertfordshire's wetlands today.** In open waters a progressive increase in nutrient tolerant plants is followed by the dominance of algae, with resultant turbidity, at the expense of aquatic plants. Water quality decreases and scarce plants and associated animals decline. It may lead to blooms of toxic blue-green algae.

Excessive nutrient enrichment arising from point sources (eg phosphates in sewage) and diffuse sources (run-off of nitrogen-rich agricultural fertilisers) is a major problem in open waters and rivers. There are clear ecological differences in terms of water clarity and aquatic plant abundance between gravel pits isolated from river systems and those connected to it. Recent studies on Hunsdon Mead have highlighted the problem of excessive levels of nutrients in the river system with increase in grass growth and reduction in herb diversity. The efforts of conservationists to increase flooding of wetlands brings a catch-22 situation in that the nutrient-rich river waters may be detrimental to the ecology.

Over-stocked angling waters pose clear threats to conservation interests. Problems include increasing turbidity of waters through pollution by organic matter and silts and the release of nutrients held within them. These problems are most associated with unnaturally high densities of bottom-feeding fish, such as Bream and Carp.

Nutrient enrichment is one of the key factors determining community type in carr woodlands with few examples of the less-enriched Alder/Tussock Sedge woodland remain.

Acidification

Predominantly caused by atmospheric sources via the soil. A known problem in open waters where biodiversity and biomass are shown to be reduced. Mainly associated with UK uplands but there is evidence of effects in some lowland areas.

Pollution

Pollution of wetlands from a variety of sources (industrial discharge, road or urban run-off) and bio-accumulation of chemicals (eg organochlorines) can be a problem. Although pollution incidents may be declining residues of past contamination remain locked in the bottom silts of many water courses. Ponds can become polluted as a result of dumping.

Drainage

Although drainage for agriculture remains a national problem it is marginal in Hertfordshire.

Development and land-use change

The development of sites may lead directly to the loss of habitats or species. This may include housing, industrial or recreational developments. Development of, or changes in, adjacent land may also pose a threat as wetlands are linked to and influenced by the land surrounding them. Changes which alter the water table, increase the pollution load or degrade adjacent habitat will adversely affect wetland biodiversity.

Conflicts with recreational and leisure activities

The potential conflict between recreational activities and wildlife is a key area for concern. Although the effects of recreational activities upon wildlife are wide-ranging, it is the potential conflicts on open water habitats that are the most critical.

The effects of water-based leisure activities on wildlife

The recorded effects of angling on wildlife include: bankside disturbance; habitat change through trampling; littering; competition with waterbirds for food resulting from overstocking of fish. The removal of the angling close season on still waters, although not compulsory, may represent a threat to breeding birds, fish and other wildlife on some waters. Angling policies are generally biased towards stocked fisheries rather than natural fish communities; this may pose a threat to fish conservation. Watersports such as sailing, boardsailing and water-skiing have all been shown to affect waterbird numbers and distribution, with increasing detrimental effect associated with watersport intensity. Effects upon aquatic plant communities are also possible. On rivers, recreational pressure from pleasure boats can cause erosion of riverbanks, increased turbidity and a reduction in water available to associated wetlands through excessive use of locks. In general, intense use of open waters for recreational activities such as watersports or angling suppresses the wildlife value.

It is important to distinguish between *disturbance* and *impact*. *Disturbance* is the immediate effect of the activity in the short term, while *impact* is the long-term effect on species populations. Studies in the Lee Valley have shown that watersports are influencing the distribution of waterbirds but it is unclear whether the existing levels of watersports are having any impact on the total valley population.

Case study – Strategic use of wetlands by waterbirds in the Lee Valley

Waterbirds are mobile and adaptable – up to a certain point. Their distribution through a complex of closely associated waterbodies reflects their continuing requirements. In the Lee Valley a complex series of links exists between sites, varying from species to species, depending on the time of year and even from year to year. This strategic approach by waterbirds to the use of multiple and varied waterbodies within a given area allows them to fully utilize the wetland habitats they live in. The requirements of waterbirds may be summarized as follows:

A feeding site: The principal requirement is a source of food, ultimately this will determine the carrying capacity of a given area.

A roosting site: When not feeding, a safe roosting site is required for resting, sleeping or preening. Large, open waters with undisturbed islands are generally preferred.

A refuge: The refuge is an alternative roost if the usual site is untenable for some reason. This may be through regular disturbance by watersports or natural events such as severe weather.

A moult site: Moulting duck require undisturbed sites with a rich food supply. Large, open waters are usually chosen.

A breeding site: Breeding waterbirds require a secluded nesting site free from disturbance, islands are preferred. A nearby, rich feeding area, usually shallow water, is also essential for successful rearing of the young.

Studies over the last ten years have shown that within the Lee Valley very few waterbird species obtain all their requirements from a single waterbody. Feeding areas, roosting sites and refuges may all be in different locations. Key sites may only be used for short, but critical, periods of time. Natural changes, particularly in food supplies, during the winter and between years will cause shifts in distribution. Patterns of behaviour will vary not only between species but also within a species from year to year.

Resolving conflict: Methods put forward to reduce conflict include both time and spatial zoning, habitat management and the establishment of refuges. Refuges are perhaps the best solution. However, evidence suggests that only very large waterbodies (far larger than any in the Lee Valley Park) are able to be zoned to include an effective on-site refuge. Refuges should ideally be separate waterbodies.

At the present time food supplies in the Lee Valley probably represent the limiting resource and determine the carrying capacity for wintering waterbirds. However, a number of sites have conflicts developing on them and if leisure activities increase without the provision of corresponding waterbird refuges an adverse impact on the waterbird populations of the Lee Valley is inevitable.

5.4 The future for wetlands in Hertfordshire

5.4.1 The value of wetlands to people

The benefits that wetlands provide to people are immensely varied. These benefits may come from wetland functions (e.g. groundwater recharge), the use of wetlands (e.g. recreational activities) or from the products or attributes of the wetland (e.g. aesthetic value). The maintenance of naturally functioning wetlands will ensure these benefits to the community, industry and agriculture are retained. Wetlands are highly productive, often approaching or even exceeding that of intensively managed farmland. For example, the annual production of Reedmace ranges from 30-70 tonnes per hectare while submerged pondweeds can reach 40 tonnes per hectare. The benefits of wetlands to people can be summarised as follows.

Water supply. Wetlands are frequently used as a source of water for domestic, industrial and agricultural use. Wetlands can aid water movement (recharge) into the underlying aquifer system.

Flow regulation. The natural qualities of the 'wetland sponge' can help manage both flooding and drought problems by regulating river flows. They act as storage areas by soaking up excess water during heavy rainfall. Flood water can be stored in soils (peat can be up to 90% porous) or retained as surface water in lakes, marshes etc. This reduces the volume of floodwater downstream. In dry periods river flows are maintained for longer periods as stored water is slowly released from wetland habitats.

Shoreline protection. Wetland vegetation prevents or reduces erosion of riverbanks by trapping sediments and dissipation of wave energy.

Sedimentation, nutrient and pollutant retention. The physical properties of wetlands can slow water flow and therefore increase the deposition of sediments. This deposition is closely linked to the beneficial effects of nutrient and pollutant retention as these substances are often bound to sediment particles. Nutrients from run-off of fertilisers or industrial discharges can be effectively removed. They may be taken up by vegetation or transformed by biological or chemical processes. It has been shown that wetlands can remove 95%+ of all nitrogen and phosphorus from waste water. Pollutants can also be filtered out in the same way.

Recreation and tourism. Wetlands are important for recreation and tourism as evidenced by the increasing demands for use of the remaining areas by all kinds of water-based activities. Wetlands are often key components of landscape, providing diversity and a focal point for views. This combined with their often highly visual and abundant wildlife makes them of great aesthetic value.

The reasons for maintaining and restoring wetlands have been well researched. If wetland restoration is to be widely supported these benefits must be more widely understood. In addition, water as a resource is very much under-valued by the consumer. Increasing awareness of the whole water environment must therefore be a major aim in the future.

5.4.2 Management of key sites – retaining the 'jewels'

Wetland habitats are one of the more re-creatable habitat types so in theory there is the potential for significant increase. However, as in most instances, the species richness of new sites will depend on the ability of less mobile species to colonise. **Thus it is essential that all existing high quality wetlands are retained and managed to maximise their potential. These are the 'jewels' amongst wetland habitats.** To achieve this we must first ensure that we know where all such sites are by continuing the current programmes of survey and assessment.

Case study – Silvermead

Silvermead is 10 ha of relict flood meadows and water-filled ditches to the south of Broxbourne within the Lee Valley Park. The site had remained unmanaged for over 20 years, had inappropriate tree planting and had lowered water levels. However, botanical surveys during the early 1990s highlighted the site's conservation importance, being one of the few areas in the valley to escape gravel extraction or development.

In 1995, the Lee Valley Park Authority embarked on a 10-year restoration plan through the Countryside Stewardship Scheme. The meadows have been fence and grazing re-introduced, with gates maintaining public access. Inappropriate trees have been removed and native ditchside willows are being re-pollarded. In 1997, the Environment Agency restored ditches and installed a sluice to raise water levels. Restoration has revealed the true importance of the site; 14 species of locally rare plant are recorded, 12 species of dragonfly, a good population of Water Voles and possibly the largest willow tree in the county.

Tackling the problems of our existing wetlands must be a priority. Many are suffering from increasingly low water levels, natural succession and fragmentation. The lack of traditional management of marshes and fens (by grazing or cutting) has allowed the growth of scrub and trees, accelerating the rate of desiccation. The management and restoration of our existing sites must therefore be a priority over the coming few years. The targeting of schemes such as Countryside Stewardship has helped in many cases but the current approach to landowners is at best piecemeal and must be expanded, most profitably perhaps by partnership action by involved organisations.

Grazing animals play an irreplaceable role in the maintenance of many wetland habitats. Yet the current fragmentation of sites and the concentration of the beef industry into local areas has lead to neglect of many sites and makes restoration of grazing hard to achieve. However, some recently restored river valley nature reserves now provide good grazing again for cattle. The value of these lush grasslands has been heightened in recent drought summers when many 'improved' pastures were yellow and parched. With the current BSE crisis in the beef industry, the public are more aware than ever about how food is produced. **If considerable tracts of river valleys were restored to damp grasslands, to extend and link remaining wetland habitats, the potential to rear cattle would be increased and there would be significant gains for wildlife conservation.** In addition, the beef produced from such extensively reared, grass-fed cattle could fetch a premium price in an expanding market. Each steak sold could be stamped 'naturally reared in harmony with wildlife'. There is surely an urgent need to promote extensive livestock production and associated quality assurance schemes (see Chapter 9 – Farmland).

Case study – Grazing with longhorn cattle

The search for a grazier for an area of species-rich grassland at Danesbury Park brought Welwyn Hatfield Council in contact with Bob Williams, a farmer based near Hitchin. Bob is passionate about English Longhorn Cattle! He also rears them commercially and before long a small herd was grazing Danesbury Park.

The benefits of grazing Longhorns on conservation areas soon became clear with this old breed easily dealing with the coarse vegetation typical of such sites. Bob Williams was keen to expand the herd and by 1997, Longhorns are also grazing Singlers Marsh, Oughtonhead Common and Tewinbury SSSI; a clear example of how farming, nature conservation and rare breed conservation can have common objectives.

Case study – Restoration of the River Ver

The River Ver was identified by the National Rivers Authority (NRA), now the Environment Agency, as one of the five rivers in the Thames region most seriously affected by low flows. The problem was identified as the pumping station at Friars Wash, abstracting huge amounts of water from the underlying chalk aquifer. Large stretches of the upper reaches were completely dry and previously common species such as Snipe had gone.

The NRA in partnership with Three Valleys Water company, and with ideas and support from the Ver Valley Society, sought to implement a restoration scheme. The £2.5 million scheme involved bringing an additional supply of water to the area from Grafham Water in Cambridgeshire while drastically reducing the amount of water drawn from Friars Wash. This would allow water levels in the underground chalk to gradually rise up through underlying rocks to support the river flows.

The pumps at Friars Wash were shut off in 1993 and the water duly rose over subsequent years. The NRA also carried out further enhancements along the river channel. This excellent scheme has no doubt benefited the river. Unlike some similar schemes it dealt directly with the problem of over-abstraction at the pumping station rather than trying to enhance river flows by bed-lining or water-recycling.

However, early satisfaction is unwise. Surveys of the birds of the river valley between Redbourn and St Albans have not shown a rapid return of breeding populations. After four summers the range of breeding species has almost recovered – but with some notable exceptions such as the Snipe. Populations of most species have only recovered to about half of that in the mid 1980s (which were presumably already in decline). This suggests that although the water has returned much of the habitat quality has been lost. This may take much longer to recover.

Just add water

Although restoration of wetlands is not quite as simple as ‘just adding water’, there can be little doubt that a concerted effort to restore water levels along river corridors will bring major benefits to all wetland habitats. The incidence of flooding should be increased wherever practicable, particularly in parallel with environmentally sensitive farming. At the same time it will be essential to limit further built development within the floodplain. The fluvial processes in rivers are, in many cases, naturally self-righting. By a combination of increased flows and the pulling back of flood defences, structural diversity within the river in the form of pools, riffles and meanders will increase. The Environment Agency (formerly the NRA) is continuing to seek ways of enhancing rivers, for example by removing or ‘notching’ weirs to reinstate the natural fluvial processes. More work of this kind needs to be done, and it needs to be more strategic rather than opportunistic as at present. Enhancing the quality of our chalk rivers, such as the Mimram and Chess, must be a priority, followed by the particularly degraded stretches of other rivers.

The restoration of water levels will need to be through a combination of on-site management measures, including imaginative flood defence schemes using flood pounds, as well as a wider appraisal of water abstraction issues. The protection of sensitive areas such as spring sources and wetland SSSI's will need to be more carefully considered. A number of current abstractions are suspected of causing damage to wetlands. These should be investigated and, where damage is proven, licences amended or revoked. The potential effects of climate change will also need to be assessed. However, the implications of alternative supply and compensation need to be considered. The cost of compensation may be high and it is likely that some additional funding mechanism will need to be found. There is a general assumption that ground water levels are falling over a wide area and yet there is little documented evidence of this on key wetland sites. It is essential that monitoring is instigated on all wetland SSSI's in the near future.

The poor quality of many waters is a major problem. It may be argued that the regulators are not dealing effectively with all forms of water pollution that are damaging to wildlife and that existing regulatory powers are inadequate. Further powers neeed to be gained to secure water quality improvements to enhance biodiversity.

Of particular concern is the continuing pollution of wetland habitats by nutrient enrichment (eutrophication), a process that is leading to major changes in plant and animal communities. As already stated this pollution comes from point (e.g. sewage effluent discharge) or diffuse (agricultural) sources. The nutrient levels in sewage effluent discharged to our rivers will need to be examined and in certain cases reduced. The diffuse source pollution is a result of agricultural land-use, the use of fertilisers and pesticides and soil erosion. It is well known that riparian buffer strips (a vegetated strip of land from five to 50 m in width that is managed separately from the rest of the field) can substantially reduce diffuse pollution. Different forms of buffer strips will perform in various ways but rough grass strips with trees by the watercourse are very effective. However, the benefits of buffer strips are much wider, they:

- reduce pollution;
- provide habitats for wildlife;
- provide corridors for wildlife movement;
- control temperature in the water body through shading; and
- enhance the visual quality and amenity of the landscape.

The return to pastured floodplains urged above will help greatly in this respect. However, the use of buffer strips alongside watercourses that remain in intensively farmed arable areas must become commonplace over the next ten years. Overall, our rivers must again become swathed in grass, marsh and wooded habitats. Such a move will be to the benefit of us all. A partnership between the water industry, agriculture and conservationists should be sought to take this forward.

5.4.3 Expansion and linking – a 'necklace' of wetland habitats

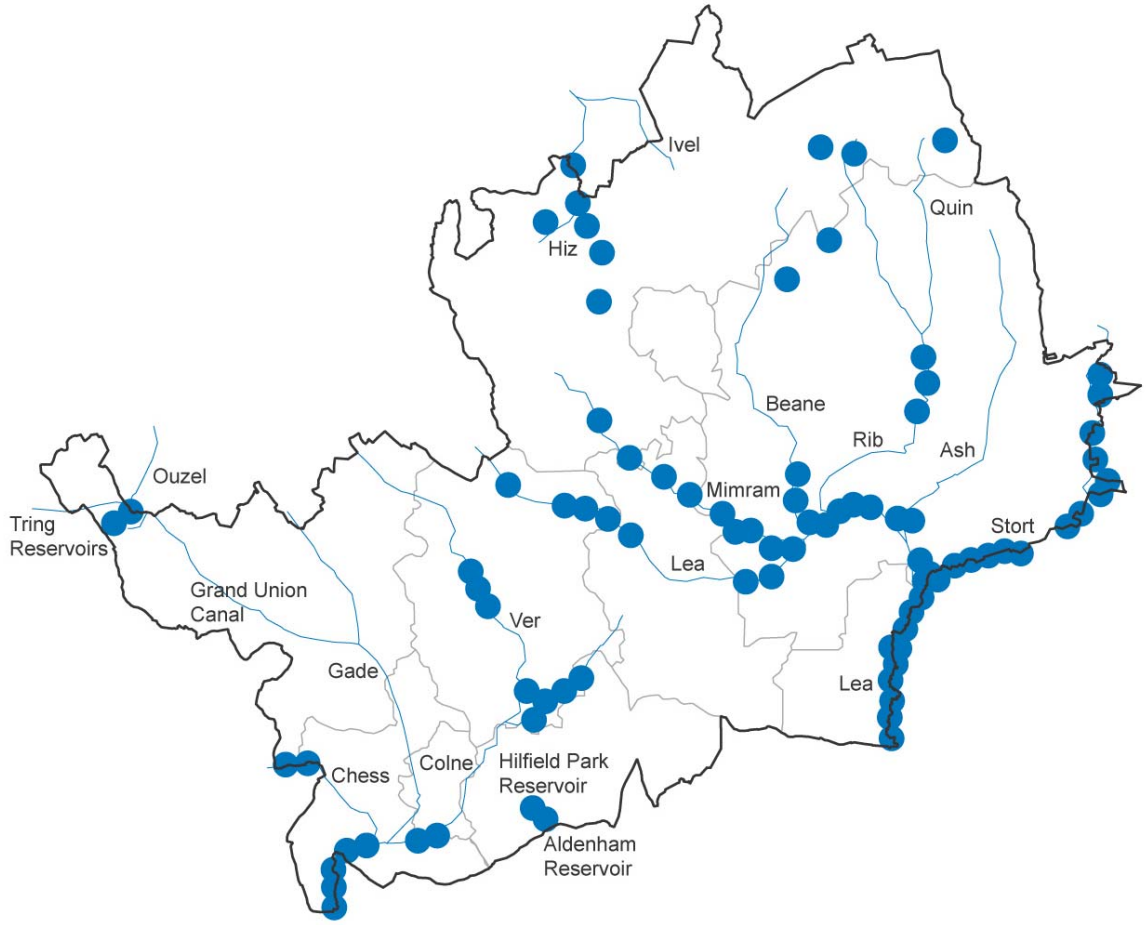
By combining enhanced management of existing wetlands (the 'jewels') with restoration of pasture and the creation of buffer strips, much will have been achieved to restore the integrity of our river valleys. They will again become linked ecologically and hydrologically to form a 'necklace' of wetland habitats through the county (see map 5.1). However, the opportunity remains to increase the wetland resource through habitat creation, particularly where it will allow the expansion of existing sites.

Case study – Partnership action at King's Mead

The meads between Hertford and Ware are owned by a variety of organisations and individuals. As a result of unco-ordinated management this area of remnant floodplain pasture and ditch habitat became progressively degraded. In 1993 The Herts and Middlesex Wildlife Trust and The Countryside Management Service put forward management proposals aiming to restore its ecological and cultural importance. The ideas gained support from the landowners and was then put out for wider consultation to the local community via Ware Town Council.

In 1995 Thames Water Utilities and the National Rivers Authority funded a range of measures such as ditch restoration, fencing, tree planting and sluice installation. A Wildlife Trust local group was established to carry out management tasks such as scrub removal and ditch clearance. Thames Water Utilities also worked with Groundwork Hertfordshire to increase access and interpretation.

Early results are very encouraging. Several species show early signs of recovery and the problems of the area are being resolved. A full management plan to cover the whole area is now being prepared by the Wildlife Trust on behalf of the landowners. Overall the project amply demonstrates how partnership action between a range of organisations can bring substantial benefits.



Map 5.1 – A necklace of wetland habitats

More natural wetlands

Large areas of wetland are more valuable than small fragments, therefore it is important to re-establish links between the fragments where possible. Management of larger sites is easier and more economical. Large sites are more successful at ensuring the survival of threatened species. Control of hydrology may also be more attainable on a large scale. Overall a large wetland habitat mosaic will be more able to function as a natural system under the influence of such factors as water levels and flooding.

There is widespread discussion about the effects of climate change through global warming and it is accepted that it is difficult to predict precisely. However, we can be fairly sure of more extreme conditions including longer, drier summers. Wetlands may well suffer to some extent. It may be pointless trying to retain unsustainable, small wetlands managed in a highly artificial manner. The emphasis should not only be on large systems which will retain water better but also on a flexible management attitude that works with nature rather than against it.

Our aim should therefore be to create a series of large wetland 'refuges' functioning at a more natural level with low intervention management systems. There are no large wetland complexes in Hertfordshire at present so the creation of large sites may at first seem impossible. However, the key is to connect wetlands along the river valleys, expanding where possible at key ecological points, such as river confluences. The following areas may present opportunities:

- The lower Stort from Harlow to the Lee Valley;
- The Stort/Lee confluence at Rye Meads;
- The Lee from Hertford to Ware including the Rib and Beane confluences;
- The Mimram valley
- Parts of the upper Colne valley; and
- Tring Reservoirs.

Each area should contain a mosaic of different wetland types and there will be opportunities to create scarce habitats. The restoration of large expanses of wet grassland within these areas will not only assist wildlife but also bring wider environmental benefits. Creation of washlands on the floodplain to accept water at times of high flows should be explored.

Reedbeds are threatened habitats. All existing sites in Hertfordshire need to be managed appropriately but there is also the potential for expansion. In the Lee Valley it should be possible not only to enhance and link existing patches but also to create new and adjoining reedbeds. Our natural floodplain forests have all gone. However the possibility of re-establishing such a habitat in an appropriately unstable floodplain situation should be explored.

Smaller wetlands – the conservation of ponds

The reasons for pond degradation are clear; pollution, neglect and natural succession. However, the remedies are not always simple. Many ponds have suffered from inappropriate management caused by a poor understanding of their ecology. All stages of pond succession are important to wildlife and it is perhaps as critical to create new ponds as it is to over-manage old ponds and risk damaging existing habitats. However, sensitive pond management should be encouraged as well managed established ponds will support a rich variety of wildlife. New ponds should be allowed to develop naturally but their siting is important. It is all too easy to destroy an important wet hollow by excavating a pond in it. Overall, much emphasis in the future is required on raising awareness on pond management.

5.4.4 A strategic approach

The complex and often extensive nature of wetland systems, from spring source to the sea, demands that we take a wide overview or strategic approach to their conservation and management. Such an approach is already being established.

Catchment management plans/Local Environmental Action Plans

The National Rivers Authority was established in 1989 as the principal agency responsible for safeguarding and improving the water environment in England and Wales. The NRA embarked on a process of preparing Catchment Management Plans for all river catchments. Such plans aim to establish an integrated strategy and plan of action for the water environment of each catchment. In Hertfordshire plans have been prepared for the Upper Lee, Middle Lee and Lower Lee.

In 1996 the Environment Agency came into being, combining the NRA, Her Majesty's Inspectorate of Pollution (HMIP) and the Waste Regulation Authorities. The Agency is to take an integrated approach to providing environmental protection, taking account of impacts on air, water and land. Catchment Management Plans will become Local Environmental Action Plans (LEAPS).

Such plans are central to the conservation of wetlands habitats. They review the condition of each catchment and identify key issues to be tackled. A series of actions are presented and reviewed annually.

Natural areas

English Nature has developed its Natural Areas initiative based on natural characteristics such as climate, geology, landform and the effects of traditional land management of vegetation types. Five such Natural Areas have been identified in Hertfordshire (see Chapter 2). Although all contain stretches of river, the London Basin, has wetlands well represented. These include river valley habitats and standing open waters such as gravel pits and reservoirs. Draft objectives for these areas include maintaining the integrity of river valley corridors and maintaining and enhancing the most important waterbodies as significant sites for waterbirds.

Conservation v recreation

The strategic approach demonstrated by the above initiatives needs to be adopted for other specific issues, most notably to resolve the increasing conflict between conservation and recreation. There is a continuing demand for access to open waters for recreational purposes in a wide range of forms including sailing, water skiing and angling. This demand will continue to increase.

At the same time the importance of these open waters for conservation is increasingly being recognised, for example the proposal to designate parts of the Lee Valley as a Special Protection Area (SPA) under the EU Birds Directive. Hertfordshire supports internationally important numbers of certain waterbirds such as Gadwall and Shoveler. Our wetlands form one link along an extensive migratory fly-way for these species, from northern Europe to the Mediterranean or beyond. We therefore have a wider responsibility to maintain these sites.

A related issue is the extent to which anglers now manipulate fish populations through stocking. It is probably now difficult to find natural fish communities in the county. Overstocking of waters leads to conflict with conservation interests. At the same time the release of non-native fish and other species can have a profound effect. The native White-clawed Crayfish (see Chapter 23) is severely threatened by the increasing spread of the introduced Signal Crayfish, and the crayfish disease it brings with it.

If open water wetlands are to retain their value for both conservation and recreation we have a duty to manage any conflict. It must be recognised by both parties that this is a shared and finite resource. As has already been stated, wetlands that fulfil their natural potential may well also perform recreational functions better and more economically. Therefore sustainable wetlands are to all our benefit. A strategic approach is desperately required, involving wide consultation between all involved.

With such a strategy in place a more positive approach could be taken to wetland creation. In recent years new wetlands in the form of gravel pits have naturally developed wildlife value and also attracted demand for leisure activities. Yet virtually all such sites fail to reach their potential for either due to a lack of forethought. Few new sites are now likely to arise. However, when they do, it is essential that such sites are carefully designed to suit one need or another. Perhaps a new reedbed and shallow water wetland, or a major watersports venue. Such pre-planning will seek to reduce current conflicts.

Raising awareness

Raising public awareness of the value of wetlands is essential. This will need to be undertaken by all involved in the water industry and nature conservation. A first step would be the increased use of interpretation on some of the most heavily visited wetland nature reserves. Increased community involvement in the management of wetlands should also be sought.

5.5 A vision for wetlands

In 50 years time the appreciation of floodplains and wetland systems will have turned full circle. Wetlands will again be valued not only for their wildlife importance but for what this represents – a natural system that reduces pollution through natural purifying qualities and reduces both unwanted flooding and the effects of drought by drawing on the natural qualities of the 'wetland sponge'. Open waters will provide a sustainable recreational resource while lush floodplain grasslands will support summer cattle grazing, extensively managed by low input/low output farming methods.

A 'necklace' of high quality wetlands distributed along ecologically and hydrologically connected river corridors will have been established. The 'jewels' in this necklace will be a series of high quality wetland habitats forming a network of wildlife refuges. A number of the highest quality wetlands, ideally located at key ecological 'cross-roads' such as river confluence's, will have been expanded into large wetland habitat mosaics of fen, swamp, wet grassland, carr and open water. These sites will function more naturally, with low intervention management systems. Likely areas of search for such sites will include:

- the Stort Valley;
- the Lee and Stort confluence – Rye Meads;
- the Lee between Hertford and Ware including the Rib and Beane confluence's;
- the Mimram Valley;
- the Colne Valley; and
- Tring Reservoirs and the Grand Union Canal.

River and wetlands will be buffered from intensive agriculture. All stretches of river with adjacent intensive arable farmland will have a minimum width of 10 m of buffer habitat. This will also aim to ecologically link currently isolated wetland fragments.

Floodplains will be just that. Water abstraction will be reviewed and targeted away from sensitive areas, allowing rivers to fully flow again. The hydrology of wetland sites will be restored wherever possible.

Open waters will be highly valued, managed to a carefully prepared strategy, ensuring their wise use for the benefit of both humans and wildlife. New wetlands, for example mineral sites or river valley restorations, will have been designed to support this strategic approach.

The following wetland types will all be represented;

Free-flowing tufa springs
Free-flowing chalk springs
Free-flowing springs with associated fen peat
Free-flowing flush-line springs
Active watercress beds
Winterbournes, seasonal streams and clay-based brooks
Chalk streams with abundant submerged aquatic vegetation
Slow-flowing lowland rivers with abundant fringing swamp vegetation
Slow-flowing lowland rivers with diverse in-channel structure
Artificial river features such as weir-pools, millstreams and millraces.
Extensive areas of single species swamp e.g. reed, reed sweet-grass and sedge swamp
Grazed fen meadows associated with chalky boulder clay
Tall herb fens of alluvial floodplains
Alder Carr with Tussock Sedge community
Alder/willow carr
Floodplain forest
Seasonally inundated wet grassland
Floodplain meadow and ditch systems
A diversity of pond types
Clear open waters with rich submerged aquatic weed communities
Open waters with diverse breeding, moulting and wintering bird populations
Open waters with rich invertebrate communities
Open waters with natural fish populations

The overall extent of wetland habitat will reach a minimum of 1500 ha. The priority will be to restore hydrological and ecological links, increase appreciation and strategic use and restore sympathetic management.

5.6 Ten year targets

To ensure no further loss of wetland habitats.

To have begun to restore the integrity and hydrology of river valley corridors.

To ensure appropriate water quality and quantity in wetlands.

To ensure that all wetlands of wildlife value are managed appropriately within 10 years.

To have restored 100 ha of seasonally inundated wet grassland from drier, semi-improved or improved sites where ditches and other features remain.

To have begun the re-creation of at least 500 ha of wetland habitat.

To develop and implement a strategic approach to the conservation of wetlands.

To promote the conservation of notable wetland species.

5.7 Wetlands Action Plan

Objectives, actions and targets

Objective 1: To protect Hertfordshire's wetlands

Target: To minimise damage to wetland Wildlife Sites by development

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WE/A/1.1	Through inclusion of protection policies in local plans and the development control process, seek to minimise development adjacent to, or on wetland sites and river corridors	2005	Ongoing Annual report of progress	HMWT	HBRC, EA, EN, BW, LA's, LVRPA
WE/A/1.2	Ensure that protection of wetlands and key BAP wetland species are included in EA and all partner's strategic and local plans	2005	2010 with annual report	EA	All
WE/A/1.3	Ensure conservation and recreation management plans recognise the importance of open water bodies for wintering, roosting, moulting and breeding birds	2005	Ongoing Annual report on progress	HMWT	All members of Wetlands HAP Steering Group
WE/A/1.4	Ensure the significance of wetlands is recognised in all conservation management plans	2005	Ongoing Annual report on progress	HMWT	CMS, LVRPA, RSPB, TW, TVW, minerals companies

WE/A/1.5	Seek to ensure that key wetlands (SPAs, SSSIs, Wildlife Sites) are not adversely affected by low water levels resulting from unsustainable water abstraction	2005	Ongoing Annual report on progress	EA	

Objective 2: To promote the positive conservation management of existing wetland sites

Targets: a) 95% of the area of wetland SSSIs in favourable conservation status by 2010
b) 50% of wetland Wildlife Sites in favourable conservation status by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WE/A/2.1	Review the criteria for selection of wetland Wildlife Sites	2007	2007	WSO	EN, HBRC, HNHS
WE/A/2.2	Audit the distribution, area and composition of Hertfordshire's wet woodlands	2006	2007	EA	HMWT, HBRC
WE/A/2.3	Monitor and record the condition of three wetland Wildlife Sites annually	2005	Annual report	WSO	WSP
WE/A/2.4	Produce an annual report on the condition of wetland SSSIs	2005	Annual report	EN	
WE/A/2.5	Identify priority wetland areas for positive management and agree a programme of work	2005	Annually	HMWT	Wetlands HAP Working Group
WE/A/2.6	Implement positive management work on priority wetland areas	2006	Annual report	HMWT	Wetlands HAP Working Group
WE/A/2.7	Provide conservation management/grant aid advice to owners of wetland Wildlife Sites	2005	Annual report	WSO	WSP

Objective 3: To undertake targeted enhancement and restoration of priority wetlands and create new wetland habitats where appropriate

Targets: Restore 5 km of chalk rivers and 30 ha of reedbed by 2010
Restore/create five ponds and 1 km of ditches annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WE/A/3.1	Identify degraded wetland areas including those adjacent to rivers which are priorities for action as part of the Environment Agency's plans	2006	2007	EA	Wetland HAP Working Group
WE/A/3.2	Implement restoration works on the identified priority degraded areas	2007	2009	EA	Wetland HAP Working Group
WE/A/3.3	Restore 0.5 km of chalk rivers annually.	2006	Annual report	EA	HMWT, EN, CMS, Gwk, LA's

WE/A/3.4	Restore or create five ponds per year (excluding sites restored for Great Crested Newts)	2005	Annually	LVRPA, Lafarge, HMWT, RSPB, CMS	Gwk, RDS
WE/A/3.5	Restore and create a total of 30 ha of reedbed in Hertfordshire	2005	2010	HMWT, RSPB, LVRPA, BW, Lafarge	Cemex, EA
WE/A/3.6	Restore and enhance a minimum of 50 ha of floodplain (wet) grassland at a minimum of three sites	2006	2010	LVRPA, HMWT, Lafarge	
WE/A/3.7	Restore and create 1 km of ditches annually	2005	Annual report	LVRPA, HMWT, Lafarge	CMS, RDS
WE/A/3.8	By 2010, create 100 ha of wetland habitats including wet woodland, floodplain grassland, marsh/fen and open water through mineral restoration works	2006	Annual report on progress	Lafarge, Cemex	HCC minerals
WE/A/3.9	Establish a Wetlands Project Officer post to co-ordinate implementation of the HAP	2005	2008	HMWT	EA, BW, TW, TVW, LVRPA, EN

Objective 4: To raise awareness of wetlands, their need for conservation and to encourage participation in their conservation

Targets: Hold ten public events and a training workshop annually
Provide access to five large wetlands, with interpretation

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WE/A/4.1	Annually, hold ten public events, supported by articles and newsletters, to highlight the importance of wetlands for biodiversity	2005	Annual report on action	HMWT	CCB, CMS, RSPB, EA, HMWT, LVRPA, TW, TVW, BW
WE/A/4.2	Undertake demonstration event of best practice in wetland restoration for landownwers and managers once every five years	2007	Once every five years	EA	HMWT, CCB, CMS, RSPB, EA, HMWT, LVRPA, TW, TVW, BW, Lafarge
WE/A/4.3	Organise a wetland management workshop for practitioners to exchange best practice once every two years	2006	Once every two years	HMWT and CMS	CCB, RSPB, Gwk, EA, HMWT, LVRPA, TW, TVW, BW
WE/A/4.4	Establish a wetlands section on key partner's websites, highlighting wetland habitats and species, conservation and links to this plan	2006	2008	HMWT	CCB, RSPB, EA, HMWT, LVRPA, TW, TVW, BW
WE/A/4.5	Establish managed access, with	2006	2011	HMWT	RSPB, LVRPA,

	interpretation, to five large wetlands (over 4 ha) in Hertfordshire				BW, TVW, English Nature (Natural England), Lafarge, CMS, Gwk
WE/A/4.6	Establish King's Meads as a Dragonfly Sanctuary and Local Nature Reserve, with managed access and interpretation	2007	2007	HMWT	LA's, EA, TW

Relevant Action Plans:

Hertfordshire Plans
Water Vole; Otter; Bittern; Black-necked Grebe; White-clawed Crayfish; River Water-dropwort
Lee Valley Regional Park Authority BAP and Chilterns AONB BAP

National Plans
Eutrophic standing waters; chalk rivers; fens; reedbeds; wet woodland;
Fen, marsh and swamp Habitat Statement; Rivers and streams Habitat Statement; Standing open water and canals Habitat Statement

Abbreviations (Partners)

BW – British Waterways
CCB – Chilterns Conservation Board
CMS – Countryside Management Service
EA – Environment Agency
EN – English Nature
Gwk – Groundwork Hertfordshire
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
LA's – Local Authorities
LVRPA – Lee Valley Regional Park Authority
TVW – Three Valleys Water
TW – Thames Water
WSO – Wildlife Sites Officer
WSP – Wildlife Sites Partnership
(HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The lead for this plan is Herts & Middlesex Wildlife Trust
Tim Hill
Conservation Manager
Email: tim.hill@hmwt.org

6 Heathland and acid grassland habitat action plan

6.1 Heathland habitats

6.1.1 Summary

Heathlands and acid grasslands and their associated habitats contain a specialised group of plants and animals, often found in no other habitats. These species include heathers, gorses, sedges and bog mosses, and most of the British reptile and amphibian species. Where heathlands occur they are very popular, as demonstrated in the recent (Jan 1996) English Nature report 'Attitude survey of the value of heathlands'. They are much valued as beautiful 'wild' places full of wildlife and as attractive landscapes, particularly in the autumn when the heather is in flower. Heathlands, as remnant common land and often in the ownership of public authorities or conservation organisations are also greatly valued as accessible open spaces, where informal recreational activities such as walking may be carried out in peace and tranquillity.

This action plan considers heathlands and acidic grasslands together, as they invariably occur on the same soils and often as intimate mixtures on the same site. In Hertfordshire, acidic grassland is generally more significant.

6.1.2 Lowland heathland and acid grassland ecology

Lowland heathlands and acid grasslands are largely semi-natural habitats produced as a result of centuries of human influence. Most of the areas where lowland heathland has developed were covered by the wildwood 6000 years ago. The early clearances by Neolithic farmers were largely concentrated on drier soils. However, in many places, particularly where the underlying deposits were sands and gravels, these clearances resulted in the leaching of nutrients and acidification of the former forest soils. Under these conditions, heath and acid grassland communities could develop. Subsequent use of these areas for rough grazing by both domesticated and semi-wild stock would then maintain the new open habitats indefinitely. However, cessation of grazing or cutting results in the eventual succession of heathland to woodland.

Lowland heathland generally consists of an intimate patchwork of different vegetation communities, including dry heath, wet heath, acid grassland, bracken and scrub communities. Other important associated habitats are oligotrophic (nutrient poor) ponds and boggy pools and bare sandy ground. The precise location and mix of habitats develops in response to underlying geology and soils, topography and management influences, but the greater the variety of habitats the more species-rich the heathland is likely to be. **In Hertfordshire, acidic grasslands are the dominant habitat type.**

The heath vegetation is generally species-poor and dominated by combinations of dwarf shrubs such as Heather or Ling *Calluna vulgaris*, Bell Heather *Erica cinerea*, Cross-leaved Heath *Erica tetralix*, Common and Dwarf Gorse *Ulex europaeus* and *U. minor* and Petty Whin *Genista anglica*.

Acid grassland generally consists of a mixture of fine grasses such as Sheep's and Fine-leaved Sheep's Fescue *Festuca ovina* and *F. tenuifolia*, Common and Brown Bent *Agrostis capillaris* and *A. vinealis*, Early Hair-grass *Aira praecox* and Wavy Hair-grass *Deschampsia flexuosa*. This habitat is generally not rich in herbs, but typically includes Sheep's Sorrel *Rumex acetosella*, Tormentil *Potentilla erecta*, Heath Bedstraw *Galium saxatile* and Harebell *Campanula rotundifolia*.

Boggy pools and ponds will contain species adapted to the demanding conditions. These may contain various species of bog-moss *Sphagnum spp.* along with species such as Common Cottongrass *Eriophorum*

angustifolium and the insectivorous Sundew *Drosera rotundifolia*.

A specialised fauna is also associated with heathlands and heath/grass mosaics. Dartford Warblers breed in dense gorse scrub, while Nightjars nest in open heathy areas, often close to woodland. A majority of the British reptile and amphibian species can be found on heathlands. Of the rarer species, Sand Lizard and Smooth Snake are almost exclusively associated with this habitat in Britain, though neither of these has ever been recorded in Hertfordshire. Natterjack Toads are also found on heathland habitats and possibly occurred on Northaw Common, though there is no data to confirm this. Dwarf shrub species support a specialised range of invertebrates, including moths, beetles, spiders, bees and wasps. Black Darter dragonfly or Silver-studded Blue are also confined to or usually associated with heathlands. Bare sandy ground is particularly important for many solitary bees and wasps.

The precise vegetation components of lowland heathland are described more precisely in the various volumes of 'The National Vegetation Classification' (NVC) edited by J.S. Rodwell. In Hertfordshire, no survey has been undertaken of the heathland communities present, however, the communities likely to have been present at some time are listed in Appendix 3.

6.2 History of heath and acid grassland in Hertfordshire

Over many parts of southern and central Hertfordshire the underlying geology and soils would have permitted the establishment of acidic grassland and in localised areas heathland given suitable management practices. Therefore in pre-enclosure Hertfordshire there was potentially up to 10000 ha, perhaps more, of these habitats in the county. This would have included very large areas around Colney Heath and Tyttenhanger, North Mymms – Northaw – Little Berkhamsted, and in the west, above Berkhamsted.

Even by the early nineteenth century, it is estimated that approximately 5000 ha of heathland and acid grassland remained unenclosed (Sawford, 1990). **However, enclosure and agricultural improvement (ploughing, reseeding and/or fertilising) continued to destroy heathland and acid grasslands through the century and into the current century.**

By 1940, in addition to agricultural improvement, other developments for leisure facilities such as golf courses, urban expansion and mineral extraction had also taken their toll, resulting in a huge decline in the area of heathland and acid grassland. However, in spite of this it is estimated that 80% of Hertfordshire's remaining commons still contained good heathland habitats, and perhaps as much as 750 ha of heathland and at least this area of acid grassland survived in the county.

Unfortunately, the loss of heathland in Hertfordshire has been even more dramatic since 1940, with an estimated 97% loss in area, so that today no more than about 20 ha of open dry and wet heath survives (Herts Habitat Survey). **The major cause of this decline was almost complete cessation of traditional management practices on common land, with the resultant scrub and bracken growth smothering the remaining open heathy habitats.**

Today, the remaining heathland in Hertfordshire is present as scattered fragments amongst scrub, bracken and secondary woodland habitats, on about 15 sites, most of which are commons in public ownership.

The area of acid grassland has survived to a greater extent, with as much as 145 ha surviving on about 30 sites, most of which are privately owned and still farmed. However, the majority of this area is concentrated on a few sites, with only five being greater than 10 ha in size.

This decline in the area of habitat has resulted in the extinction from the county of several typical species, including Cross-leaved Heath *Erica tetralix*, Dartford Warbler and Black Darter dragonfly, as well as the marked decline in others such as Bell Heather, Petty Whin and Nightjar.

6.3 Heathland and acid grassland – current status, trends and threats

6.3.1 Status

The UK currently has approximately 57000 hectares (ha) of lowland heathland, which represents 20% of the European resource (*Biodiversity Challenge*, 2nd edition, 1995). Nationally, we therefore have an international responsibility for the conservation of this resource. In addition it is estimated that there are 30000 ha of lowland acidic grassland.

Lowland dry and wet heath communities are listed on Annex 1 of the EC Habitats Directive, which requires member states to restore and maintain these habitats at a favourable conservation status.

The total heathland resource for Hertfordshire is estimated to be about 20 ha of dry and wet heath communities. This figure rises to about 100 ha if areas of degraded open heathland, comprising associated acid grassland, bracken and scattered scrub communities, found on the remaining heathland sites are also included. The remaining heathland is scattered over about a dozen sites which are listed in Appendix 1, with heathy remnants on about another two dozen sites.

The total acid grassland resource for the county is estimated to be about 145 ha. This occurs on about 30 major sites, which are listed in Appendix 1.

The heathland zones in the county correspond to the 'Natural Areas' of the Countryside Commission and English Nature Joint Character Map. Remaining heathland sites are found in three of the 'Natural Areas' covering Hertfordshire, though are mainly located in the London Basin and Chilterns. Likewise, the remaining heathland sites are found in four of the County Council 'Landscape Regions', though mostly in two of these: the Chilterns and the Central River Valleys.

Lowland heath and acid grassland is recognised as an important component of the London Basin natural area, with the stated objective of increasing the area of properly managed heathland, through maintaining and enhancing existing heathland sites and restoration of degraded land. It is also recognised as a component of the Chilterns natural area.

The Natural areas where heathland and acid grassland is found in the county are listed below with their geological deposits and the current major heathland and acid grassland sites (see also map 6.1).

Chilterns – **Geology: Clay-with-Flints and/or Pebbly Clay and Sand**

Key heathland sites: Berkhamsted and Northchurch Commons; Gustardwood Common.

Key acid grassland sites: Harpenden Common; Marshalls Heath and Kinsbourne Green, Harpenden.

London Basin – **Geology: Pebble Gravels, Reading Beds, London Clay**

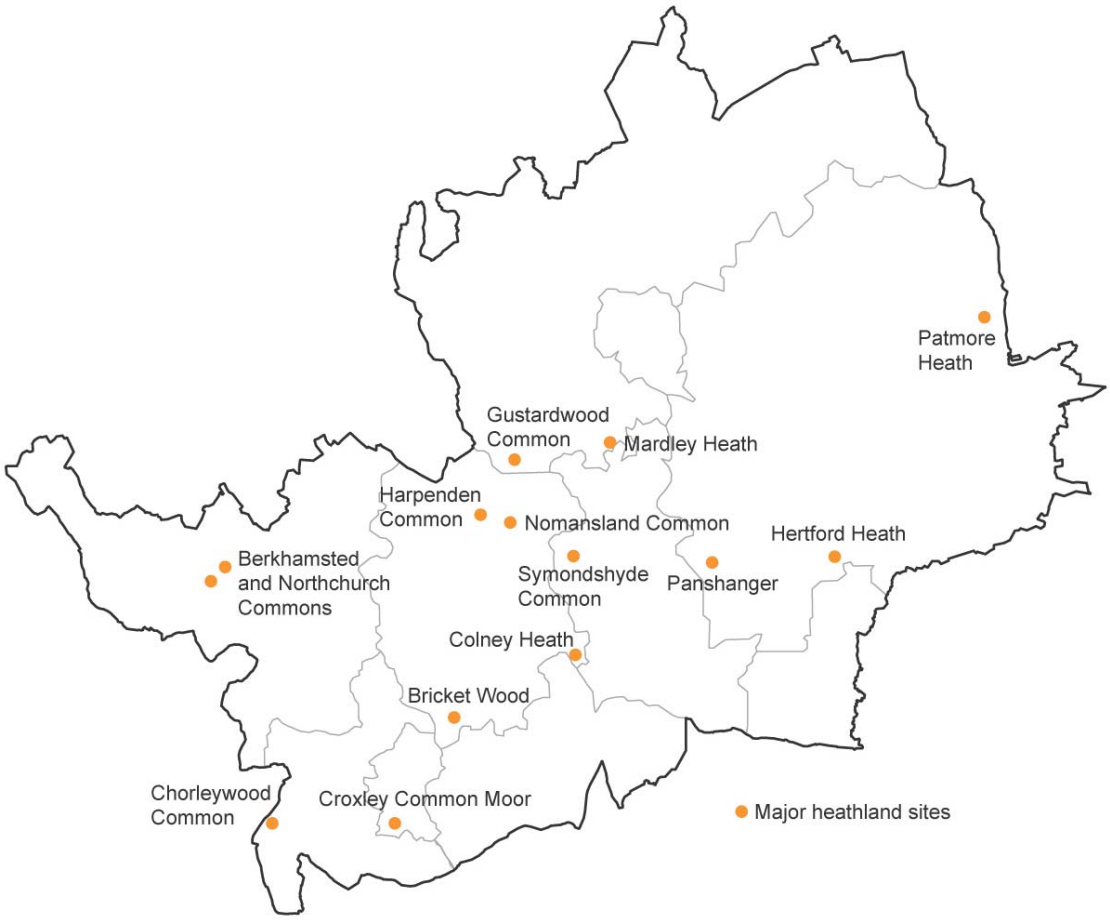
Key heathland sites: Hertford Heath SSSI; Bricket Wood Common SSSI; Nomansland Common; Colney Heath; Chorleywood Common; Croxley Common Moor SSSI and (formerly North Mymms-Northaw-Little Berkhamsted triangle).

Key acid grassland sites: Knebworth Park; Meadow by Norton Green, Knebworth; Crouch Green, Knebworth; Burleigh Meadow, Knebworth (SSSI); Jacotts Hill Golf Course, Watford; Radlett Golf Course; Batchworth Heath; Codicote Heath and adjoining Pasture; Peplins Wood Meadow, North Mymms; Ponsfall Farm Pastures, Newgate Street; Brickendon Green; Claypits Meadow, Bayford and Wormley West End Meadows (part SSSI).

Other potential heathy sites: Symondshyde Great Wood; Panshanger Park; Mardley Heath; Hatfield and Millwards Park; Northaw Great Wood SSSI; Broad Riding Wood; Cowheath Wood; Broxbourne Wood and Moor Park.

East Anglian Plain – **Geology: Reading Beds outlier**

Key heathland and acid grassland sites: Patmore Heath SSSI.



Map 6.1 – Existing heathland sites in Hertfordshire

Little work has been done on the status or extent of decline of species associated with heathland and acid grassland habitats. The production of the Hertfordshire Red Data Book by the Herts Natural History Society (Sawford, 1990) will help provide this information. This will include species still found in the county, but could also include species known to have become extinct locally.

Examples of species associated with this habitat which are locally of conservation concern include:

Flora:

Heather/Ling *Calluna vulgaris*
Bell Heather *Erica cinerea*
Petty Whin *Genista anglica*
Dyers Greenweed *Genista tinctoria*
Dwarf Gorse *Ulex minor*
Creeping Willow *Salix repens*
Heath Milkwort *Polygala serpyllifolia*
Heath Grass *Danthonia decumbens*
Heath Spotted Orchid *Dactylorhiza maculata*
Purple Moor Grass *Molinia caerulea*
Mat-grass *Nardus stricta*
Green-ribbed Sedge *Carex binervis*
Star Sedge *Carex echinata*
Common Yellow Sedge *Carex demissa*
Fine-leaved Sheep's Fescue *Festuca filiformis*
Creeping Tormentil *Potentilla anglica*
Upright Tormentil *Potentilla erecta*
Silvery Hair-grass *Aira caryophyllea*
Early Hair-grass *Aira praecox*
Heath Rush *Juncus squarrosus*
Birdsfoot *Ornithopus perpusillus*
Heath Dog Violet *Viola canina*
Lousewort *Pedicularis sylvatica*
Brown Bent *Agrostis vinealis*

Lower plants:

Bog mosses *Sphagnum spp*

Birds:

Nightjar
Woodlark

Invertebrates:

Lepidoptera
Neglected Rustic Moth *Xestia castanea*
Aristotalia ericinela
Coleophora juncicolella
Sophronia semicostella
Narrow Winged Pug *Eupithecia nanata angusta*

Coleoptera
Green Tiger Beetle
Heather Beetle

Hymenoptera
Andrena fuscipes
Nomada ruficornis
Priocnemis fennica

Orthoptera
Mottled Grasshopper *Myrmeleo tettix maculata*

6.3.2 Trends

Loss of heathland and acid grassland sites to other land uses or agricultural improvement is now largely a thing of the past. The remaining dry and wet heath sites are now mostly being managed with conservation in mind, though much of the work is being undertaken in an unco-ordinated fashion. Continued scrub encroachment is still a problem on some sites. At present, heathlands are also inherently unproductive in economic terms, hence the scale of conversion to other land uses and neglect. This low value threatens their future existance, with the increased use for more formal sports activities, such as golf, an example of this. However, they are often valued as open space for recreational activities.

The effects of acid deposition, resulting in species impoverishment is an undesirable trend for both heathland and acidic grassland. Neglect or conversion to more 'productive' grassland is a continuing trend for acid grasslands, as is the increase in horse grazing.

6.3.3 Threats

The major threats facing the remaining heathlands and acidic grasslands in Hertfordshire are continued scrub encroachment, management practices, the small size of many of the remaining heathland patches, recreational pressures and nutrient enrichment.

The major threat facing many heathland and acid grassland sites on common land continues to be scrub encroachment. In the absence of grazing or cutting management, the growth of scrub overshadows the typical plants, eventually leading to their loss from a site. On other sites Bracken rather than scrub may overshadow the vegetation. On many of the most valuable sites scrub is now being controlled, though in the absence of long-term management, the threat will remain.

The second threat is from the management practices adopted on heaths and acidic grasslands. Grazing is the ideal management for these habitats, but few sites are actively grazed. Many sites are cut, particularly where they include golf courses or are part of publicly managed open spaces. On these sites the mowing regimes are often too frequent, inhibiting flowering of the typical species and not allowing the development of the varied sward structure required by many invertebrates.

The third major threat, which applies particularly to acid grasslands is inapproprite grazing, usually by horses. Well managed horse grazing is often a good way to manage many sites and better than mowing or neglect. However, too often overgrazing occurs resulting in species impoverishment.

The fourth threat identified is the small size and isolation of most of the remaining sites. This makes them unsuitable for many dependent plants and animals because there is insufficient suitable habitat. In addition, there is an increased risk of small populations becoming extinct from a site due to chance factors such as fires. The isolation of sites also precludes the likelihood of a species recolonising a site once lost.

The fifth major threat which applies to many common land sites is from recreational pressures. Trampling in particular can inhibit the growth of scarce

plants, while other associated risks include accidental fires. A largely urban population often resists attemps to positively manage or restore heath and acidic grassland habitats, by scrub and tree removal or enclosure (even temporary) for grazing.

The final major threat is from the effects of nutrient enrichment. This occurs as a result of pollution, from for example road traffic, and run off or spray drift from agricultural chemicals. Heathlands and acid grasslands depend on low soil nutrient levels and low soil pH. Pollution alters these and results in a change in vegetation with fast growing species out-competing the typical heath and acid grassland flora.

6.4 The future for heathland and acid grassland in Hertfordshire

6.4.1 Is Heath/acid grassland restoration worthwhile in Hertfordshire?

This question must be answered by looking at both national and local priorities for conservation action and the feasibility of restoration from such a small resource, in the case of heath communities.

Heathland

The argument against restoring heathland can be summarised as follows. Within the national heathland habitat action plan, Hertfordshire is not one of the priority counties for the management and restoration of lowland heathlands. Restoration of true heathland depends on the formation of podzolised soils, which only develop under demanding conditions over a long period. We may already have lost too much heathland and therefore restoration may be difficult and costly. Restoration could also potentially result in damage to valuable habitats which have superceeded the original heathland.

It could therefore be argued that, conservation effort in the county should be targeted to other more extensive and easily managed habitats typical of the county. Under this option it would still be desirable to manage the existing open heathland areas, but not aim to extend these areas to any significant degree.

However, the case for restoring heathlands in the county is strong. The aim of the national biodiversity action plan is **to maintain and increase the extent and range of all the habitats found within the UK.** Though heathlands in Hertfordshire are not a national priority for action, being located away from the core areas, conservation and restoration of the county's heathlands would contribute to **maintaining the range of the habitat**, which is a vital component of biodiversity protection. Hertfordshire's heaths and acid grasslands could form a strategic link between those of central southern England and East Anglia.

Secondly, within Hertfordshire there are only a few habitats, which can be considered a national priority for action. Therefore, we should also concentrate on those locally important habitats which make a significant contribution to our county's biodiversity resource. Heathlands were once a major feature of the landscape and ecology of the county and they have suffered a huge decline over the past 200 years. The remaining heathlands in the county are likely to support many species which depend on the heathland habitats for their continued local survival. However, the small size of many of the remaining heathland patches also increases the risks of local extinctions of heathland species. Loss of heathland and associated species would result in a significant decline in our local biodiversity resource. Finally, there is the aesthetic value of heathland, which involves the open space character of the habitat and the attractiveness of some of the species such as heather.

Acid grassland

Acidic grasslands are not a national priority for action, but like heathlands are an important part of the local ecological resource. They also have the potential to form a strategic link for this habitat between central southern England and East Anglia and are therefore important in maintaining the range of the habitat. Acidic grasslands are also more extensive than heathlands in Hertfordshire and can occur on a wider variety of soils. Restoration is therefore less problemmatic than for true heath.

We therefore strongly believe that management and restoration of heathlands and acid grasslands should be seen as a local priority for conservation action.

6.4.2 How much heathland and acid grassland should be restored?

Precise figures for the extent of heathand and acid

grassland in the county at various times in the past are not available. However, there are the estimates given earlier in this document for about 5000 ha in the early 1800s, approximately 750 ha in 1940, and about 20 ha of true dry or wet heath and 145 ha of acid grassland today.

The targets established must reflect the following nationally accepted sequence:

1. Manage existing heath and acid grassland

2. Restore heath and acid grassland on existing sites

3. Create new 'heath' and grasslands to enlarge, buffer and link existing sites.

The figures presented later in this plan have been carefully considered. Ideally they would have been based on scientific data for the minimum areas required to maintain viable, self-sustaining populations of species typical of Hertfordshire's heathlands. Unfortunately such information is not available. The figures are therefore based on a knowledge of the ecology and history of heaths and acid grasslands in the county. They comprise existing areas of heath and acid grassland, areas of degraded habitat that will realistically revert to heath and acid grassland, as well as additional areas of land where it may prove feasible and be beneficial to create new 'heath' and acid grassland habitats.

6.4.3 Management of existing sites

Heathland

Initial efforts must be aimed at ensuring that all remaining sites have ecologically sympathetic management regimes established within ten years. **It will be essential to write/review management plans for all sites to reflect the priorities and targets established in this action plan.**

Grazing has always played a fundamental role in the development and maintenance of heathlands. It is the traditional form of management for the habitat and can provide the means to create and maintain a wide variety of heathland communities. It is therefore vital to successful management. **In the longer term, low intensity grazing management must be re-introduced to all the major heathland sites, in order to enhance and thereafter maintain the open areas and prevent scrub encroachment.**

Re-introducing grazing to many sites is problematical, in that they are often registered common land. Grazing will not usually occur without fencing, but fencing common land, even if temporary, requires approval from the Department of the Environment. There is a lengthy legal and consultation process to go through, involving local commoners in particular, the Open Spaces Society and local people. Very often, temporary fencing is the only accpetable solution, but even this is often opposed. Greater recognition of the essential role of grazing in management is required if heathy common land is to survive as open space in the

Case study – Mid-Herts Golf Club, Gustardwood Common

Mid-Herts Golf Club have recently changed their mowing regimes for roughs and out of play areas, under advice from the Herts & Middlesex Wildlife Trust. Previously, roughs and out of play areas had been mown at a low height several times each summer and there were no areas of semi-rough. This management had greatly suppressed the heathy and acid grassland flora, with a noticeable decline in heather, a typical and much loved feature of the course.

The new mowing regime involves cutting the roughs and out of play areas only once a year back to a height of 10 cm. Selected patches of heather in out of play areas are being left unmown. In addition, fairways have been narrowed by the creation of areas of semi-rough, improving the golfing environment.

The benefits have been seen after only one year, with improved flowering of heather and other typical heathy species and the development of a more varied grassland habitat.

future.

While grazing is feasible on many sites, it will take time to re-introduce. In the meantime cutting will be required to prevent scrub encroachment and domination by more competitive species. However, on some sites, particularly the heath and acid grassland golf courses, grazing is unlikely to be a realistic option. The heath and acid grassland vegetation on the roughs and out of play areas of golf courses require **a suitable cutting regime to be introduced to maintain the diversity of habitats and associated wildlife.**

Acid grassland

As for heathland, the most appropriate form of management is grazing. With many sites being in private ownership and still farmed, grazing is more possible than for heathland sites on common land. However, it is important to ensure that owners recognise the value of these sites and that grazing is carried out sensitively. The 'old meadows and pastures' option of Countryside Stewardship now covers these sites and can therefore be used to ensure owners receive advice and grant aid to help achieve sympathetic management.

The acid grassland sites which are also common land suffer from the same constraints described above for heathland. Likewise acid grassland out of play areas and roughs on golf courses require sympathetic mowing regimes to maintain their ecological interest.

6.4.4 Restoration on existing sites

The second stage is to look at the possibilities for restoring heathland and acidic grasslands on existing sites and sites which had these habitats until relatively recently.

Heathland

A vast majority of the heathland present in 1940 was on unenclosed common land. Much of this common land still survives today, although the open habitats have largely been replaced by scrub and secondary woodland. It is possible that a heathland and acid grassland seedbank still survives on many of these commons and with the appropriate restoration management it would be possible to re-establish these habitats over large areas. Likewise areas of heathland recently planted with conifers also have potential for restoration, particularly where a remnant heathy habitat remains along rides and in glades. However, to take advantage of this, **it is essential that the restoration work is undertaken in the next 10**

Case study – Berkhamsted Common and Golf Club

Berkhamsted Golf Club own part of Berkhamsted Common. They have recently drawn up a plan for heathland restoration in conjunction with the Countryside Management Service. This covers both the roughs and out of play areas of the golf course as well as other parts of the common in their ownership.

The club has entered into a Woodland Grant Scheme, to manage areas of woodland in their ownership. The 20% open space allowed in woodlands entered into this scheme has been targeted to woodland edges along the roughs and adjacent to other heathland and acid grassland areas. Encroaching scrub and trees are being cleared, preventing overshadowing of the remnant heath and acid grassland areas.

The club have also entered the larger areas in their ownership, away from the golf course, into Countryside Stewardship. Through this, an area dominated by bracken and scrub has been targeted for restoration to the former heath and acid grassland vegetation. The scrub and trees were initially cut and removed. The bracken has since been cut once or twice a year depending on growth rates. The area was also rotovated once, to expose the rhizomes to frost action and turn the accumulated litter into the soil. After two years, the bracken has decreased dramatically and a heathy/grassy vegetation is beginning to return. The cut bracken is being composted in a trial scheme, which if successful will provide an incentive to restore larger areas of both Berkhamsted and Northchurch Commons.

years, before the seed bank is completely lost and soil profiles changed too much.

When undertaking restoration management, not all species formerly present will return, but heath and acid grassland vegetation can be restored with only a moderate decline in the original species complement.

Relic dry heath and acid grassland, in particular, responds very well to appropriate restoration management. This ideally involves clearance of scrub and secondary woodland followed by heavy disturbance and removal of accumulated organic layers. This encourages the remnant heath and grassland seed bank to germinate and natural colonisation of species from neighbouring areas. Where bracken has encroached onto heath and acid grassland, restoration of the original heathy communities can also be achieved by cutting and removing accumulated bracken litter. However, wet heath is more difficult to restore, though may also respond well in areas immediately adjacent to existing heathland. It is therefore essential to retain and manage the remaining wet heath sites.

However, care must be taken when carrying out such restoration management, to ensure that an existing habitat of value is not destroyed. For example, simply converting a valuable acid grassland habitat to a heather stand can not be justified ecologically. Likewise, areas that have been secondary woodland for a prolonged period and are considered unlikely to revert to heathland, or have gained their own significant wildlife value should be excluded.

Acid grassland

The restoration work on commons described above, will also benefit acid grassland habitats as well as heathland. In addition, acid grasslands which have been semi-improved and are still in agricultural production could be restored to a more ecologically valuable condition through appropriate management. Introduction of more sensitive and less intensive grazing regimes may enable an increase in species richness and the development of a more varied structure to the benefit of a wide variety of wildlife.

Again in the longer term, once heath and acid grassland vegetation has been restored, **it will be essential to implement low intensity grazing management**, in order to enhance and maintain the restored habitats.

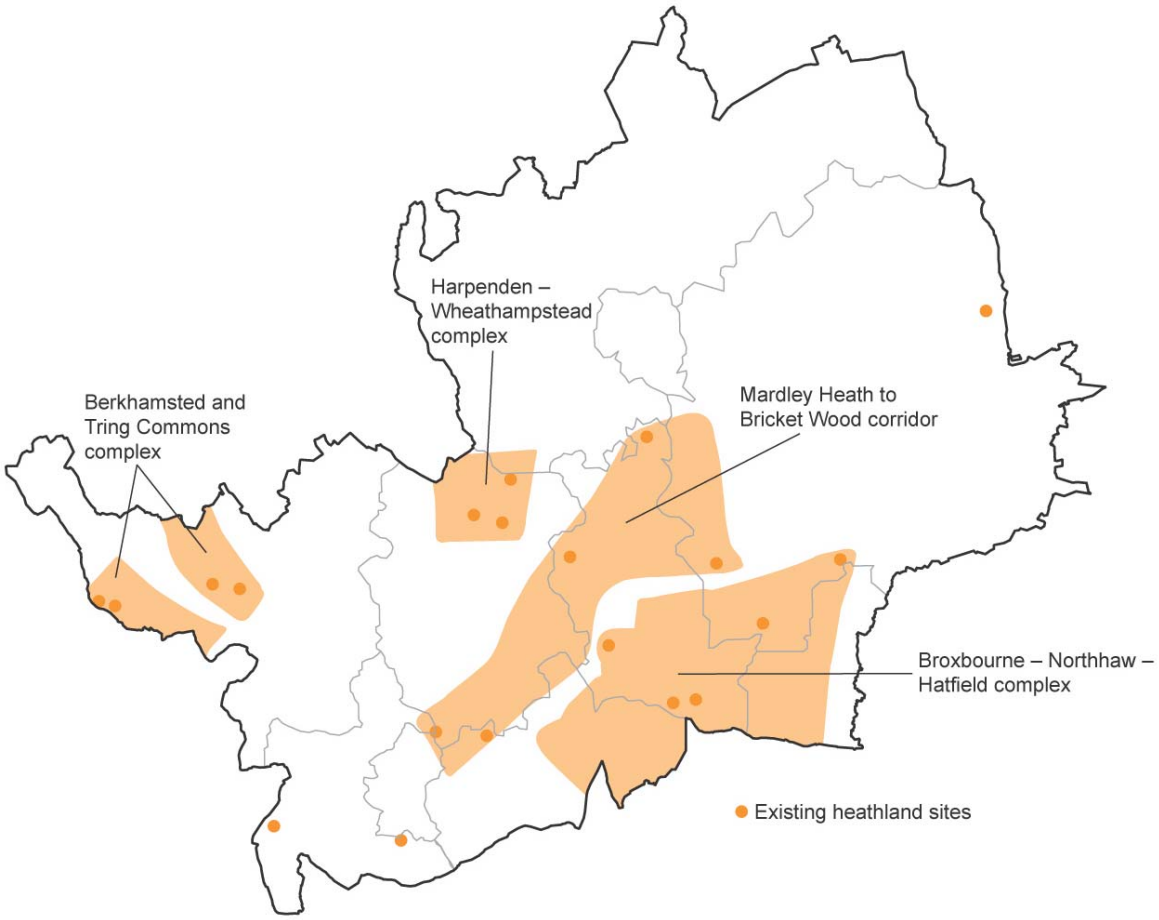
The Wildlife Trust estimates that it would be possible to restore 150 ha of heath and acid grassland vegetation on the remaining commons and unimproved and semi-improved acid grassland sites. This would be achieved by a planned programme of heath and acid grassland restoration work and the re-introduction of grazing, or suitable cutting regimes.

6.4.5 Creation of new heath/acid grassland habitats

As well as management and restoration on existing sites, this action plan looks to create *heathland-type* communities on new sites with suitable geology and soil conditions. Heath and acid grassland sites which were enclosed during the last century and first part of this century, and have been in agricultural production since, are unlikely to retain any semblance of a heathy flora or seed bank. While the underlying geology means it would in theory be possible to re-create these habitats in many areas of southern and central Herts (see map 6.2), **the gross changes in soil profiles and chemistry due to modern agriculture means that in practice re-establishment of true heathland is unlikely.**

We should, however, aim to create extensively managed 'natural' grasslands with no predetermined view as to the composition of the vegetation communities which develop. These new *heathland-type* habitats will form valuable habitat types in their own right, particularly if managed to create a varied habitat structure.

The existing heath and acid grassland sites are marked on map 6.1. Map 6.2 relates these sites to the underlying geology and from this identifies four core areas where there are concentrations of sites. Core areas have been identified for targeting work on heaths and acid grasslands, which is necessary due to the extreme fragmentation and isolation of the remaining sites. In order to conserve the county's



Map 6.2 – Core areas for heath and acid grassland restoration and re-creation in Herfordshire

heath and acid grassland biodiversity it will be essential to increase the area of habitat blocks. Therefore concentrating effort on fewer larger sites will be more valuable than undertaking action on many small sites. The core areas have also been chosen with the aim of maintaining the ecological variation found in Hertfordshire's heaths and acid grasslands, by maintaining the traditional geographical spread inthe county. **Opportunities for the creation of these new *heathland-type* habitats should be targeted to these core areas and be aimed at enlarging, buffering and linking existing heath and acid grassland sites.**

Where the creation of new *heathland type* habitats is undertaken, it is essential that natural processes are encouraged. Heath and acid grassland is a complex habitat with a mixture of vegetation communities often found in an intimate patchwork. Such a habitat cannot be artificially created by man. Management must therefore be aimed at promoting natural colonisation processes and the establishment of extensive management practices such as grazing. It should not be aimed at establishing pre-determined vegetation communities such as heather stands, since in time, the heath and grassland habitats which develop more naturally will be of greater value to wildlife. It is likely that the new *heathland-type* habitats will appear as grasslands rather than true heathland communities dominated by dwarf shrubs such as heather and gorse.

However, in some situations, particularly where new habitats are being developed on land coming out of agricultural production, sowing of a fine acid grass seed mix consisting of locally appropriate species may be acceptable. In other cases, the carefully considered deliberate re-introduction of key heath and acid grassland species may also be appropriate, for aesthetic reasons or because there is little chance of such species recolonising naturally. Locally appropriate species, ideally from local seed sources

Case study – Cox's Field, Berkhamsted Common

This isolated field on Berkhamsted Common, was until recently in arable production, though had formerly been part of the extensive heathland habitats of the common. The tenant farmer and Countryside Management Service have worked together to enter this field into the Countryside Stewardship scheme, under a habitat creation option.

With advice from the Hertfordshire Biological Records Centre, the field has been sown with a fine-leaved grass mix, consisting of locally appropriate species. The area is not at present grazed, but is mown annually. In order to diversify the habitat, it was decided to attempt to re-introduce heather to trial plots. In January 1996, the trial heather re-introduction plots were established. The grassland vegetation was sprayed and heather seed put down. There was not enough local seed available at the time of the trial, so seed was brought in from Surrey. Unfortunately, this has not taken due to the summer drought conditions of the last two years. However, another attempt will be made, using local seed.

should be used, to maintain any locally distinct genetic variation.

There are several opportunities for creating new *heathland-type* habitats, including through a future more environmentally based agricultural policy, through management of forestry plantations and through restoration of old mineral sites.

Opportunities for creation on farmland may arise out of future agricultural reforms, with a greater emphasis on extensification and non-food related payments to the farming industry, and the likelihood that a significant area of land may become available for non-agricultural related purposes. However, the inherentlylow productivity of these habitat types means that little or no restoration or creation of these habitat types on farmland will occur without the support of improved countryside and agricultural grant packages. Even withimproved packages, the option may not be attractive to landowners and may only occur if public authorities or conservation organisations enter land into such schemes.

A second opportunity is from creating and maintaining open space in forestry plantations on former heathy sites. Within the Broxbourne/Northaw complex, Cowheath Wood and Broad Riding Wood do have the right soils and history and may be suitable if a programme of selective ride widening and glade creation was agreeable to the owners. The provision of a heathy corridor such as this between Hertford Heath and Northaw is a major opportunity. Likewise, such a ride and glade programme at Hatfield Home Park and Millwards Park provides an opportunity, though again is dependent upon the interests of the owners.

The major opportunity for creation will be through the restoration of old mineral workings. Rather than restoring to agricultural land, which is in surplus, more imaginative restoration programmes involving re-creation of habitats, including *heathland-type* habitats must be considered. These could, and should, provide a large contribution to the conservation and enhancement of our local biodiversity.

Minerals companies and the planning authorities responsible for minerals planning, must consider large scale habitat creation, including *heathland-type* habitats, as a priority for restoration schemes. Specific sites in strategic locations should be identified at an early stage with the mineral operators and the minerals planning authority.

Creation of *heathland-type* habitats, would provide real opportunities for increasing the recreational resource for the local population, particularly if associated with initiatives such as Watling Chase Community Forest. Indeed provision of areas of heath and acid grassland as public open space for informal recreation, may provide the best opportunity for promoting restoration and creation, by providing a beneficial land use for these habitats. A recently established example is at Waterford Heath, where a partnership between the owners Redlands, Groundwork Hertfordshire, Herts & Middlesex Wildlife Trust and the local community, is turning a former

minerals working into a public open space, based around naturally regenerating grasslands.

While agreement may be reached with minerals operators to restore workings to new *heathland-type* habitats and to dedicate areas as public open space, further expansion from agricultural or forestry uses is only likely if land is purchased by public authorities, conservation organisations or partnerships between these.

The work of the Watling Chase Community Forest can help realise opportunities for creation of *heathland-type* habitats, on both agricultural land and as part of restoring mineral workings, particularly where public access is an option.

The Wildlife Trust believes it would be possible to create at least 250 ha of new *heathland type* habitats, by targeting agricultural land, restored minerals sites and forestry plantations in the core areas in the county. The aim would be to enlarge, buffer and link existing heath and acid grassland sites, providing opportunities for natural colonisation of plants and animals.

6.4.6 Public awareness

To achieve the management, restoration and creation objectives outlined above, a programme aimed at raising public awareness of the issues surrounding heaths and acid grasslands is required. The EN 'Attitude survey of the value of heathlands', showed that even in major heathland areas such as Surrey and Dorset, while heathlands were much valued, understanding of their management by the general public was poor. People were generally unaware of the long history of heathlands and did not relate management techniques to the changes which have occurred, such as scrub encroachment.

The survey also showed that people would value more information on heathland wildlife, history and management, with media such as maps, path guides, leaflets and interpretative boards favoured. It is therefore vital for all organisations involved in heathland management to involve local people in the work and to provide them with the information they seek.

6.5 A vision for heathland and acid grassland

We would expect to see a significantly expanded heath and acid grassland habitat in 50 years time, of at least 650 ha. This expansion will be concentrated in four core areas, where there would be at least one larger site and several linked smaller sites.

Populations of all species typical of heath and acid grassland in Hertfordshire and still present in the county will be maintained at, or enhanced to viable self-sustaining levels. In addition, heathland species lost from the county since 1900 will be encouraged back to the county through the creation of suitable habitat conditions. If necessary some species may be re-introduced using accepted scientific criteria and methods.

All heathland and acid grassland sites will be managed in environmentally sensitive ways, based around rough, low intensity grazing, which will maintain the variety of associated habitats.

Where grazing is not possible, for example on golf courses, appropriate cutting regimes will be in place. On golf courses the out of play areas and the areas of rough will be managed for the benefit of the heath and acid grassland communities through appropriate scrub management and mowing regimes.

Restoration and re-creation of these habitats in Hertfordshire will be concentrated in four core areas, based around existing concentrations of sites and underlying geology and geographical position. These core areas would aim to maintain the ecological variation found in Hertfordshire's heathlands. The four core areas would be (1) Berkhamsted and Tring Commons, (2) Harpenden-Wheathampstead complex, (3) Upper Colne Valley, and (4) Broxbourne-Northaw-Hatfield Park complex. Within these core areas there would be at least one larger main site and several smaller heathland sites, linked where possible.

In the Berkhamsted Commons complex, a heath and acid grassland area of about 250 ha will have been established on Berkhamsted/Northchurch Commons, and other smaller sites, through management of existing areas and a programme of heath and acid grassland restoration on these existing sites. In addition, a smaller area may be restored on the former heathy site of Wigginton Common.

In the Harpenden-Wheathampstead complex, the major existing sites at Nomansland Common and Gustardwood Common will have been largely restored and will be managed as open heath and acid grassland. In addition, other acid grassland sites will be managed appropriately making a total area of approximately 30 ha of heath and acid grassland. Opportunities will have been sought for creating new *heathland-type* habitats on at least 10 ha of neighbouring agricultural or forestry land to enlarge and buffer these sites. However, opportunities are likely to be limited, due to the nature of the geology and soils in this area.

In the Upper Colne Valley, open heath and acid grassland will have been restored where possible on all existing sites, which will be managed appropriately. Key sites include Colney Heath and Bricket Wood Common. This will make an area of approximately 35 ha. In addition, opportunities will have been sought for creating new *heathland-type* habitats on at least 50 ha of neighbouring agricultural or forestry land to enlarge and buffer the sites in this core area. A further opportunity will have been sought for creating at least two new *heathland-type* sites of at least 50 ha, to the south of St Albans, associated with restoration of a completed minerals working.

In the Broxbourne-Northaw-Hatfield Park complex, open heath and acid grassland will have been restored on existing sites, all of which will be managed appropriately, making an area of at least 25 ha. Opportunities will have been sought for creation of new *heathland-type* habitats on a further 100 ha of neighbouring agricultural or forestry land with the aim of enlarging and buffering the remaining heathland areas. Key areas include the old Northaw and Cuffley Commons and a ride/glade network through the Broxbourne Woods area. This, together with the Upper Colne Valley, is likely to be the area with the greatest opportunities for the re-creation of *heathland-type* habitats, because of the large historic heathland

commons which were present in the area, the very poor soils and the fact that the area already contains a high concentration of important wildlife sites.

There will be at least a further 25 ha of open heath and acid grassland restored and managed on other isolated heathland sites such as Chorleywood Common, Mardley Heath, Patmore Heath or Panshanger Park.

In total, there will be an area of at least 400 ha of heath and acid grassland on existing sites. In addition, at least 250 ha of *heathland-type* habitats (naturally regenerated grasslands) will have been created on new sites. This will be as a result of conversion of surplus agricultural or forestry land and restoration of minerals sites, including two large new heathland sites of at least 50 ha.

Heaths and acid grasslands will provide a valuable recreational resource for the local population. Sites where heathland restoration and re-creation is possible should be promoted as areas of public open space, to ensure that they acquire a 'beneficial' land use, without which there is unlikely to be any incentive to promote heathlands.

6.6 Ten year targets

To ensure no further loss of heathland and acid grassland sites to development or other changes.

To have all remaining heaths and acidic grasslands under appropriate management and to have established restoration programmes on degraded sites by 2007.

To have restored 150 ha of heathland-type habitats on existing sites by 2007.

To have begun large-scale creation of at least 100 ha of new heath and acid grassland type habitats.

6.7 Grassland and Heathland Action Plan

Combining the previous action plans for heathland and acid grassland, neutral grassland and chalk grassland

Objectives, actions and targets

Objective 1: To protect and safeguard Hertfordshire's grasslands from further loss from development

Target: Ensure no further loss or damage to grassland Wildlife Sites from development by annual monitoring through the Wildlife Sites Partnership

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GH/A/1.1	Ensure that there are protection policies for Wildlife Sites in Local Development Frameworks (LDF's) and Local Plans	2006	Annual report	HMWT	LA's, HBRC
GH/A/1.2	Defend threatened sites through responses to all relevant planning applications	2006	Annual report	HMWT	LA's, HBRC
GH/A/1.3	Continue designation of grassland Wildlife Sites	2006	Annual	WSO	WSP, LA's

GH/A/1.4	Review the new criteria for selection of grassland Wildlife Sites	2006	2007	WSO	EN, HBRC, HMWT
GH/A/1.5	Identify and designate as LNRs key grassland sites of ecological importance, designating at least one a year (Suggested sites are: For acid grassland – Nomanslands Common, Brickett Wood Common SSSI For chalk grassland – Tring Park/Oddy Hill and Weston Hills, Baldock For neutral grassland – Fairlands Valley, Stevenage and several open spaces in Hemel Hempstead)	2006	Annual report	HMWT	EN, CMS, HBRC, LA's

Objective 2: To promote the positive conservation management of ecologically important grassland sites

Target: Aim to have 95% of existing SSSI grasslands and 10% of existing grassland Wildlife Sites in positive conservation status by 2010

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GH/A/2.1	Identify and map the number and area (ha) of existing grassland wildlife sites	2006	2007	HBRC	WSP
GH/A/2.2	Identify, list and map the grasslands that are owned or managed by public bodies, local authorities and nature conservation organisations and assess whether they have appropriate management plans in place	2006	2007	HBRC	GWG
GH/A/2.3	Identify the ecologically important grasslands that are being managed positively for their nature conservation interest.	2006	2007	GWG	LA's, landowners
GH/A/2.4	Establish a monitoring program to determine the condition of these ecologically important grasslands	2007	2007	WSO	HMWT, HBRC, EN
GH/A/2.5	Establish a Hertfordshire Grazing Animal Project to help achieve sustainable grazing in Herts	2006	2007	HMWT	GAP, GWG
GH/A/2.6	Establish a strategic approach to grazing and identify the priority sites for grazing	2006	2007	Herts GAP steering group	GWG, GAP, LA's, landowners
GH/A/2.7	Establish and maintain grazing on the identified priority sites	2007	Annual report	Herts GAP steering group	GWG, GAP, LA's, landowners
GH/A/2.8	Provide advice on conservation and opportunities for grant funding to owners and managers of grassland sites	2005	Annual report	GWG	BC, CCB, CMS, FWAG, HMWT, LA's, WSP

Objective 3: Restore and enhance grasslands and heathlands within the county, through creation, linking and restoring identified grassland (or potential grassland) sites

Target: a) By 2010 restore: 150 ha of heathland type habitat (on existing sites), 150 ha of chalk grassland (across three core areas) and 200 ha of neutral grasslands (from semi improved grasslands across three core areas)
b) By 2010 also create: 100 ha of heath and acid grassland type habitats, 100 ha of chalk grassland (across three core areas) and 200 ha of new neutral grassland (in three core areas)

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GH/A/3.1	Review where the priority areas for implementing targeted restoration and creation of grassland habitats are	2006	2007	HMWT	GWG, LA's
GH/A/3.2	Implement targeted restoration work on identified priority sites	2006	2008	GWG	EN, LA's, landowners
GH/A/3.3	Identify priority woodlands for the restoration of a network of heath and grassland rides	2006	2008	BC	GWG, HWF
GH/A/3.4	Restore a network of heath and grassland rides and glades	2006	2008	HWF	GWG
GH/A/3.5	Identify the extent and quality of arable reversion land	2006	2007	CMS	DEFRA, EN, FWAG HMWT, LA's, landowners
GH/A/3.6	Encourage the creation of arable grasslands where it links to existing grassland	2006	2007	CMS	DEFRA, EN, FWAG HMWT, LA's, landowners
GH/A/3.7	Encourage planners to create grasslands through section 106 agreements	2006	Ongoing	HBRC	HMWT, LA's
GH/A/3.8	Encourage the creation of ecologically appropriate grasslands through mineral restoration works	2006	2010	HCC	Aggregate Companies and Quarry Operators
GH/A/3.9	Aim to get policies that will link grassland sites (ie green infrastructure policies) included within the LDF'S and other strategic LA documents	2006	Ongoing	HMWT	HBRC, LA's

Objective 4: To raise awareness of grasslands and their need for conservation to farmers, landowners and the public and encourage participation in their conservation

Target:: Produce a best practice leaflet on grassland management and hold at least one publicity event /guided walk and a training workshop annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GH/A/4.1	Hold at least one demonstration event/ training workshop of best practice in grassland management for landowners and managers every three years	2006	Ongoing	CMS	GWG, GAP
GH/A/4.2	Review existing grassland advisory leaflets on management and best practice Establish a Web link for grassland management and point of contact for advice highlighting good grasslands to visit	2006	2007	HMWT	GWG
GH/A/4.3	Organise and lead at least 10 guided walks annually for target audience with emphasis on habitat management	2006	2010	CMS	GWG
GH/A/4.4	Produce at least one article or feature annually on grasslands in key publications which are aimed specifically at target audiences	2006	2010	HMWT	GWG

Objective 5: Promote the positive management of road verges

Target: Sympathetic management of all roadside verge Wildlife Sites by 2010

Action Code	Action	Target start date	Target end date	Lead partner	Other partners
GH/A/5.1	Re-establish roadside verge working group	2006	2007	HBRC	BC, CMS, HCC Highways, HBRC, HMWT
GH/A/5.2	Aim to achieve sympathetic management of roadside verge Wildlife Sites	2007	2010	HCC Highways	CMS

Relevant Action Plans:

Hertfordshire Plans
Farmland; Woodland; Urban; Wetlands; Pasqueflower; Chalkhill Blue, Grizzled Skipper; Great Pignut

National Plans
Lowland calcareous grassland; Lowland dry acid grassland; Lowland heathland; Lowland meadows

Abbreviations (Partners)

BC – Butterfly Conservation, Hertfordshire & Middlesex Branch
CCB – Chilterns Conservation Board
CMS – Countryside Management Service
DEFRA – Department for Environment, Food and Rural Affairs
EN – English Nature
FWAG – Farming and Wildlife Advisory Group
GAP – Grazing Animal Project
GWG – Grassland Working Group
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
HWF – Herts Woodland Forum
LA's – Local Authorities
NT – National Trust
WSO – Wildlife Sites Officer
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The Lead for this plan is Herts & Middlesex Wildlife Trust
Pauline Holmes
Senior Conservation Officer
Email: pauline.holmes@hmwt.org

7 Neutral grassland habitat action plan

7.1 Neutral grassland habitats

7.1.1 Summary

Hay meadows and flower-rich pastures provide a breeding and feeding habitat for many species of bird, including finches, buntings and birds of prey, small mammals such as mice, voles and shrews and beetles, spiders and butterflies, amongst other invertebrates. They are also one of the most beloved aspects of the traditional English landscape. They have inspired many writers and painters and are one of the typical images of the rural idyll etched in the English psyche. They are therefore highly valued for their aesthetic appeal. In addition, these meadows and pastures contain a rich array of plants, including many scarce species.

7.1.2 Neutral grassland ecology

Neutral grasslands occur throughout the United Kingdom on soils in the pH range of 5-7. By definition, these are neither strongly acidic as with heathlands or strongly alkaline as with chalk grasslands. They often occur on damper soils which are difficult to cultivate.

Unimproved neutral grasslands developed over many years in response to traditional low input farming operations. They are the typical **hay meadows**, or **'old meadows and pastures'**, of lowland England. These grasslands provided grazing and hay as winter feed for farm livestock and working horses. Such areas were probably most abundant in the last century and early part of this century when horses were used on every farm and large quantities of hay were required as feed.

Management systems would have varied widely with a combination of hay making and grazing being favoured in some fields while others were used solely as pasture. A typical management regime may have involved grazing in early spring before the meadows were shut up for hay until late June/July and finally, after the hay cut, grazing the new growth in the autumn. The **'Lammas'** system of management which was practised on some hay meadows next to rivers was particularly distinctive. Such meadows were often common land and managed to a rigid timetable, with hay cutting occurring in July and grazing not allowed until Lammas day (12th August). Fertility was maintained by regular winter flooding. The long continuity of management provided by this system enabled a rich wildlife community to develop and today, where it continues, also provides a historical interest.

Such management regimes with only low inputs of organic fertilisers and no inorganic fertilisers or herbicides, maintained soil nutrients at levels which kept the growth of competitive grasses in check and allowed finer grasses and herbs to compete. The cutting of hay favoured the development of a specialised herb rich plant community which was adapted to flowering and setting seed before the hay was cut. This combination of nutrient levels and the specialised management regime produced the flower-rich meadows which are so valued today.

Typical herb species of these unimproved neutral grasslands are Birds-foot Trefoil, Black Knapweed, Red Clover, Meadow Buttercup, Ox-eye Daisy, Lady's Bedstraw and Cowslip. Fine grasses include Red Fescue, Sweet Vernal Grass, Crested Dogs-tail and Common Bent. Other more specialised species associated with this habitat include Green-winged Orchid, Snakeshead Fritillary and Yellow Rattle. Sawford (1990) lists the characteristic plants of this habitat in more detail.

Neutral grassland habitats are most noted for their floral interest. Many species of insect can not cope with the drastic changes in habitat caused by hay cutting. However, these meadows and pastures may be valuable for a specialised range of plant feeding and predatory invertebrates and as a nectar source for some insects. They also provide a key part of the

habitat requirements for many birds, such as finches, buntings and birds of prey and small mammals, such as voles, mice and shrews.

The most ecologically valuable neutral grasslands are those with a species-rich sward and a varied structure. Features such as ant hills or ridge and furrow provide added interest, due to the subtle changes in topography, aspect and micro-climate. Ridge and furrow features, developed as a result of past cultivation, may also be linked to important archaeological features.

The ecological value of these meadows and pastures is often enhanced if they are found as part of a well-wooded landscape of hedgerows and woodland. The meadows can act as foraging areas and nectar sources, while the hedges and woodlands provide sheltering and breeding sites for a wide variety of wildlife.

The National Vegetation Classification (NVC) survey recognises four neutral grassland types which may be found in Hertfordshire. These are listed in Appendix 3. In the river valleys there is often much overlap between the drier neutral grassland communities described here and the wet grasslands, fen meadows and marshes described in Chapter 5. This action plan confines itself to the drier neutral grasslands and those river valley grasslands which have traditionally been managed as hay meadows (NVC Community MG4).

7.2 History of neutral grassland in Hertfordshire

Unimproved neutral grasslands occur in a broad swathe across Hertfordshire, on the chalky boulder clay areas in the north and east, on less acidic gravels in southern and mid Herts, on London Clay in the far south, gault clay in the far north and west and on clay with flints on the Chilterns dip slope.

These grasslands would have formed an extensive part of Hertfordshire up until mechanisation of farms during this century. The maximum extent of grassland would have been during the agricultural depression of the 1930s. It is estimated that there was about 75000 ha of permanent grassland in the county in 1934 (Herts State of the Environment report, 1992). Most of this grassland would have been relatively unimproved and species-rich compared to today's grasslands, though ancient grasslands would have still been relatively uncommon, though far more abundant than now.

From the 1940s onwards the mechanisation of farming and intensification of production methods was greatly encouraged. This resulted in a dramatic decline in the extent of permanent grassland and unimproved 'old meadows and pastures' in particular. Traditional hay making also ceased as it was no longer seen to be economic.

The impetus for these changes in agricultural practice was largely driven by government policy in the wake of the food shortages experienced during the Second World War. Initially subsidies and grants were provided by the British government, and these were continued with entry into the EEC and Common Agricultural Policy in the 1970s.

Mechanisation of farming resulted in a decline in demand for hay for working horses. Intensification of farming with the application of large quantities of inorganic fertiliser and use of herbicides reduced the species richness of these grasslands, encouraging only the fastest growing grasses. In Hertfordshire, many grasslands were ploughed and converted to arable. Others were reseeded with simple rye grass based swards, containing new highly productive varieties of grass adapted to high inputs of agri-chemicals. Faster grass growth led to an increase in the numbers of livestock and allowed these to be grazed earlier in the year. The switch from hay to more productive silage resulted in more frequent cutting.

These changes have resulted in a decline in floral species richness and also in species richness and overall populations of invertebrates. This in turn had knock on effects further up the food chain, with a decrease in available food for birds and mammals. The declines of common farmland birds, detailed in

Biodiversity Challenge (1994) demonstrate this. Changed farming practices have also proved to be detrimental to many ground nesting birds such as the Corncrake, with increased risks to nests and young from trampling or machinery.

Nationally, it is estimated that over 95% of unimproved neutral grasslands have been lost this century (*The Lowland Grassland Management Handbook*, English Nature and The Wildlife Trusts, 1994). No precise figures are available for Hertfordshire, but the loss of unimproved neutral grassland is likely to have mirrored the national decline. The Corncrake last bred in Hertfordshire in 1968 (*The Breeding birds of Hertfordshire*, 1993).

7.3 Neutral grassland – current status, trends and threats

7.3.1 Status

Unimproved species-rich neutral grassland of NVC community MG5 is now one of the most threatened semi-natural habitats in the UK. It has been estimated that only 4000 hectares (ha) remain (The Lowland Grassland Management Handbook, English Nature and The Wildlife Trusts, 1994). Since 1940 there has been over a 95% decline nationally in the area of this habitat.

Lowland seasonally flooded hay meadows (NVC community MG4) are a priority habitat under the European Community Habitats Directive, which member states have a duty to maintain at or restore to a favourable conservation status. Hunsdon Meads SSSI is the only example in Hertfordshire and the whole of the East Anglian Plain Natural Area.

Today, it is estimated that there is about 950 ha of quality unimproved neutral grassland remaining in Hertfordshire (Hertfordshire Habitat Survey). In addition, there is an unknown quantity of relatively species rich semi-improved neutral grassland.

There are over 80 known unimproved neutral grasslands remaining in the county but only about a quarter of these are fields or groups of fields greater than 5 ha in extent. The only extensive area of neutral grassland still being actively farmed is on the upper greensand and gault clay north of Tring. There is also a concentration of unimproved neutral grasslands on the London Clay in south Hertfordshire, particularly west of Broxbourne and on the chalky boulder clay in north Herts. However, these are usually small, scattered fields, within largely improved grassland or arable farmland.

Neutral grasslands can be found in all the Natural Areas recognised in the English Nature and Countryside Commission joint Character Map, and in all the Hertfordshire County Council landscape zones. The important sites and major geological deposits supporting neutral grasslands are listed below by Natural Area and shown in map 7.1.

West Anglian Plain – **Geology: Upper Greensand and Gault Clay.**

Key sites: Folly Farm meadows, Tring; Astrope meadow and pastures, Puttenham; Boarscroft Farm meadows and pastures, Long Marston.

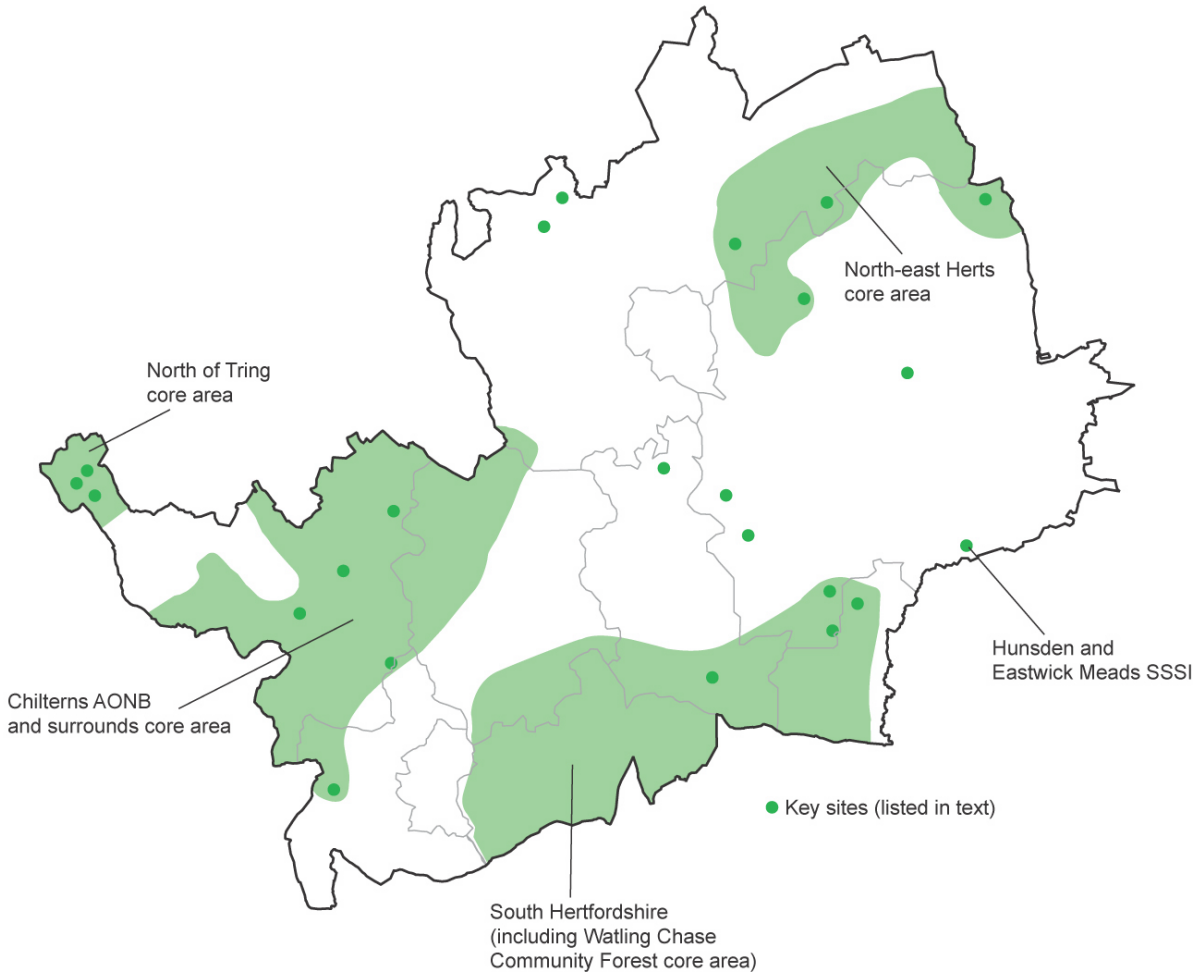
Chilterns – **Geology: Clay-with-Flints, Valley Gravels and River Alluvium.**

Key sites: Shrubhill Common LNR, Hemel Hempstead; Chorleywood Dell nature reserve; Pepperstock meadow, Flamstead; Water End meadows; Cow Lane meadows, Tring; Great Revel End pastures; Gaddesden Hoo meadows; Champneys grasslands, Wigginton; Mimram meadows, Whitwell and Long Deans nature reserve, Hemel Hempstead.

London Basin – **Geology: London Clay, Valley Gravels & River Alluvium.**

Key sites: Dalmonds Farm meadows, Brickendon; Hoddesdon Lodge meadow; Wormley West End meadows; Northaw Place Fritillary meadow; Danesbury pasture, Welwyn; Archers Green, Tewin. Panshanger pasture, Hertingfordbury.

East Anglian Plain – **Geology: Decalcified Boulder Clay, Valley Gravels & River Alluvium**.



Map 7.1 – Distribution of key neutral grasslands and core areas

Key sites: Hunsdon and Eastwick Meads (SSSI); Langley meadow, Knebworth (SSSI); Roe Green, Sandon (part); Meesdon Green (part); Colliers End meadows; Weston recreation ground; Hooks Green meadows, Clothall; Munchers Green & Moor Green, Ardeley; Burns Green meadows, Benington; Meadow north of Standon Lordship; Braughing Friars meadow.

Other sites – Kings Meads (part); Ickleford Common; Oughton Head Common, (part).

Species almost exclusively associated with this habitat which are locally and/or nationally of conservation concern include:

Flora:

Green-winged Orchid *Orchis morio*
Snake's Head Fritillary *Fritillaria meleagris*
Adders-tongue Fern *Ophioglossum vulgatum*
Meadow Rue *Thalictrum flavum*
Greater Burnet *Sanguisorba officinalis*
Saw-wort *Serratula tinctoria*
Lady's-mantle *Alchemilla filicaulis*
Meadow Saxifrage *Saxifraga granulata*
Pepper Saxifrage *Silaum silaus*
Yellow Rattle *Rhinanthus minor*
Greater Bird's-foot Trefoil *Lotus ulignosum*
Grass Vetchling *Lathyrus nissiola*

Birds:

Corncrake *Crex crex*

7.3.2 Trends

Though the loss of these grasslands has slowed markedly in recent years, many of those remaining are still threatened as a result of no longer being part of mainstream agricultural production. The traditional management upon which the ecological interest of these grasslands depends is therefore no

longer economic. It will only be continued as a result of the interest and goodwill of the landowner or manager. The provision of grant aid and advice to the owner or manager is also often required, because the equipment and knowledge to manage the grasslands sensitively may not be available.

Some of the best grasslands in the county have been targeted by the County Councils Countryside Heritage Site project. Through this project, advice, limited grants and practical assistance have been provided to landowners. However, most of the important neutral grasslands have not been included. Unfortunately, until recently, there has not been an agri-environment scheme such as Countryside Stewardship available for these grasslands, unless they were also in river valleys, in which case the waterside landscapes category was appropriate. From April 1996 onwards, however, an old meadows and pastures category has been added to Countryside Stewardship to cater for unimproved neutral grasslands.

Many of the remaining old grasslands in and around towns and villages have been converted to informal open spaces. If managed sensitively, this can ensure that the grasslands are protected into the future. However, too often frequent amenity mowing regimes are adopted which will in time reduce the species richness of the grasslands.

7.3.3 Threats

There are five major threats to unimproved neutral grasslands which are still present today.

The first major threat is agricultural improvement, either through ploughing and reseeding or application of agricultural chemicals (herbicides or inorganic fertilisers). These decrease the species richness of the sward and decrease populations of invertebrates, mammals and birds. There have been a couple of recent cases where known important neutral grasslands have been treated with agricultural chemicals in order to improve the nutritional value of the sward.

A second problem is lack of management. This is also associated with the intensification of agriculture, particularly where neutral grasslands are now part of a largely arable landholding. On larger farms management of these meadows is peripheral to the main farm business and therefore unimproved grasslands often remain neglected if they have not already been improved. The absence of both grazing and cutting can result in the change to a more species poor sward dominated by coarse grasses and the eventual succession to scrub and woodland.

The third major threat to these grasslands is from inappropriate management. This is particularly a problem where unimproved pastures are now grazed by horses, often all year round or where they are mown as amenity swards by local councils. These both inhibit flowering of many species reducing the species richness of the sward.

Horse grazing is often accompanied by overgrazing and poaching. **This is a major problem facing many grasslands in Hertfordshire and one that is increasing.**

Other examples of inappropriate management are seen where neutral grasslands are now also recreation grounds or public open space and are cut too frequently. These sites may often also be threatened by built development. These particular issues are also covered in the Urban habitats action plan.

A specific more recent threat has been the development of golf courses. Even where important grassland sites have been retained within the design, their future management is not assured, as the Newgate Street golf course has demonstrated.

The widespread adoption of sensitive management may be further hindered by the generally fragmented ownership and management of unimproved neutral grasslands.

The fourth threat is from nutrient enrichment as a result of run off or spray drift from agricultural sources, air pollution from traffic or more distant sources or in river valley hay meadows from polluted floodwater. Enrichment causes a change in the species composition of the vegetation, often encouraging faster growing, rank species to out-compete the smaller herbs, which are often of greater conservation concern.

The fifth threat is lack of water, particularly on damp grasslands, as a result of falling water tables. The cause of this is a mixture of the recent drought years, perhaps linked to the onset of global warming combined with over-abstraction to satisfy increased public demand.

7.4 The future for neutral grassland in Hertfordshire

7.4.1 Farming and neutral grasslands

In the future, a wholesale return to low input farming systems in which traditionally managed neutral grasslands are a key component is extremely unlikely to occur, even though such systems would have many environmental benefits. However, the adoption of less intensive farming in selected areas, where environmental and social objectives have equal weight to food production, is achievable and desirable. The current trends in the agricultural economy towards a system based on a mixture of market forces and environmental/social subsidies would support this.

Old unimproved meadows and pastures and new wildlife-rich neutral grasslands could play an important role in any increase in the production of meat and dairy products based on low input pasture economies. A more health and environment conscious public has now begun to demand food products derived from more environmentally sustainable farming methods and these demands are likely to increase further. The recent BSE scares demonstrated this level of concern. Such trends in public opinion present a real opportunity to promote wildlife-rich neutral grasslands, as a key part in producing livestock 'reared in harmony with nature'.

7.4.2 Management

The priority for the remaining unimproved neutral grasslands in the county is to ensure they are protected from agricultural intensification and well managed. Sensitive management of the remaining resource is essential because species-rich unimproved grasslands can not be re-created in the short-medium term.

Sensitive management depends on continuation or re-introduction of a low input management system. Such systems will only develop if management incentives and advice are available to landowners and managers. Advice targeted at small holders with horses is particularly required in Hertfordshire.

The increased use of the agri-environment schemes currently in operation, the Environmentally Sensitive Area (ESA) and Countryside Stewardship schemes, would ensure that the remaining unimproved neutral grasslands are well managed. **The Chilterns should become an Environmentally Sensitive Area (ESA) as soon as possible and include management options for neutral grasslands as well as chalk grassland (see Chapter 8).** The Chilterns conference is already actively promoting ESA designation. Such an approach would help support the development of a more widespread low input pasture or mixed farming system in the area, which would encourage sensitive management of neutral grasslands and have wider environmental and wildlife benefits.

The addition of the old meadows and pastures category to Countryside Stewardship from April 1996, for the first time provides a scheme which can target both resources and advice to these grasslands. **It is essential that all the remaining unimproved neutral grasslands in Hertfordshire are actively targeted through this scheme.**

Many good quality old grasslands have survived within or on the edge of urban areas, such as Fairlands Valley, Stevenage; Boxmoor, Hemel Hempstead; Danesbury, Welwyn and Templewood Vale, Welwyn Garden City. These have great potential for enhancement if managed sensitively. Unfortunately too often they are treated as close mown amenity swards.

However, both Danesbury and Boxmoor show how such sites can be managed to benefit wildlife. Both of these sites are grazed, Boxmoor by cattle and ponies and Danesbury by Longhorn cattle. Danesbury has also been entered into the Countryside Stewardship Scheme. Grazing is not appropriate on all these sites,

but more sensitive mowing regimes can be established to benefit wildlife and these are discussed further in the Urban action plan (Chapter 10).

Water resources

Many of the drier river valley grasslands and damp clayey neutral grasslands depend on sufficient water levels and clean water to maintain their wildlife value. These issues are considered in detail in the Wetlands action plan (see Chapter 5). However the following case study demonstrates some of the problems.

7.4.3 Restoration

There are limited opportunities for restoration of neutral grasslands on existing unimproved sites because most have been lost as a result of agricultural improvement rather than neglect. However, the remaining unimproved sites which are threatened by scrub encroachment would benefit from scrub clearance and the re-introduction of suitable grazing and cutting regimes.

In Hertfordshire, there exists a large area of neutral grasslands which has been semi-improved. These grasslands retain some of the species associated with unimproved grassland, though they are likely to have lost the more specialised and rarer species. They have usually been treated with low doses of inorganic fertiliser. Restoration to a more species-rich sward is possible in the medium term, though it will depend on the nutrient levels in the soil, the proximity of seed sources and probably most importantly the reinstatement of a low input management regime.

Restoration of semi-improved grasslands to a more species-rich sward would have benefits, particularly where these are adjacent to existing unimproved sites. This would buffer the best grasslands from, for example, damage by fertiliser or pesticide drift. It would also have ecological benefits in that a larger area of grassland would be under a low intensity grazing regime, allowing larger populations of insects, mammals and birds to use the habitat and may allow the spread of scarce species.

Another opportunity for restoration, involves the re-establishment of Lammas grazing/hay cutting on river valley grasslands. Suitable examples may include Roydon Meads adjacent to Hunsdon Mead SSSI, part of Kings Meads and Sawbridgeworth Marsh SSSI.

The Countryside Stewardship old meadows and pastures category includes incentive payments to encourage restoration of grasslands. The scheme should be targeted to fields adjacent and close to unimproved grasslands, with the priority initially being

Case study – Hunsdon Mead SSSI

Hunsdon Mead SSSI is of vital importance as the only meadow of its kind left in Hertfordshire. The site continues to be managed on the traditional Lammas system, by a local farmer and commoner. However, the waters of the Stort navigation which provide the regular winter flooding, which is an essential part of the management regime, are now polluted. The Environment Agency has shown that the pollution is mainly nitrates and phosphates, derived from agricultural run-off upstream in the Stort catchment (there is no sewage works upstream). Flooding with this polluted water is causing nutrient enrichment of the species-rich sward, which is resulting in a decline in the numbers of herb species and therefore the sites conservation value.

In the short-term, there are plans to build up the banks of the navigation and to divert water along back channels at times of high flow, thereby avoiding flooding of the mead. While this will solve the immediate problem of nutrient enrichment, in the medium to long term, the lack of flooding is also likely to result in changes in the composition of the vegetation. A better long-term solution is therefore required. This must involve decreasing pollution levels in the Stort navigation and then allowing flooding to re-occur. To decrease pollution levels, buffer zones will need to be established adjacent to the river upstream, ideally including new wetland habitats, as suggested in Chapters 4 and 8. Such an approach will also involve co-operation in Essex since much of the problem derives from farmland in that county.

larger blocks of potentially good grassland. Similar comments apply to any future Chilterns ESA scheme.

7.4.4 Creation

Creation of herb-rich grasslands is very difficult and expensive. However, it would be possible to create new areas of wildlife-rich rough grassland on areas now occupied by improved grassland or arable production. If these were created next to existing unimproved and species-rich, semi-improved grasslands they would provide similar benefits to restoration. They could buffer the more ecologically valuable grasslands from threats such as fertiliser and pesticide drift; they would provide a larger area of less intensively managed grassland habitat; and by providing a larger area of grassland would increase the management options available to a landowner or manager under a low input pasture system. **This is particularly important if the problems associated with overgrazing from horses are to be resolved.**

A major problem for creation of these grasslands is the lack of a suitable seed source. Locally collected seed from species adapted to local ecological conditions is best, because these species are adapted to local conditions and are likely to have their own distinct genetic makeup. Very few meadows in Hertfordshire are still managed for hay, therefore harvesting of local seed is unlikely to be anything other than a very localised option. It is highly likely that large-scale grassland creation will depend on seed sources from outside Hertfordshire, but these should be derived from elsewhere in the UK (and not abroad) and preferably as close to Hertfordshire as possible.

Grassland creation should also be promoted through the Countryside Stewardship old meadows and pastures option and any future Chilterns ESA. Areas around existing unimproved grasslands should be targeted through such a scheme.

7.4.5 Targeting agri-environment schemes

The cost of using agri-environment schemes to develop a low input-low output system for managing grasslands across Hertfordshire would be prohibitively expensive and would conflict with the need to farm the best soils economically and efficiently. However, targeting of smaller areas would allow the most efficient use of money and achieve the greatest environmental benefits.

While general principles suggest that areas around all existing unimproved neutral grasslands be targeted for restoration and creation, the ease of future management, grazing in particular, will determine which areas are most suitable. In Hertfordshire, the most obvious areas to target are those where a pasture/mixed farming system is still fairly well established and may become more predominant in the future and around concentrations of good quality grasslands.

The neutral grasslands on the Chilterns clay-with-flints, those on the upper greensand and gault clay north of Tring, and those grasslands in south Herts on the London Clay are found within more mixed farming systems. These have developed because the heavier clay soils found in these areas are less suitable for arable cropping. As agriculture moves towards a world market and increased specialisation, pasture/mixed farming may increase in these areas and there may be greater opportunities for restoration and creation.

The remaining neutral grassland sites in north and east Hertfordshire, outside the river valleys, are generally isolated within a largely arable landscape, which is likely to remain in the future. It is not therefore appropriate to target the whole area for grassland restoration and creation. However, there are important concentrations of existing sites around many villages which should be targeted to ensure their future survival.

Management grants and advice should be available and targeted to all remaining examples of unimproved neutral grassland in Hertfordshire. However, the restoration and creation of neutral grasslands should be targeted more closely to **the Chilterns, the area north of Tring, south Hertfordshire and in selected areas of the boulder clay in north and east Hertfordshire.** These areas and key sites are listed in Appendix 1, with their distribution shown in map 7.1.

A large part of the south Hertfordshire area is included within the Watling Chase Community Forest. The Countryside Commission currently view the community forest area as a priority for targeting of grant schemes. While increasing the area of woodland is the major priority (see Chapter 4), there are also opportunities for

increasing the area of wildlife-rich grassland. On more acidic soils these will form the new heathlands envisaged in Chapter 6, but on less acidic soils, new neutral grasslands can be created. Within the community forest area, there is therefore a need for a strategic approach to identifying areas suitable for planting and those suitable for neutral and heath/acid grassland creation.

An additional area where the creation of new 'hay meadows' should be targeted is the river valleys. Chapter 5 on wetlands envisages the creation of a series of larger wetlands linked along the major river valleys in the county. These would be composed of mixed wetland habitats such as grazing marsh, reedbeds and carr woodland, but there would also be opportunities for including new 'hay meadows' on drier parts of the floodplain. The creation of such hay meadows should be targeted as part of the Countryside Stewardship waterside landscapes option.

Advice through Countryside Stewardship is often aimed at farmers. However, particularly in the Chilterns and south Herts, the conservation of these grasslands will be dependent on horse owners often with only small landholdings. The numbers of landowning horse owners in these areas and the numbers of horses grazed are likely to continue to increase in the foreseeable future. It is therefore necessary to develop a strategic approach and specific advice for these horse owners, since they will play a major part in the quality of grassland resource in the future. English Nature have recently published a leaflet on horse grazing which is aimed at this audience and must be made more widely available. The successful restoration and creation of large areas of wildlife-rich meadows and pastures on working farms through agri-environment schemes will not occur unless these schemes are made more attractive. In particular, the levels of payment will have to be increased to encourage participation by landowners and managers and improved management advice provided.

7.4.6 Urban fringe open space

Perhaps a greater opportunity for restoration and creation of these meadows and pastures, is in the fields around towns and villages. There is an increasing demand for access to the countryside and areas around towns and villages are generally well used. However, there is potential to provide even greater access opportunities for local people, coupled with increasing the area of wildlife-rich meadows and pastures.

The areas around towns and villages are often intensively used for grazing horses. As such they are often overgrazed which limits their wildlife potential. Purchasing of areas by public subscription for use as public open space or new 'commons' would provide a real opportunity for increasing access and improving the wildlife interest of these areas. The areas could still be used for horse grazing, though managed with the aim of restoring their wildlife interest. Arable fields could also be purchased for the creation of wildlife-rich grasslands and so partially relieve the pressure of overgrazing on existing pastures.

Some areas could be managed as 'hay meadows' and involve the local community in their management. An example of this in slightly different circumstances is the road verge at Grange Hill in Welwyn. The council cut this verge twice a year in July and September and local people organised through the Welwyn Natural History Society rake the 'hay' off the verge the following weekend.

The key to establishing these **'new commons'** is meeting the cost of land purchase. Funding opportunities include the Millennium Greens scheme, the Landfill Tax (potentially), as well as other grants associated with the Watling Chase Community Forest or the reclamation of derelict land.

With the high demand for grazing land for horses, an additional short-term opportunity is the grazing of set-aside land. Such management would provide a rough grassland habitat of benefit to a wide range of insects, birds and mammals, and would be far more preferable to the current standard management guidelines which result in spraying or ploughing of the area. Areas managed in this way may become suitable for longer-term grassland creation schemes as part of new public open spaces.

Case study – Bunkers Lane, Hemel Hempstead

Dacorum Borough Council acquired a 50 ha site from the Commission for New Towns in 1995 to develop as a new area of public open space. The location is typically urban fringe being on the edge of Hemel Hempstead, though with a rural character. The land had been previously leased to a tenant farmer. It had been in arable production, though on transfer to the council the land was in set-aside.

Within the design, provision is included for more formal areas, however, a majority of the open space is to be developed into new wildlife habitats. The council commissioned the Herts and Middlesex Wildlife Trust, to prepare a report detailing how this area could be designed and developed into a wildlife-rich open space.

The site has the typical geology and soils (clay-with-flints over chalk) of the Chilterns dip slope. The site is therefore suitable for the creation of new wildlife-rich neutral grasslands. The proposals for the site include developing an intimate mixture of new wildlife-rich grasslands and mature hedgerows and a community woodland.

The fields to be developed as grasslands have been sown in spring 1996 with either a simple fine-leaved grass and wildflower mix or a nurse crop of fine grasses, using only locally appropriate species and where possible seeds of UK origin. It was not possible to use local Hertfordshire seed or hay. These mixes will also allow natural colonisation of species to occur and so should increase in species richness in the future.

The future benefit of these grasslands to wildlife will be largely determined by the management regime adopted. It is planned to graze the grasslands and by varying timing and intensities of grazing it will be possible to create a series of meadows with a diverse structure, of greater benefit to wildlife.

7.5 A vision for neutral grassland

We would expect to see all of the unimproved neutral grassland meadows remaining in 1996 (approximately 950 ha) being sensitively managed. A minimum of a further 1000 ha would be at an advanced stage of restoration or creation. This would be concentrated in the following core areas (see map 7.1 also):

- the Chilterns dip slope;
- north of Tring;
- south Hertfordshire, including the Watling Chase Community Forest;
- in selected areas in north and east Herts.

Low input pasture or mixed farming systems supporting the management of these grasslands, will be favoured in these areas, by environmental land management schemes such as the ESA scheme or Countryside Stewardship.

In the Chilterns AONB and surrounds, a neutral grassland resource of at least 450 ha will be established and managed as part of a low input pasture and mixed farming system. An ESA scheme for the Chilterns will encourage and support such a system. The existing 60 ha of unimproved neutral grassland will be managed sensitively and 300 ha of semi-improved grassland will have reverted to more species-rich neutral grassland and 100 ha of new wildlife-rich neutral grassland created from land currently in arable production.

In the area north of Tring, the existing important sites at Folly Farm meadows, Astrope meadows and pastures and Boarscroft Farm meadows and pastures, will be sensitively managed and form a core area of at least 250 ha. This will include about 150 ha of new wildlife-rich grassland restored from semi-improved grasslands and a further 50 ha created from arable production in this area.

In south Hertfordshire, including the Watling Chase Community Forest area, there will be an area of at least 500 ha of neutral grasslands set within a well-wooded landscape. Existing important sites will be managed appropriately and where possible enlarged. The area of wildlife-rich neutral grassland will be increased by restoration of about 200 ha of semi-improved grassland and creation of new grasslands on about 150 ha of arable land.

In north and east Herts, there will be an area of at least 150 ha of neutral grassland, concentrated around the villages and managed as an integral part of the rural economy. The area of wildlife-rich grassland will be increased by restoration of about 50 ha of semi-improved grassland and creation of 50 ha of new grasslands.

Neutral grasslands and traditional hay meadows will be restored as part of the large interlinked mixed wetland habitats envisaged in the Wetlands action plan (see Chapter 5).

New areas of public open space will be created around the towns and villages in the above areas. These open spaces will include both restored and newly created areas of meadows and pastures. An area of at least 10 ha of new wildlife-rich neutral grassland, will be developed as accessible open space in each parish in the above core areas, where the soil types are appropriate and where such an area does not exist at present.

A demonstration farm containing large areas of wildlife-rich grassland and showing the commercial application of low input farming methods will have been established. Such a farm will also provide a repository of livestock for grazing more isolated unimproved grassland sites without access to local grazing stock.

In total, there will be about 950 ha of unimproved neutral grassland of long standing, as well as a further 1000 ha of wildlife-rich grassland being restored from semi-improved grassland or created on former arable land.

7.6 Ten year targets

To ensure no further loss of long-established unimproved neutral grasslands through improvement or development.

To have all remaining (approx 950 ha) unimproved neutral grasslands under appropriate management regimes to ensure that they retain their wildlife interest.

To have begun large-scale restoration of at least 200 ha of neutral grassland from semi-improved grassland in the three core areas.

To have begun large-scale creation of at least 200 ha of new grassland consisting of locally appropriate species in the three core areas.

Increase the number of farms and area of farmland managed as low input pasture systems.

7.7 Neutral Grassland Action Plan

This is considered in the Grassland and Heathland Action Plan in Chapter 6, section 6.7.

8 Chalk grassland habitat action plan

8.1 Chalk grassland habitats

8.1.1 Summary

Chalk grasslands are some of the most botanically species-rich communities found in the UK. They are also home to a specialised and diverse invertebrate fauna. Chalk downland is the typical landscape feature of the chalk hills of southern England, with its open, treeless, rolling hills and coombes. These landscapes are highly valued by both the people who live in and visit them alike. All the major chalk hills in the country are covered by national landscape designations. Most downland areas are highly visited for informal recreation and relaxation and many of the most visited sites are also the most valuable sites for downland wildlife.

8.1.2 Chalk grassland ecology

Calcareous grasslands in the UK develop on nutrient-poor, base-rich substrates, almost invariably in response to many years of grazing. In Hertfordshire, they occur exclusively on chalk and will therefore be described from here on as chalk grassland.

Chalk grassland habitats originally developed following clearances several thousand years ago. The chalk hills of southern England may have been some of the first areas to be opened up because of the ease of clearance and cultivation on the thin, dry soils. The steeper slopes prevented cultivation, but could be used as common grazing. Grazing, of sheep mainly, continued as the major land use for centuries in many chalk hill areas, with important local pasture economies developing through the medieval period. These continued up to the present century. This long history of low intensity grazing management, combined with the particular physical conditions found on the chalk substrate, has exerted a strong influence on the development of the flora and fauna of this habitat, producing some of the most botanically species-rich communities found in the UK today.

The extremely stressful growing conditions found on the thin chalk soils, particularly on the steeper slopes, is one of the major factors responsible for the richness of the biological communities. The thin *rendzina* soils hold low levels of nutrient, little water and heat up very quickly, producing the stressed conditions which prevents domination by taller competitive grasses. This allows a diverse range of smaller herbs and lower plants to flourish. These conditions also allow the development of a specialised and diverse invertebrate fauna.

Some of the warmer microclimates provided by the chalk grassland habitat in southern England are particularly attractive to many species more usually associated with warmer, continental European conditions, which find the northern limit of their European range on the chalk of southern England. Such species include some of the rarer British orchid species e.g. Military Orchid, and butterflies e.g. Adonis Blue.

A further major influence on chalk grasslands is the presence of rabbit populations. In small numbers they help to graze chalk grasslands and provide short turf and bare ground habitats, though in larger numbers they will damage the turf and create large amounts of bare ground.

Chalk grassland therefore typically comprises a species-rich short turf, especially where grazing pressure is relatively high. However, where grazing pressure is lower, more species-poor tussocky grassland may develop, and in the absence of grazing, chalk grassland will develop into scrub habitats. Associated with these grassland and scrub communities is a rich assemblage of invertebrates.

Where a species-rich chalk scrub community develops, this can have conservation value in it's own right, both because of the species-richness and as an example of natural succession. The scrub may in

some circumstances also support a rich epiphytic community of mosses and lichens.

A further interesting variation is the occurrence of **chalk heath** in some localities. The type of soils that form on chalk would be acidic but for the proximity and neutralising action of the underlying chalk, which pushes the pH up to between 7-8. Where thicker soils develop, for example on plateaus or where there are acidic surface deposits such as gravels, plants more typical of acidic conditions can grow to form chalk heath. Heather and gorses can typify such situations, and local variations in topography bringing the chalk closer to the surface can result in intimate mixtures of chalk grassland and dry heath/acid grassland.

The most ecologically diverse chalk grasslands are likely to contain a mixture of large areas of botanically rich short turf, smaller areas of longer turf, some bare ground and patches of scattered and more dense blocks of scrub. The greater the variety of these habitats, the greater the opportunities for associated species, particularly invertebrates.

The chalk grassland vegetation communities found in Hertfordshire are listed in Appendix 3. The Sheep's Fescue – Meadow Oat-grass (CG2) and Upright Brome (CG3) communities are the most important in Hertfordshire.

8.2 History of chalk grassland in Hertfordshire

Chalk grassland once covered a much greater area of the county than at present. The precise extent of the chalk grasslands is unknown, however, it is likely that during the 18th century there was at least 3000-4000 ha in the county, present in three major areas; the Chiltern scarp around Tring, the edge of the Chilterns west of Hitchin, and by far the largest area, North-East Herts between Baldock and Royston ('the East Anglian Heights').

The area of chalk grassland around Tring has always been limited, because the Chilterns scarp only outcrops in the county at a couple of places, the vast majority of the scarp and therefore chalk grassland being found in neighbouring Buckinghamshire.

Likewise the area of chalk grassland between Hitchin and Luton was probably limited because the scarp slopes of the Chilterns occur solely in Bedfordshire at this point. However, the rolling hills at the edge of the Chiltern Hills in this part of Hertfordshire, do show chalk at the surface with very little surface deposits. They are therefore capable of supporting chalk grassland. The extent of grassland would have varied depending on the amount of arable cultivation ongoing at any one time, but may have been quite extensive up to the 18th century. Since the late 18th century, with continued improvements in agricultural techniques, the proportion of arable to permanent grassland has increased to the point where today the vast majority of this area is given over to arable farming. The last major area of chalk heath in the county occurred on Lilley Hoo, before it was ploughed up in 1944.

The major area for chalk grassland in Hertfordshire in the past and today is the area known as the 'East Anglian Heights' between Baldock and Royston. Here the chalk is exposed at the surface with thin soils. Until the advent of modern farming practices cultivation of this area would always have been short lived and large areas were therefore put down to permanent grassland. It is known that into the last century, from Therfield Heath to Deadman's Hill, there was an extensive chalk grassland of up to 1000 ha (T. James, Pers.Comm.)

Prior to the 19th century this area would have comprised mainly chalk grassland with only scattered areas of short-lived arable cultivation. However, as elsewhere in the county, from the late 18th century onwards improvements in agricultural techniques encouraged the conversion to arable cultivation. Large areas of chalk grassland survived up until the First World War, but increasing mechanisation and use of inorganic fertilisers rapidly put an end to the traditional sheep farming system after this.

In the county as a whole, the changes in agriculture ensured that by the Second World War only about 350 ha of unimproved chalk grassland remained. After the

war, further agricultural intensification, cessation of livestock grazing, and the decline in rabbit numbers due to the 1950s myxomatosis outbreak, has resulted in further declines in this habitat.

8.3 Chalk grassland – current status, trends and threats

8.3.1 Status

The precise extent of lowland dry calcareous grassland in the UK is unknown, but is estimated to now be less than 45000 ha, (*The Lowland Grassland Management Handbook*, English Nature and The Wildlife Trusts, 1994). Whatever the precise figures, the undisputed fact is that there has been a dramatic loss of this habitat in the UK over the past 200 years.

The European Community Habitats and Species Directive 92/43/EEC identifies calcareous grasslands as a habitat of Community importance which member states therefore have a duty to maintain at, or where appropriate, restore to a favourable conservation status in their natural range. In addition, within this general habitat description, calcareous grasslands which are also important orchid sites are a priority habitat, which should be given the greatest degree of protection under the directive.

The current extent of unimproved chalk grassland in Hertfordshire is only 177 ha, scattered over more than 30 sites (Hertfordshire Habitat Survey). In addition, there are approximately 300 ha of species rich semi-improved chalk grassland. A majority of the unimproved grassland is found on Therfield Heath SSSI. Of the other remaining fragments of unimproved chalk grassland, there are only four sites greater than 5 ha in size. Most sites are less than 1 ha.

The current extent of chalk grassland sites in the county mirrors the historical distribution. It also fits in well with English Nature's and the Countryside Commission's 'Joint Character Map', which divides the English landscape into areas based on their distinctive natural and cultural characteristics. Chalk grassland sites occur in both the Chilterns and East Anglian Chalk Natural Areas. The 'Landscape Zones' used by Herts County Council also reflect the occurrence of chalk grasslands, with most sites found in the Chilterns and North Herts Ridge Landscape Zones. Within these broad areas the important sites occur in three major concentrations which are shown on map 8.1 and are listed below. A comprehensive list of larger chalk grassland sites is included in Appendix 1.

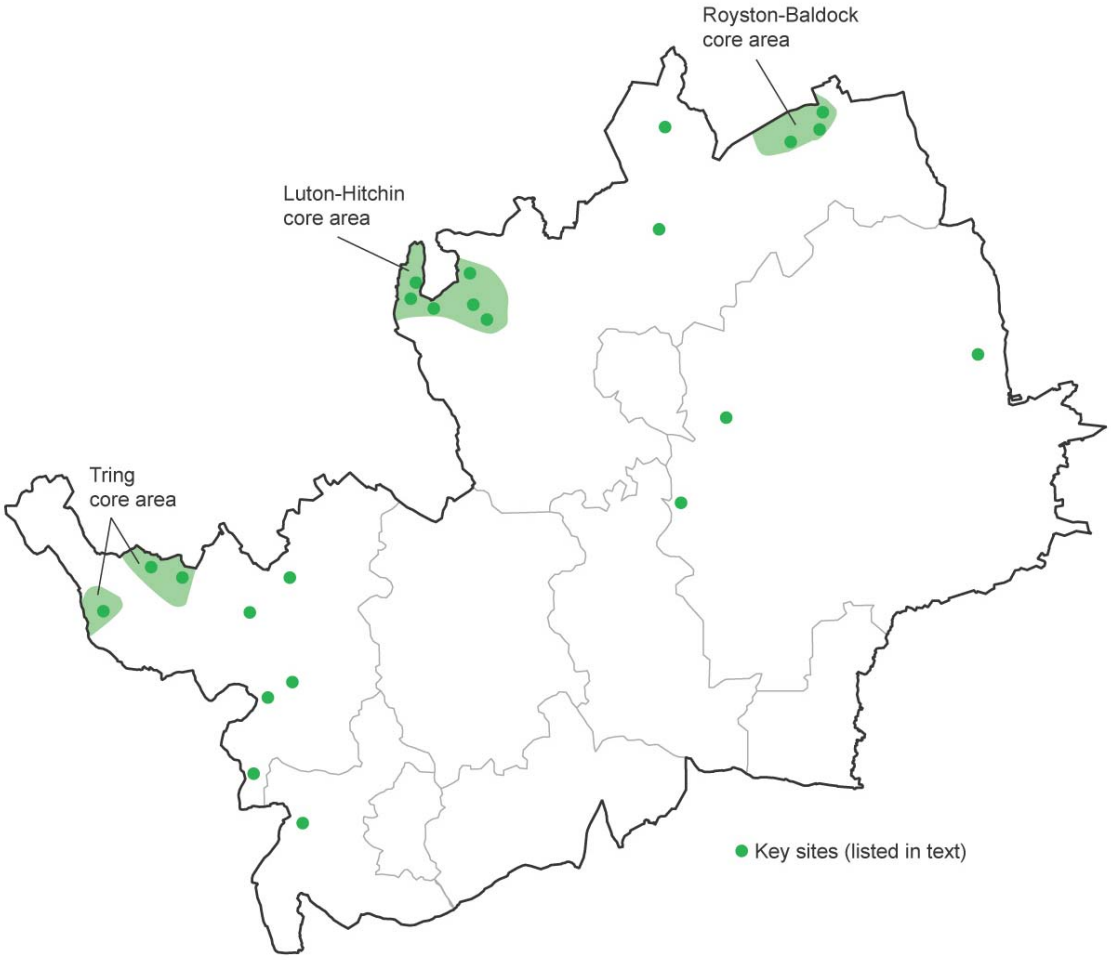
Tring area: All the important sites occur where the Chilterns scarp outcrops either side of Tring.
Key Sites: Tring Park and Oddy Hill SSSI, Aldbury Nowers SSSI, Alpine Meadow SSSI & Aldbury Down (Ashridge SSSI).

Luton-Hitchin area: Most of the important sites occur near the county boundary with Bedfordshire, on the rolling chalk outlyers of the Chilterns beyond the scarp.
Key Sites: Hexton Chalk Pit, Tingley Down, Telegraph Hill/Hoo Bit and Ravensburgh Castle and banks near Little Offley.

Royston-Baldock area: The surviving important sites are now mostly situated at either end of the East Anglian Chalk area in Herts, around Royston and Baldock.
Key Sites: Therfield Heath SSSI; Coombe Bottom, Kelshall; Wing Hall chalk bank; Weston Hills; Newfield Hill & Ashwell Quarry nature reserve.

Other important surviving sites outside of the above major areas include, Roughdown Common SSSI and Sheethanger Common, both in the Chilterns natural area, Chadwell chalk bank at Kings Mead and the many grassland road verges in the major chalk areas of the county. In addition to the individual sites listed in Appendix 1, it is estimated that there is a total of 50 ha of chalk grassland distributed over road verges or sites under 0.2 ha.

The European Habitats Directive and the UK Biodiversity Action Plan Steering Group (BAPSG) report (HMSO, 1995) identify important or threatened species which are priorities for conservation action in Europe and the UK respectively. The Wildlife Trust has also identified other species which are important locally, because of being locally uncommon or threatened.



Map 8.1 – Distribution of key chalk grasslands and core areas

Examples of key chalk grassland species found in Hertfordshire are listed below.

Flora:

Species from BAPSG Long List:
Burnt Tip Orchid *Orchis ustulata**
Spotted Cat's-ear *Hypochoeris maculata**
Pasqueflower *Pulsatilla vulgaris*
Purple-stemmed Catstail *Phleum phleioides**
Early Spider Orchid *Ophrys sphgodes (introduced)*

Species regarded as rare or threatened in Herts:
Juniper *Juniperus communis**
Lesser Meadow Rue *Thalictrum minus**
Wild Candytuft *Iberis amara**
Perennial Flax *Linum perenne* (status doubtful)
Kidney Vetch *Anthyllis vulneraria**
Purple Milk-vetch *Astragalus danicus**
Dropwort Filipendula vulgaris
Bastard Toadflax Thesium humifusum*
Autumn Gentian *Gentianella amarelle*
Chiltern Gentian *Gentianella germanica**
Eyebright Euphrasia pseudokerneri*
Field Fleawort Tephroseris integrifolia*
Wild Thyme *Thymus praecox*
Squinancywort *Asperula cynanchica*
Great Pignut *Bunium bulbocastanum*
Spring Sedge *Carex caryophyllea*
Musk Orchid *Herminium monorchis**
Fragrant Orchid *Gymnadenia conopsea*
Frog Orchid *Coeloglossum viride**
Meadow Oat-grass *Helictotrichon pratense*
Slender Bedstraw *Galium pumilum** **(possibly extinct)**
Autumn Lady's Tresses *Spiranthes spiralis** **(possibly extinct)**
Man Orchid *Aceras anthropophorum** **(possibly extinct)**

* Species regarded as particularly threatened in Hertfordshire.

Invertebrates:

Species on BAPSG Lists:
Small Blue butterfly
Duke of Burgundy butterfly
Chalkhill Blue butterfly

Chalk grasslands are also important for their archaeological remains. The chalk areas of north and west Herts were some of the first areas to be inhabited by people after the last ice age. Unploughed chalk grasslands retain important archaeological remains dating back to the mesolithic period. The Hertfordshire Archaeology Strategy details this importance.

A few chalk grassland sites occur as a result of past quarrying for chalk. Where cliff faces have been left exposed these are often also a valuable geological resource. Their value is considered in the Hertfordshire Geology Strategy.

8.3.2 Trends

Most of the area which was formerly chalk grassland is now under arable cultivation, though some is permanent improved pasture. Other areas, particularly in the Chilterns, have been lost to scrub encroachment and the development of secondary woodland.

While the decline in the area of chalk grassland has largely halted, the remaining habitat is generally declining in quality. Many of the most valuable chalk grassland sites are now under sympathetic management and important examples are improving in quality. Others though are declining in quality in the absence of appropriate grazing regimes.

8.3.3 Threats

A major threat facing many remaining sites is the absence of controlled grazing. Most remaining sites are located within predominantly arable farming areas. Therefore the sites no longer form a relevant part of farm holdings, are expensive to manage and are often under-grazed or become neglected, resulting in scrub encroachment. However, at present the high and generally increasing rabbit population has started to cause over-grazing on many sites resulting in damage to the vegetation. Without management aimed at controlling numbers over-grazing may result in a loss of sensitive species.

Both under and over-grazing can damage the important vegetation and invertebrate communities associated with chalk grassland. Grazing regimes must be tailored to the needs of each individual site, sites might result in over-grazing on one and under-grazing and scrub encroachment on the other.

A second and more insidious threat is that many rare species are in danger of local extinction due to the small number of sites on which they occur, the isolation of most of these remaining sites and the small size of remaining populations. If a species is lost from a site there is often no nearby population to provide a source for recolonisation.

The third major threat is from nutrient enrichment of soils due to fertiliser application, spray drift, agricultural run-off or air pollution as a result of traffic or more distant sources. The species diversity of chalk grassland is partly a result of the extremely nutrient poor soils. Enrichment encourages faster growing, rank species to out-compete the smaller herbs which are usually the species of greater conservation value.

A further source of enrichment, on publicly accessible sites, results from dog faeces. On some sites, public access may also cause localised erosion problems.

8.4 The future for chalk grassland in Hertfordshire

8.4.1 Management

Protection and appropriate management of the remaining unimproved chalk grassland sites, no matter how small, is an urgent priority, since these provide a reservoir of both common and rare species from which the essential expansion of this habitat can occur.

Ideal management of chalk grassland vegetation communities involves varying intensities of grazing, mainly by sheep but also cattle, ponies and goats. **Restoration of grazing management is therefore essential on the remaining chalk grassland sites if their conservation value is to be enhanced and maintained.**

Grazing management of chalk grassland is often not profitable for farmers or landowners. For those landowners who do not have either the inclination or the means to subsidise the re-introduction of sensitive grazing management of chalk grassland sites, **adequate incentives and advice will need to be made to make management of their chalk grasslands worthwhile.** The Countryside Stewardship Scheme, formerly run by the Countryside Commission, but now transferred to MAFF, is applicable to chalk grasslands.

Many of the most important remaining chalk grassland sites are now grazed regularly, though there are a few notable exceptions. Re-introducing grazing on some of these other sites is difficult because either they fall

Case Study – Therfield Heath SSSI

Therfield Heath SSSI is a nationally important chalk grassland site. It is also an important informal recreational area for local people and an important archaeological site. It is owned by Therfield Conservators, but the Royston Golf Club have an established lease over the site. There is a Ranger employed under the auspices of the Hertfordshire Countryside Management Service. The Herts & Middlesex Wildlife Trust organise volunteer work parties through their voluntary warden and his 'heathwatchers' group. The current management plan was written by the Wildlife Trust. To help co-ordinate these different strands, the Conservators have a Conservation Joint Advisory Committee which meets annually and English Nature organise an annual management plan review involving the key management partners.

While a large part of the Heath is managed as a golf course, there are still parts which have remained as the original unimproved grassland, including the golf course roughs. By the 1980s, these areas were declining in wildlife value due to an absence of grazing. Volunteer work parties maintained the best areas clear of scrub, and ensured some grassland areas were cut, but this was insufficient. In 1986 the re-introduction of sheep grazing was organised. The sheep are supplied by a neighbouring farmer and grazed on the out of play areas using temporary grazing compartments. The areas grazed have been increased so that now some of the larger areas of rough on the golf course are also grazed. Areas which are too small to graze are now cut by the golf club under a management agreement with English Nature.

This case study demonstrates the successful management of a publicly accessible chalk grassland using both grazing and cutting. It is also a highly successful example of partnership action achieving more than individual organisations could in isolation. This was recently recognised by the presentation by English Nature, to all the organisations involved in managing the heath, of a SSSI Award 1996.

within solely arable landholdings or are part of a smallholding. Targeting of advice and incentives through Countryside Stewardship will only achieve sensitive management on these sites, if a source of grazing stock can be found. Other sources of livestock should also be considered in addition to commercially farmed sheep breeds. Rare breeds of livestock and other older more hardy breeds of sheep, cattle, goats and ponies, run by hobby farmers, could be a valuable alternative to sheep on some sites. In other areas such as parts of the Chilterns, horses may provide the only regular grazing stock.

A general increase in the numbers of grazing stock on the chalklands of the Chilterns and north Herts is required to ensure that there is adequate livestock available to graze the chalk grasslands. This will only come about if there is an increase in mixed farming and a move towards low input grazing in these areas. Designation of the Chilterns as an Environmentally Sensitive Area (ESA) would provide such incentives, encouraging a move towards mixed farming and low input grazing (see Chapter 7).

However, reliance on farmers to provide stock for grazing existing chalk grasslands will not necessarily guarantee ideal grazing management. In order to ensure grazing stock are available for management and available at the right times, the conservation organisations and public authorities will need access to their own grazing stock. A livestock operation would have to be run at a large enough scale to be profitable and would require access to farm facilities. Individual organisations would be unlikely to be in a position to establish a suitable livestock operation, but jointly there would be a greater chance of success.

Development and expansion of a scheme similar to the Bedfordshire chalk managers co-operative could provide a suitable mechanism for achieving better management, including grazing on chalk grasslands. This scheme currently involves sharing of management resources including equipment, advice and experience. An enlargement of this scheme to cover North Herts or a Chilterns wide scheme would be invaluable in ensuring the remaining chalk grasslands are managed appropriately. It would also be a suitable forum for establishing a livestock venture for the conservation management of grasslands.

A further area requiring co-operation is the control of rabbits. To successfully maintain the rabbit population at levels which are not damaging needs control over a wide area involving several landowners. Rabbit management schemes are required in all the major chalk grassland areas.

The narrow chalk grassland road verges found in much of north Herts can no longer be grazed for highway safety reasons. **Management must therefore be directed at achieving ecologically sensitive mowing regimes.** These are likely to be based around cutting the whole width of grassland verges in chalk areas twice per year, before flowering of most species in late April/early May and after seeding of most species in September/early October. On some sites, particularly those which suffer less from nutrient enrichment, a single autumn cut may be sufficient.

Road verges can also potentially be used to provide links between fragmented grassland sites. The A505 corridor in particular is important, containing an almost continuous strip of chalk grassland road verge across north Herts. As such it is a priority for management. There are also many other important verges in north Herts.

In the future, expanded grassy field margins may also provide valuable links between sites and these will require similar management based on sensitive mowing regimes.

8.4.2 Restoration

Appropriate management on existing sites is unlikely to be sufficient to maintain the conservation value of chalk grasslands in the county. The extremely small and fragmented nature of many of the remaining sites, greatly increases the risks of localised species extinctions. **There is therefore a need to restore areas of former unimproved chalk grassland which are now either covered in scrub or have been partially improved for agriculture, through the use of fertilisers.**

On unimproved chalk grassland sites which have become covered in scrub over the past half century due to the cessation of grazing, clearance of scrub is required, where this will not damage a habitat which is

of value in its own right. Scrub clearance is usually only worthwhile on areas where the scrub canopy is less than 75%. This may be done by mechanical methods or by using goats as has been successfully trialled at Smithcombe Hills, Bedfordshire. Development of the grassland must then be encouraged by grazing and interesting swards can begin to develop after 5-10 years. A high quality chalk grassland turf will however take decades to develop.

Secondly, on semi-improved chalk grassland sites, the introduction of management aimed at increasing the wildlife value of the sward and reversing the effects of past agricultural improvement is required. The wildlife value of these swards can be improved in the short term by increasing the area of rough grassland and over several decades also by increasing their species richness.

In Hertfordshire, however, the opportunities for restoration are limited, due to the fact that much former chalk grassland has been converted to arable. Only as much as 80 ha may be available on existing major sites for restoration management, as detailed in Appendix 2. Priority areas include scrub and semi-improved grassland around Aldbury Nowers SSSI, scrub at Tring Park and Oddy Hill SSSI, and semi-improved grassland on the gallops at Therfield Heath.

There is up to 300 ha of semi-improved chalk grassland which could be restored, with the radio station east of Baldock being a major opportunity. However, more drastic measures are required if we are to maintain and enhance the biodiversity associated with this habitat.

8.4.3 Creation

If Hertfordshire is to have a sufficiently large area of chalk grassland to maintain the presence of the species still associated with this habitat, and to consider reintroducing typical chalk grassland species now extinct from the county, then a programme of grassland re-creation will be required. Such grasslands will not be as species-rich as old unimproved grasslands, but will within 5-10 years still provide a suitable habitat for many species and over several decades will become more species-rich.

Such a programme should be aimed at creating large enough areas of grassland to form viable grazing blocks, and to support ecologically stable populations of vulnerable species. The likelihood of climatic changes arising from global warming makes the need for larger areas of habitat and links between habitats more essential. Without this species may have less opportunity to respond to the predicted changes and therefore decline or even become locally extinct.

Existing unimproved chalk grassland sites should wherever possible form the core areas for new chalk grassland creation. In this way they can act as a reservoir of species for the colonisation of the newly created habitats. An additional benefit of creating chalk grassland adjacent to existing sites is that larger, more valuable units will be formed and the new habitat can act as a **buffer** to the core unimproved areas, preventing enrichment as a result of fertiliser spray drift or run-off from neighbouring land. Where possible, existing fragmented chalk grassland sites should be **linked** by newly created grasslands.

Priority areas for grassland re-creation are from Therfield Heath to Deadman's Hill, which was the last major expanse of chalk grassland in the county; around Lilley Hoo (**'chalk heath'**) and **Tingley Down**, linked to the important scarp downlands at Pegsdon and Knocking Hoe on the Bedfordshire side of the border; **around Offley Chalk Banks and adjacent to Aldbury Nowers**, which forms part of a larger site by being linked to Pitstone Hill SSSI and Pitstone Quarry, over the county boundary with Bucks.

An alternative economic use which may permit the expansion of chalk grassland is the expansion of the horse racing training facilities around Therfield Heath, currently limited to the gallops on the Heath. At Newmarket, there are large areas of chalk grassland which form such a training area, providing a possible model for this area of north Hertfordshire.

Other opportunities include the creation of a series of new chalk grassland sites linked to the A505 corridor and other road verges in north Herts and the widespread adoption of unploughed grassy field margins to provide valuable links between grassland sites in mainly arable areas. Bridleways and footpaths may also provide links in some areas.

The success of such a targeted re-creation approach is demonstrated by the set-aside field below Aldbury Nowers SSSI, which is already developing into a valuable addition to the SSSI after only five years out of arable production.

The major opportunity in Hertfordshire for creation of new chalk grassland habitats is on land coming out of arable production. The best areas will be where there are thin, bare chalk soils, usually on steep slopes or hill tops. These are often of agricultural grade 3b in the MAFF farmland productivity classification and are therefore not priority areas for food production.

Over a period of typically 10-20 years on such areas, nutrient levels in the soils could be lowered, thereby encouraging species typical of the chalk to return. This can be achieved by a mixture of natural leaching processes, the growing of sacrifice crops and grazing. Land currently in set-aside would be very suitable for grassland creation. **Re-creation of chalk grassland habitats should be undertaken largely by allowing natural colonisation processes, supplemented by grazing. New chalk grassland habitats should include a mixture of rough and shorter grassland and include other key habitat components such as bare ground and scrub.**

Grazing will bring in seeds via the livestock and the use of hay crops taken from other grassland sites would further reinforce natural regeneration. However, often it will be necessary to sow a low density nurse crop of locally appropriate fine-leaved grasses, which will limit weed problems as well as allow natural colonisation. Re-seeding may be appropriate in some circumstances, though, it should only be considered after natural colonisation has been shown to fail or where, after full consideration, natural colonisation is deemed unlikely to succeed.

8.4.4 Agri-environment schemes

Although the re-creation of chalk grasslands is possible in several areas of the county it will not occur as part of an economic farm or estate landholding. While arable land is currently put into set-aside by farmers, they are unlikely to enter this land into long-term habitat creation schemes, because such schemes do not count towards the set-aside requirement. In addition, farmers are unwilling to tie land up in long-term schemes, when it is likely that continuing moves towards a world agricultural market will enable arable production to begin again.

The other major constraint preventing arable land in set-aside from being put into long-term countryside schemes such as the grassland creation options of Countryside Stewardship is the levels of grant payment. It is more profitable for a landowner to keep land in set-aside than to enter the more positive Countryside Stewardship or ESA schemes.

If chalk grassland is to be re-created to any extent in Hertfordshire, it will only happen through a greatly improved incentive package for landowners. However, because the ideal management of chalk grasslands is based on agricultural systems (even if low input grazing) **farmers are in an ideal position to contribute towards achieving the targets set for chalk grassland re-creation**.

Even with enhanced agri-environment schemes, large-scale re-creation is unlikely to be undertaken by landowners in the mainly arable areas of north Hertfordshire. A targeted approach therefore becomes more essential. This should identify the precise areas with greatest potential for re-creation (thin soils etc), whether around existing sites or as stepping stones between sites. It should also identify linking grassland corridors between these sites along road verges and field margins. These must be identified with the landowners and advice provided on management and available financial incentives.

8.4.5 Public open space

In many areas suitable for chalk grassland re-creation, farmers and landowners will want to continue specialising in arable production. **The only way to then meet the habitat creation targets will be through purchase and subsequent management of land by conservation organisations and public bodies.**

Such areas could fulfil a valuable role both as wildlife habitats and as accessible countryside for a large local population, particularly if created near to towns and villages. This would ensure they acquire an additional

'beneficial' land use, without which there is unlikely to be any incentive to purchase land or promote habitat creation.

These areas would also provide larger areas on which to graze a conservation flock or herd and increase the chances of developing such a venture. One option would be the purchase of a whole farm, which could be run as a demonstration low input livestock or mixed farm. A farm on the chalk area between Royston and Baldock, would contribute towards achieving the biodiversity targets set out in both this action plan and the farmland action plan (see Chapter 9).

Through a mixture of improvements to agri-environment and countryside schemes, promotion and targeting of these schemes, and purchase of land by conservation and public bodies it should be possible to create at least 300 ha of new chalk grassland habitats in Hertfordshire, on land which has currently come out of agricultural production or may come out of production in the future.

8.5 A vision for chalk grassland

We would expect to see a significantly expanded chalk grassland (and associated) habitat in 50 years time, from 177 ha to a minimum of 600 ha. This would be concentrated in the three chalk grassland core areas. In each core area there would be at least one major large site. All chalk grasslands in the county will be sensitively managed, ideally by low intensity grazing.

In the Tring area, the existing chalk grassland area of 47 ha will be expanded to 90 ha, through restoration and creation of grassland. A large site with existing, restored and newly created chalk grassland and associated habitats will have been created based around Aldbury Nowers and Pitstone Hill SSSIs and Pitstone Quarry. A second major site will be developed around Tring Park and Oddy Hill SSSI.

In the Luton-Hitchin area, the existing 10 ha of chalk grassland will be expanded to an area of 160 ha, through restoration of 50 ha and creation of 100 ha of new grassland habitats. One or two larger sites with existing, restored and newly created chalk grassland will be created in the vicinity of Lilley Hoo and Tingley Down, linked to the important sites in Bedfordshire.

The Chilterns will be designated as an Environmentally Sensitive Area (ESA), to support environmentally sensitive low input grazing and mixed farming. Such a designation would cover both of the above core chalk grassland areas in Hertfordshire.

In the Royston-Baldock area, the chalk grassland resource will be expanded from 35 ha to at least 385 ha. A major chalk grassland site will be created based around Therfield Heath and Coombe Bottom, Kelshall, with 50 ha restored on the heath and new chalk grassland created on nearby arable land. New chalk

grasslands will be created at selected locations and links developed between sites along road verges and field margins. In total, an additional area of about 100 ha of semi-improved chalk grassland will be restored, including Baldock Radio Station and 200 ha of new chalk grassland created.

A demonstration farm will be established in this area by a consortium of conservation organisations and public bodies, managed as a low input livestock and mixed farm. The farm will contribute towards the achievement of the targets in both this, the neutral grassland and the farmland action plans. Such a farm will also provide a source of livestock for conservation management of important grassland sites.

An improved Countryside Stewardship Scheme, with increased payments, better advice and targeted to chalk grasslands, will also be available in this area.

Road verges and field margins will be managed to provide links and corridors between fragmented chalk grassland sites across north Herts, with the A505 being a major chalk grassland corridor.

Species exclusively associated with chalk grassland and currently present will have been retained and no further local extinctions will have occurred. All chalk grassland species will occur in large enough populations to be self-sustaining. Some chalk grassland species lost from Hertfordshire may be re-introduced to the county.

Some of both the existing and new chalk grassland sites will provide a valuable recreational resource for local people, particularly where access does not interfere with farming operations.

8.6 Ten year targets

To protect and prevent further loss or damage to important chalk grasslands.

To manage all remaining unimproved chalk grassland sites to ensure they retain their full wildlife interest.

To have begun restoration of at least 150 ha of chalk grassland from scrub and semi-improved grassland in the three core areas.

To have begun large scale creation of at least 100 ha of new grassland consisting of locally appropriate species across the three core areas.

8.7 Chalk Grassland Action Plan

This is considered in the Grassland and Heathland Action Plan in Chapter 6, section 6.7.

9 Farmland habitat action plan

9.1 Farmland habitats

9.1.1 Summary

A patchwork of farmland fields and hedgerows is probably the dominant image of lowland English countryside. Within this patchwork are the fragments of semi-natural habitat such as woodlands, grasslands and river corridor wetlands that support the greatest variety of our wildlife. Agricultural practices are one of the most important influences on biodiversity in the UK, and have the potential to cause greatest damage. However, the intensively managed countryside of arable, improved grasslands and field boundaries also support a distinctive and often specialised community of plants and animals that has developed over hundreds of years alongside human farming systems. Many, such as the Skylark and Poppy, are amongst the most familiar of our countryside plants and animals. Formerly widespread and abundant, many are however, now in sharp decline. It is this intensively managed farmland and its associated wildlife that is the main focus of this action plan. However, this plan is also critical to the success of those for semi-natural habitats as it is this fabric of farmland that they sit within.

9.1.2 Arable land

Land under arable cultivation forms 44% of the total land area in England. Technological advances over the last 50 years have brought about greatly increased productivity in crop production with a consequent loss of semi-natural habitats under the plough. However, some wildlife has always found arable landscapes to its liking, and flourished. Now even many of these species are showing sharp declines as farming practices ever intensify.

In total nearly 300 kinds of wild plant grow on arable land. Some previously considered to be problem weeds, are now amongst our rarest plants. For example, the Corn Buttercup was widespread until the 1960s but is now found in fewer than 25 locations nationally. Other threatened plants include Cornflower, Corn Chamomile, Corn Cleavers and Ground Pine. Most arable weeds are annuals, either adapted to exploiting bare ground or depending on a large seed production and seed dormancy to ensure that populations survive through years when optimum growth conditions are absent. These plants in turn attract a range of animals, including invertebrates such as several grass feeding butterflies and a number of ground beetles, some of which are nationally rare or threatened.

Other features within the arable landscape can be important for wildlife, such as temporary and seasonally water-filled hollows, which can support a specialised suite of rare invertebrates, flowering plants and mosses.

A large number of insects and other invertebrates spend part of their lifecycle in cereal fields. Many of these are a food source for birds and mammals. Birds such as Skylark, Grey Partridge, Corn Bunting and Lapwing nest in arable fields, often selecting crop types according to their structural suitability. Winter stubbles are used by seed-eating birds such as finches and buntings. Many of these have experienced significant declines, probably associated with changes in agricultural practices such as the widespread switch to autumn sowing.

9.1.3 Improved grassland

Improved grasslands account for the majority of all grasslands found in the UK. They are species-poor grass dominated swards, often sown for agricultural or recreational use, or created by modification of unimproved grasslands by drainage, the addition of fertilisers or herbicides. They are characterised by the abundance of Rye Grass and White Clover. Such grasslands may be temporary ‘leys’, sown as part of the rotation of arable crops, or may be more

permanent pasture. Sown grasslands typically contain competitive varieties of plant, developed through breeding programmes.

The biodiversity of improved grassland is low. Fertiliser use stimulates the growth of competitive grasses and a few broadleaved plants, such as docks, at the expense of other plant species. Very locally such grasslands can be valuable for winter feeding of waterbirds where flooding occurs. Where machine use is low a range of grassland birds such as Lapwing and Skylark may breed.

In the past 50 years improved grasslands have increased by around 90% (*Biodiversity: The UK Steering Group Report*), usually at the expense of other habitats of high wildlife value. Increased agrochemical use and more intensive management such as high speed mechanised mowing has stimulated a change from hay to silage, further degrading their already limited biodiversity.

9.1.4 Boundary features – hedgerows and grassy margins

Hedgerows resemble woodland edge and scrub habitats. They exhibit a wide range of variation and the most important are rich in relic species of ancient woodland. Some of these will be remnants of the original woodland cover retained to mark a boundary when the surrounding woods were first cleared. The oldest may have existed for more than 1000 years. These older hedges will usually contain a greater number of shrubs and trees than recent plantings and will therefore be of greater wildlife value. However, hedges of any age can be important if other wildlife habitats on a farm are scarce. Over 600 plants, 1500 insects, 65 birds and 20 mammal species are known to live or feed in hedgerows. Hedgerows provide a vital refuge for wildlife in intensively farmed areas and may also assist movement by linking woodlands and other semi-natural habitats.

Since 1945 there has been a drastic loss of hedgerows. Between 1984 and 1990 the net loss of hedgerow length in England was estimated at 21% (Countryside Survey 1990, DOE 1993). This loss was the result of a combination of outright removal (1.7% pa) and neglect (3.5% pa). Since 1990 the loss has continued, with neglect becoming increasingly important and removal less so. The current UK total, assuming a continued overall net loss of about 5% per annum may be estimated to be about 450,000 Km (*Biodiversity: The UK Steering Group Report*).

A number of factors have led to these losses. The decline of mixed farming means that on many farms hedges have no function in stock management. Hedges have been removed to increase field size because of larger machinery or larger herd size. Wire fences have replaced hedges as stockproof structures on many farms. Hedges that have lost their function have frequently either been neglected, and left to grow tall without structure, or conversely, over-managed until they become a remnant line of short separated bushes.

The margins of hedgerows can often be of considerable importance particularly where they are derived from semi-natural grassland. Such margins may be rich in wildflowers and will add to the value of the hedge. For example, butterflies and moths whose caterpillars feed on the hedgerow shrubs need sources of nectar and many of the flowers which grow in the field margin will provide this. Umbellifers are amongst the common hedge margin plants of great value to wildlife. Hoverflies, solitary wasps and longhorn beetles all feed from the flowers. Many of these insects will be valuable natural predators of arable crop pests.

The presence of a ditch, stream or farm pond alongside the hedge, a frequent occurrence on the heavier, clay soils, can add considerably to the value of the hedge and to species diversity. A range of damp-loving or marsh plants may be found and the potential for invertebrates will increase considerably. Feeding opportunities for many birds will increase.

9.1.5 Farmland trees

Isolated trees in hedgerows or fields, although not as rich in wildlife as those in woodland, will support a variety of species. They may be particularly important for some birds. Many of our oldest trees remain not only in woodland but also in hedgerows. These veteran trees and those that show die-back may still live for many years and are invaluable for wildlife. Dead trees such as Elms provide a scarce resource for dead wood inhabitants. Pollards are particularly

important as they provide nesting cavities for birds and habitat for uncommon insects.

9.1.6 Farm buildings and walls

Farm buildings and walls can provide an important habitat for a number of specialised plants and animals, including ferns, Barn Owls and bats. The value of such features depends on their method of construction, age and siting. Generally the older the building the greater the value.

9.2 History of farmland in Hertfordshire

9.2.1 Historical development of farmland

Archaeologists have shown that from about 3500 BC the human population underwent a fundamental sociological change from a nomadic hunting existence to a more settled existence based on cultivation and pastoral farming. These changes were initiated by the Neolithic farmers who, in Hertfordshire, initially settled along the chalk escarpment and river valleys. Areas of forest were cleared for cattle, sheep and pigs and for the growing of early forms of cereals such as barley and wheat. The full extent of these early forest clearances is unclear but it is likely that much of the chalk of north and west Hertfordshire would have been opened up for grazing or crops. The lack of ancient woodland in these areas indicates early clearance. Many settlements may have been rather transient, allowing the land to regenerate back to woodland, but where grazing persisted the grassland we now prize as semi-natural habitat began to develop.

As settlers moved from place to place they carried stocks of cereal seeds and amongst these would have been the seeds of other plants. So began the association of certain plants with farming. Detailed accounts of changes in the British flora and the relationship between forest clearance and weed or ruderal species have been clearly shown. It was not until the use of herbicides and screening techniques, combined with modern cultivation practices, that these arable weeds were all but eliminated. Early accounts of the Hertfordshire flora noted many as troublesome weeds, now the vast majority are surviving in only scattered localities and several may be extinct.

The pattern of fields and hedgerows in the countryside has developed as each successive system overlaid the last. From the 16th century onwards enclosures with small fields and well-managed hedges became typical features of the local landscape, at least on the heavier clay soils. The structure and species composition of early enclosure hedges are usually more diverse than later enclosures. The differences this made on the landscape have been described in terms of either 'ancient' or 'planned' countryside. Hertfordshire has a mixture of these two types. Central Hertfordshire is dominated by 'ancient' landscape; small fields, sinuous hedges, woodlands and narrow lanes, its form being a key part of the aesthetic beauty of the countryside. In the centre and west, heathy commons were very much a feature of the countryside. The northern chalklands, formerly with open-field agriculture, remained most open, with large fields with trees and small woods as features in the landscape. It was not until the end of the 19th century that the present form of Hertfordshire's farmland became established after centuries of change.

However, the last 50 years has probably seen more rapid change in the agricultural landscape than ever before. Since the end of the Second World War, financial and other support to agriculture was strengthened with the aim of increasing production, productivity and quality. These national policies affected Hertfordshire as much as any other area. This period corresponds with the huge declines in semi-natural habitats, such as chalk grassland and riverside marsh, as more and more marginal land was brought into production. Although the major losses may well now be in the past, significant changes are still taking place to the present day.

9.2.2 Changes in agricultural practices in Hertfordshire over the last 20 years

Recent changes in the county's agricultural scene are shown by the Ministry of Agriculture, Fisheries and Food's (MAFF) agricultural holding censuses. In 1990 around 65% of the county was under agricultural use, a slight decline over the last 20 years.

Major changes have taken place in cropping patterns and the use of agricultural land over the last 20 years. The overall area of land used for cereal production has declined with the difference being a result of set-aside. In 1994 set-aside amounted to 13400 ha or 13% of the agricultural area. There have also been significant changes in the crops grown. The amount of wheat more than doubled from 17000 hectares to 36000 hectares over the period 1969-1989. At the same time a significant decline has been seen in the amount of barley and oats. Wheat is concentrated on the boulder clay soils whereas barley is most frequent in the better drained lighter soils in the north and west.

Another major change has been the shift from spring to autumn sown cereals. Whereas most barley was sown in spring at one time only 56% was still spring-sown nationally in 1988. Non-cereal crops have also shown some changes. In 1969 Field Beans were the main such crop, occupying 4% of the agricultural area. By 1989 the area of Beans had increased to around 6% but the leading non-cereal crop was now Oilseed Rape, covering 7%. In general the overall variety of non-cereal crops grown has declined at the expense of those already mentioned.

Numbers of dairy cattle decreased by 44% in Hertfordshire between 1969 and 1989, withdrawing principally from the centre and east of the county. This reduction reflects national trends where milk production is becoming concentrated within larger units. Similarly beef cattle have become concentrated in local areas. Sheep farming has recently been increasing with the number of ewes rising by 58% between 1969 and 1989.

Overall, the trend is away from traditional mixed farming towards specialisation and monocultures. Livestock and grass-based farming has generally declined, while short-cycle arable cropping rotations have increased. The ecological principle of relying on natural predators and the use of rotational farming with fallow land has been replaced by precision applications of pesticides and herbicides. Farmers are very much caught in the middle, policy encouraging them to produce quality food ever more efficiently while at the same time they are being blamed for the state of the countryside. The result of these policies has been a steady degradation of wildlife-rich habitats and a corresponding reduction in biodiversity.

9.3 Farmland wildlife- current status, trends and threats

9.3.1 Current status of key farmland species

Arable weeds

There is a long list of plants that favour disturbed ground conditions and are known particularly as weeds of arable farmland, including such familiar groups as poppies, pansies and forget-me-nots. They can be divided into groups favouring different soil conditions. Many prefer poor chalky soils, these include Round Prickly-headed Poppy, White Mustard, Narrow-fruited Cornsalad, Vaillant's Fumitory, Small Toadflax, Sharp-leaved Fluellen and the strangely named Venus's-looking-glass. The plants of gravelly soils are less numerous but include Corn Spurrey, Prickly Long-headed Poppy, Annual Knawel and various cudweeds. Specialities of the chalky Boulder Clay soils include Shepherd's Needle, Corn Gromwell, Night-flowering Catchfly, Babington's Poppy and Broad-leaved Spurge. The majority of all such plants are declining in both abundance and distribution, many are now known only from a very few sites in Hertfordshire. Interestingly, some are now becoming familiar on other habitats that display similar ecological conditions, such as mineral workings or even disturbed ground in urban areas. The following national rarities or local specialities deserve further discussion.

Shepherd's Needle. This was once a considerable problem weed even preventing the cereal harvest on

occasions, but is now found in a limited number of UK localities on heavy, calcareous soils. It grows best and produces most seed in autumn-sown crops. Susceptible to herbicides and with low potential for seed production, it has little persistence in the soil. Formerly very rare, it has re-appeared in some areas in north-east Hertfordshire and there are now 10 or more known sites in the county.

Corn Buttercup. Formerly a common weed of cornfields on calcareous soils, widespread until the 1960s but now a national rarity with only 25 sites nationally. Only five records from scattered localities in Hertfordshire since 1978.

Fumitories. The fumitories are typical plants of disturbed ground, only the Common Fumitory is at all frequent nowadays, found on lighter chalky soils. Locally, Vaillant's Fumitory may have declined the most. The Few-flowered Fumitory has always been rare with only a few recent records in the county.

Spreading Hedge-parsley. A widespread and troublesome arable weed in the 19th century now possibly surviving at only two or three sites.

Corn Parsley. Formerly reported as quite common around Hitchin, this is now a very rare plant of arable fields and grassy banks.

Great Pignut. Formerly known as an arable weed on chalk this plant is now largely restricted to chalky road verges and trackways. A nationally rare plant restricted to the Cambridge/Beds/north Herts area. Still at around 10 sites in Hertfordshire.

Ground Pine. An inconspicuous plant of stony chalk soils showing a severe national decline and now subject to a recovery programme by Plantlife. No recent Hertfordshire records but still present just across the county border in the Hexton/Telegraph Hill/Pirton area, close to the last known county locations.

Cornflower. An attractive and formerly abundant cornfield weed, now all but eradicated apart from as a garden flower. Last possibly natural occurrence in 1986.

Corn Cleavers. Recent records in Hertfordshire only from Rothamsted, now possibly one of its last sites in the UK.

Night-flowering Catchfly. This is now very rare in Hertfordshire, and is especially vulnerable to herbicides.

Farmland birds

The recent publication *Birds of Conservation Concern* (RSPB *et al* 1996) lists species in three categories: red, species of high conservation concern; amber, species of medium concern; and green, all other species which are of lower concern. Red list species are those whose population or range is rapidly declining and those of global conservation concern. The red list numbers 36 species and the most surprising recent additions are several formerly common farmland birds. These include Grey Partridge, Turtle Dove, Skylark, Tree Sparrow, Linnet and Corn Bunting. All have suffered large declines in recent years. The amber list also contains birds typical of farmland. The Lapwing and Barn Owl are both typical Hertfordshire breeding birds in decline, while the upland breeding Golden Plover makes use of our wide open arable landscapes in winter. Likewise, the montane Dotterel may seem a strange inclusion in a farmland plan but the regular spring parties of migrants in bean fields in North Hertfordshire are very much a part of the local ornithological scene. Key species are dealt with in further detail.

Grey Partridge. Over the last 40 years the numbers of Grey Partridges in the UK have declined by 82%. Partridges usually nest at the edge of a field, on a bank or in long grass. The chicks spend most of their time in cereals or in other long grasses feeding on insects, particularly those associated with broad-leaved weeds. The use of insecticides and herbicides reduces the food resource. The Grey Partridge is still widespread in central and northern Hertfordshire but nowhere abundant. The county population total is estimated to be between 1000 and 2000 pairs. However, there has been a significant decline over the last 20 years that is still continuing.

Stone Curlew. Stone Curlews have declined nationally by at least 85% since 1940 to around 160 pairs. These are largely restricted to the East Anglian

brecks and to parts of the west country. Their favoured habitat is open downland but they also nest on arable farmland. They require open habitats with all-round vision from the nest and the decline on farmland is associated with the change to autumn sown crops which have grown too tall by the spring. The Stone Curlew last nested in Hertfordshire in 1981. The north-east of the county was the favoured area and low numbers still breed not far over the border into Cambridgeshire.

Lapwing. Formerly common, the Lapwing has undergone a substantial decline in recent years, largely as a result of changes in agricultural practices. Nationally they show a clear preference for nesting on arable farmland, particularly spring tillage.

Quail. The Quail is an erratic breeder in Hertfordshire with numbers following national fluctuations. Most records are from the north and west of the county on the chalk where there is an association with large areas of Barley production.

Turtle Dove. A summer visitor to Europe, the Turtle Dove winters in sub-saharan Africa. It favours open rural localities and arable farmland with nearby shrubs and trees for nesting. It feeds primarily on arable weed seeds and its breeding distribution closely matches the distribution of the Common Fumitory. In recent years the Turtle Dove has withdrawn significantly from south and west Hertfordshire. The most recent estimation of population is put at 670 territories and decreasing.

Skylark. The Skylark is one of our most familiar birds of open grassy habitats. They feed almost exclusively on the ground on a diet of invertebrates, seeds and other vegetation. The national population has fallen by 58% over the last 20 years. In Hertfordshire the Skylark is still well distributed throughout the county but given the national decline it is unlikely to be following a different trend in Hertfordshire.

Tree Sparrow. The Tree Sparrow is a bird of hedgerow trees, parkland and open woodland. The national population has suffered a massive decline of 89% over the last 25 years. The reasons for this collapse are not clear but changes in agricultural practices affecting its seed diet are thought likely to be part of the cause. In Hertfordshire the national collapse has been mirrored. From being widespread across the county in 1970 it is now very rare to find breeding birds.

Corn Bunting. The Corn Bunting is very much a bird of arable farmland. In Hertfordshire the Corn Bunting expanded its range during the 1950s and 1960s but subsequently went into decline with the population withdrawing to the north and west of the county. The decline is thought to be linked to change in agricultural practices such as increasing intensification and the shift to autumn sowing.

Other species

A large number of insects and other invertebrates make use of farmland, many in hedgerows, some spending part of their life cycle in arable crops. Grass banks may support a number of ground beetles, some of which are nationally rare or threatened. Many mammals will make use of farmland at some time but it is the Brown Hare that is most characteristic.

Brown Hare. The Brown Hare is a conspicuous and well-known farmland animal, with its spring displays a familiar sight in the countryside. However, it has undergone a substantial decline since the 1960s due to conversion of grasslands to arable, loss of habitat diversity in the agricultural landscape and changes to cropping and planting regimes. Hares are still widespread in Hertfordshire but declining. They are most frequent in the north and east.

9.3.2 Key areas for farmland wildlife in Hertfordshire

The nature of farmland makes it difficult to define key sites within the county as locally distinctive landscape, from the open chalklands of the north to the pasture and hedgerows of the south, holds its own associated wildlife. It is perhaps better to define broad tracts of land with similar ecological and social characteristics in the way that is being developed by English Nature (Natural Areas) and the Countryside Commission (Countryside Character Areas).

A similar approach but on a finer scale has been taken by Hertfordshire County Council in defining Countryside Heritage Areas. Fifteen such areas have been identified (see section 9.5 – Vision) and relate

well to the Natural Areas/Character Areas. The following are particularly important for farmland wildlife.

Benington-Ardeley Plateau. An area of ancient countryside with small woods, winding green lanes and numerous stream-eroded valleys. Beds of sands and gravels intermix with the predominate chalky boulder clay and increase the ecological complexity of the area. Key areas include Oxshott Hill and the farmland around Combs Wood. Key species: arable weeds of both chalk and gravel (Prickly Round-headed Poppy, fumitories, Corn Spurrey), farmland birds such as Corn Bunting, Turtle Dove, Skylark and Grey Partridge.

Northern Chilterns. The steep Chiltern scarp is largely in Bedfordshire while the more gentle southern dip slope is in Hertfordshire. It is a rolling, generally open, 'upland' area with chalky soils dominated by arable cultivation. Key farmland areas generally abut the remaining chalk grasslands at Hexton, Telegraph Hill and Tingley Wood. Key species: arable weeds (Poppies, Narrow-fruited Cornsalad, Ground Pine), abundant Brown Hares and birds (Grey Partridge, Turtle Dove).

North-east Chalk Plateau. The Chilterns merge gently into the East Anglian chalk plateau, an open rolling countryside of arable fields and remnant chalk downlands. This area changes to the south into the chalky boulder clay plateau, with more woodlands, notably of Ash/Maple, and many spring sources. Key areas; Barkway-Scales Park, Sandon-Kelshall, Baldock-Wallington, Ashwell-Newnham. Key species: arable weeds (Shepherd's Needle, Corn Gromwell) and birds (Quail, Corn Bunting, Stone Curlew, Golden Plover, Dotterel, Turtle Dove, Skylark).

Vale of St Albans. Although not defined as a countryside heritage area the vale of St Albans is important for farmland birds. It typically has flat open farmland with large fields and scattered gravel workings. Key areas: Symondshyde-Stanborough, Tyttenhanger-Colney Heath. Key species: Golden Plover, Lapwing, Tree Sparrow.

9.3.3 Existing policies which contribute to enhancing the environmental value of farmland

A number of existing policies and measures are designed to safeguard or enhance the environmental value of farmland. The most significant are described below and some conclusions drawn.

Agri-environmental schemes

The following schemes offer incentives to farmers to manage their land in a way which delivers environmental benefits.

Environmentally Sensitive Areas (ESAs). This scheme helps protect those areas where the landscape, wildlife or historic interest were of national importance from the changes brought about by more intensive farming methods. The 'Conservation Headlands' option within certain ESAs aims to increase the wildlife conservation value of arable field margins. Results show an increased variety of weeds growing amidst the crop edges. There are currently no ESA's in Hertfordshire.

Nitrate Sensitive Areas (NSAs). Introduced in 1990 NSAs aim to protect valuable supplies of drinking water by assisting farmers to reduce nitrate leaching in sensitive areas. One NSA is in north Hertfordshire.

Countryside Stewardship Scheme. Countryside Stewardship was introduced by the Countryside Commission in 1991 to encourage farmers to manage selected habitats for environmental and public benefit. It aims to help reverse declining landscape and wildlife habitat quality by combining commercial farming with sensitive land management through a system of incentives and agreements. It has now been adopted by MAFF. Between 1991 and 1995 sixty agreements were approved in Hertfordshire. These have proved beneficial principally in assisting management of semi-natural grasslands but have also allowed the re-creation of habitats on arable land in appropriate locations.

Organic Aid Scheme. Aid is available throughout England to farmers who wish to convert to organic production.

Habitat Scheme. This scheme aimed to protect and enhance wildlife habitats on or adjoining land formerly in the five-year set-aside scheme. It includes an option in certain areas (not Hertfordshire) aimed at water fringes to benefit water quality.

Countryside Heritage Project. A Hertfordshire County Council scheme, administered by the Countryside Management Service, that provides advice and small-scale grant aid to managers of sites of significant wildlife or geological importance. Around 40 sites are currently designated as Heritage Sites.

Set-aside

Set-aside was introduced as part of the reform of the Common Agricultural Policy (CAP) to reduce cereal production rather than bring environmental benefits. It was originally introduced by MAFF as a voluntary scheme in 1988 and by 1991 covered 2818 ha (3%) of Hertfordshire's farmland. Evolving almost year by year, set-aside has been through five-year, one-year, rotational, non-rotational and flexible options. From 1992 it became compulsory, with farmers only eligible for cereal subsidies under the Arable Area Payments Scheme (AAPS) if they set-aside a percentage of their land (initially set at 15%). The set-aside rules have been kept under review and in recent years options designed to enhance environmental benefits, such as 'wild bird cover', have been introduced. There have been widely conflicting views on the future of set-aside and despite some claims that it may rise to 35%, by 1996/97 the figure for compulsory set-aside had been lowered to 5%, against a background of increasing cereal shortages and the BSE crisis in the beef industry. The future may well see compulsory set-aside reduced to zero.

Despite the considerable misgivings of both farmers and conservationists, it is clear that set-aside has had some beneficial effects for farmland wildlife. On some sites there has been a blossoming of flowering plants. In others butterflies and grasshoppers have rapidly colonised pesticide-free grassland. Small mammal populations have increased, with predators such as Kestrel, Barn Owl and Short-eared Owl possibly benefiting. Research by the RSPB has shown that significantly more birds may be found feeding on set-aside fields compared with neighbouring conventional cereal fields. Often set-aside has brought colour and variety into previously monotonous landscapes.

However, the scheme is far from ideal. Although benefiting in the short-term, rare arable weeds may be threatened under long-term set-aside. The species that have benefited have been the quick colonists. Misguided cutting obligations on farmers frequently did more harm than good and the short-term nature of the scheme allowed few long term benefits to accrue. Farmers frequently feel that the land is an eyesore and has no clear management objectives. Overall, although set-aside is a supply control rather than an environmental measure, it does show that farmland wildlife can recover if given a chance. Further changes to conditions would bring greater benefits. For example, the option for low intensity grazing would assist in the development of species-rich habitats. However, the recent reduction in set-aside highlights the need for more long-term agri-environmental schemes in arable areas.

Advice

The Farming and Rural Conservation Agency (FRCA), formerly the Agricultural Development and Advisory Service (ADAS), is an executive agency of MAFF. One of its objectives is to provide advice to farmers through its Project Officers. MAFF part funds the Farming and Wildlife Advisory Group (FWAG) to provide free initial on-farm advice on the conservation and enhancement of the countryside. The Hertfordshire CMS also provide advice to landowners and farmers. The Game Conservancy Trust provides advice through their Regional Adviser.

Such advice is invaluable and it is clear that many farmers are uncertain about the often-detailed requirements of the agri-environmental schemes. Conservation advice delivery in Hertfordshire is however rather uncoordinated, with the unfortunate situation that Hertfordshire FWAG is severely short of resources and therefore cannot take a leading role.

Minimisation of pesticide use

The UK's policy of encouraging farmers to minimise their use of pesticides was set out in the 1990 White Paper 'This Common Inheritance'. The policy is pursued in a number of ways including a rigorous

approvals process, setting maximum residue limits in food, surveillance monitoring and advice. The annual tonnage of agricultural products applied fell by 9000 tonnes between 1983 and 1993. However, tonnage is at best a crude indicator of the environmental risks posed by pesticides. At the local level the Environment Agency and water companies such as Three Valleys Water are trying to raise landowners awareness of water pollution issues.

9.3.4 Trends and threats

Overall, the continuing intensification of both cereal production and grassland management, as well as increasing specialisation within all forms of agriculture, are widely seen as the key threats. A MAFF working group looking at enhancing the conservation value of arable land has recently summarised the impacts of modern arable production. The following issues are drawn heavily from that work.

Ploughing out of grasslands and scrub. Important grasslands are still being lost, albeit at a lower rate. Such actions lead to the direct loss of habitats of high natural value, increase the fragmentation of remaining semi-natural habitats and reduce the mosaic of arable and grass within farmland. This results in increasing species isolation, local extinctions, less ability to continue traditional grazing management and landscape degradation.

Simplified and continuous cropping patterns. A general change from spring to autumn sown cereals has caused a loss of feeding opportunities on winter stubbles and a loss of suitable conditions in spring for ground-nesting birds. Over-wintering opportunities for invertebrates are lost. Other significant changes include the simplification of the crop rotation cycle with less use of grass leys and fallow, as well as a decline in the use of root crops in stock-rearing areas. Such patterns lead to an increased reliance on pesticides and other inputs. It also leads to a more uniform and degraded farmed landscape.

Universal use of fertilisers. The loss of nutrient-poor habitats, increased fertilising of field margins and the increasing eutrophication of waterways all lead to a decline in sensitive flora and fauna, dominance by aggressive weeds and suppression of arable weed species. Run-off of fertiliser into waterways is having a marked effect both on groundwater and surface wetlands away from farming areas.

Universal use of pesticides. The widespread use of pesticides to ensure a pest and weed free monoculture is a major factor determining species diversity. Elimination of floral diversity and insects is the key issue. This leads to eradication of arable weeds, disruption of food chains, loss of food sources, direct kill of beneficial insects and secondary mortality of vertebrates from seed-dressing, molluscicides, etc. Specific problems include the use of Ivermectin with cattle, resulting in sterilisation of dung and the loss of species responsible for its recycling. The development of genetically modified seeds that are resistant to certain herbicides will increase that herbicide's effectiveness on arable weeds.

Removal of boundaries and other features. Loss of such features reduces refuges for wildlife (including beneficial fauna) for nesting, foraging and movement. The loss of scattered farmland trees through senescence and felling without replacement is also a threat. The loss of traditional farm buildings and a general over-tidiness results in reduced roosting and feeding opportunities. The conversion of old barns is a particular problem for bats, Barn Owls and Swallows.

Neglect of appropriate hedgerow management. Many hedges are now either neglected or inappropriately managed in order to keep them low and tidy. This leads to reduced diversity within the hedge and ultimately increased pressure for hedge removal as the hedge becomes ‘gappy’ and sparse and its natural function declines.

Irrigation and water abstraction. The lowering of surface water levels and depleting of ground water reserves leads to the serious threat of drying out of wetland habitats and exacerbates problems of low flows in rivers.

Drainage. Drainage leads to the lowering of water tables, loss of wetland habitats including grass swards on low-lying land and the loss of aquatic flora and fauna along deepened water courses and ditches. Quicker water movement off the land leads to increased erosion, siltation, reduced filtering out of contaminants and increased risks of flash flooding elsewhere.

Lack of advice. Poor, uncoordinated and misguided advice can be a threat to wildlife habitats. Advice on agri-environmental schemes, as well as training in implementing them and reducing damaging practices, is lacking.

9.4 Future for farmed habitats in Hertfordshire

9.4.1 The value of farmland for people

The aesthetic beauty of the countryside is partly derived from the way it has been shaped and maintained by years of farming activity into locally distinctive patterns. Plants and animals contribute strongly to the local distinctiveness of an area and such countryside areas, e.g. the Chilterns, are a focus for recreation and tourism. Biodiversity is strongly linked to cultural diversity and identity. Many countryside plants have strong symbolic associations, such as poppy, mistletoe and holly. The degradation of the countryside into a monotonous landscape lacking in colour and form will be detrimental to us all.

Maintaining biodiversity can also have clear economic benefits for farming. Biological pest control, which has been developed through an understanding of ecosystems and predator-prey relationships, has in some cases allowed reduction in the use of pesticides. Biodiversity has played a vital role in enabling agriculture to reach its current productive state. Genetic variation within plants and animals has allowed breeders to select desirable characteristics. This manipulation of genetic diversity will be a significant factor in the future stability of agriculture. A reduction in the variety of available crops and livestock may result in a greater vulnerability to disease and pest attack. An attractive countryside, rich in wildlife, is also a basis for farm diversification through the growth in farm tourism and can bring benefits to the wider rural economy. The effect of leaching or run-off of fertilisers or pesticides into river channels can have huge repercussions for the water industry in the form of increased costs for water treatment. Finally, the widespread and costly effects of the BSE crisis and its links to human health, must have raised awareness of the need for a return to more traditional and environmentally aware farming methods.

Field sports are widely practised in the countryside and will always be a controversial issue. Many farmers have retained hedgerows and copses, or carried out woodland management, specifically to improve habitats for game species such as Pheasants. Likewise, management of arable margins has been carried out specifically for Grey Partridge. This has all had benefits for wildlife in general. On the negative side, poorly managed game estates can degrade important sites. Overall, the role of field sports in the rural economy and its potential to gain biodiversity benefits should be recognised.

9.4.2 The future of agricultural policy

Changes in agricultural practice over the last few decades have been dramatic. This period of rapidly improving productivity and quality in food production has also resulted in substantial loss of semi-natural habitats and wildlife. Following the UK joining the European Union in the 1970s, the support for increases in agricultural production that dated from the end of the Second World War was directed through the Common Agricultural Policy (CAP). With one effect of this being large surpluses of cereals and other products, pressure for policy reform grew. Since the mid 1980s there have been continuing changes, culminating in the latest reforms of the CAP and in the signing of the General Agreement on Tariffs and Trade (GATT). Farmers were asked to set-aside land, a policy which satisfied neither farmer nor conservationist. As a result of the signing of the EC Agri-Environment Regulation (1992), MAFF announced new environmental measures to complement and extend the range of financial incentives already available to farmers. However, the take-up of agri-environmental schemes remains poor as payments remain low, rules are inflexible, requirements complex and advice is poor. The result is that the fundamental problems which have led to a decline in farmland biodiversity have yet to be addressed. Whilst recognising the primary role of farmland in food production, a more environmentally

sensitive approach to farming that integrates both agriculture and conservation is urgently required.

Arable farming is arguably more profitable now than it has been for many years. Cereal prices are buoyant with the result that subsidies (Arable Area Payments Scheme – AAPS) may be seen as a bonus rather than a necessary payment to maintain the viability of the farm. However, it is difficult to predict future trends and this situation may well change. With issues such as the current profitability of arable farming and the problem of high overheads, farmers are understandably reluctant to take profitable land out of intensive production and into an agri-environmental scheme that is seen to have a lower return. The future of wildlife of farmed habitats is therefore largely policy driven and linked to CAP reform. It is clear that without some form of policy intervention arable farmers are unlikely to make changes to farming practice that would have major environmental benefits.

There is much debate over the likely direction of future policy. One option is that subsidies will remain, but CAP reform will bring about policies that link them, or other incentive schemes, ever more strongly with environmental and social needs. This principle is known as 'cross-compliance'. The idea of attaching environmental conditions to AAPS has gained favour amongst some conservationists. For example, an idea currently being discussed is that all farmers receiving AAPS should introduce conservation field margins and/or avoid damage to hedgerows.

A second, more likely, option is that production control measures will fail or will be abolished and farmers will be forced to compete on the world market. Profitable farms on the best land are likely to expand, while smaller ones in marginal areas may be forced out. Such an outcome may provide both threat and opportunity for wildlife. However, if only a small percentage of the huge amount of money saved by ending agricultural subsidies were to be directed towards environmental improvements in more marginal or sensitive farming areas, the wildlife gain could be significant.

During 1997 the European Commission published its proposals for reforming the EU's budgets: *Agenda 2000.* Central to these proposals are ideas for CAP reform that will continue the process started in 1992. It makes the case for radical reform and includes the integration of environmental goals as one of its objectives. However, the view of environmental organisations is that it fails to deliver the radical changes it proposes.

Whichever way policy goes it is clear that significant gain in biodiversity will only be achieved when it is recognised that this is of benefit to us all and is reflected in the policy through economic support. Over £1 billion is currently paid to arable farmers in AAPS in England alone while the total agri-environmental budget is only £77 million. The balance of this funding must shift and management of the countryside that benefits the environment be fully accepted. In effect we need to pay farmers to 'farm'' Skylarks or Poppies, as indicators of the quality of the environment. This does not mean that the knowledge gained in post-war agriculture is ignored. Rather that a new underlying thinking in farming strategy ensures that not only is sufficient food produced but that environmental and social needs are also met.

A farmland strategy

This new thinking should begin with a strategy for farmland that promotes sustainable agriculture. This should acknowledge that all farmland is environmentally sensitive to some degree and should recognise local distinctiveness. Although farming will be driven by market forces and will produce food in quantity, the long-term strategy should be a progressive transfer of funds from the present unconditional commodity and compensation payments to environmental and social support. Further developments in farming technology will allow productivity but not at the expense of the environment. Broad tracts of countryside, of the highest value for biodiversity, will be recognised as 'environmentally sensitive farmland'. Such areas will have targeted agri-environmental support schemes to deliver specific environmental and social objectives.

Such policy changes will undoubtedly only be implemented in the longer term and in Hertfordshire we must play our part in achieving them by feeding local information into the national picture and lobbying for change at the appropriate time. In the short term we must increase the take-up of agri-environmental

schemes and increasingly target them to the most deserving areas or sites.

Existing agri-environmental schemes

The agri-environmental schemes introduced so far have demonstrated a range of benefits to the environment and clearly show what can be achieved. The majority of schemes are targeted at the maintenance and restoration of semi-natural habitats, such as grasslands, within the farmed landscape. This is undoubtedly a priority and more refining of the targeting is required. However, the take-up rate is low and a much-increased effort in persuading farmers and landowners to consider these schemes is required. It may be possible to establish demonstration farms in key areas with a high percentage of semi-natural habitats. These farms could promote the latest schemes and techniques as well as contribute significantly to biodiversity conservation. They should ideally demonstrate mixed farming methods.

An Arable Stewardship scheme is being piloted in two areas of the UK, including part of Hertfordshire. If widely taken up, this promises substantial benefits for wildlife of arable farmland. In Hertfordshire we have the role of ensuring the success of the pilot by encouraging uptake and monitoring the results, in order to promote the scheme to the rest of the country.

There are currently no designated Environmentally Sensitive Areas (ESAs) in Hertfordshire. The benefits of increased support schemes within ESAs are well known. The designation of the Chilterns AONB as an ESA should be a priority target. This area has a high density of semi-natural habitats (chalk grassland, neutral grassland and woodlands) and a high degree of local distinctiveness.

There is a need to continue limiting the use of pesticides in order to reduce risk both to the environment and human health. Certain areas, such as watercourses need protection from pollution by agricultural chemicals. Overall there should be a move to a reliance on more natural methods of pest control. The benefits of Organic Farming and Integrated Crop Management (where farming balances the requirements of running a profitable business with responsibility and sensitivity to the environment – see case study below) should be more widely promoted.

9.4.3 Key areas for targeting environmental support

Wildlife sites

The immediate priority for nature conservation within farmed landscapes must be to maintain and enhance the existing semi-natural habitats of high wildlife value. Without the maintenance of such areas the recolonisation of degraded habitats will be at best slow, if not impossible. The Hertfordshire Habitat Survey has identified ‘Wildlife Sites’ of at least district importance for wildlife. Many are dependent on continued agricultural management for their survival. It is an absolute priority that agri-environmental schemes such as Countryside Stewardship are targeted towards these sites to enable farmers to continue sensitive management. In addition, the use of any scheme to expand, buffer and link these sites should be strongly supported.

River corridors

There is a clear environmental benefit in targeting agri-environmental schemes to the margins of water courses and to river valleys in general. Buffer strips along such water courses can act as pollutant filters and reduce soil erosion, more extensive grasslands or marsh can act as flood storage areas and help alleviate low river flows. This should be our aim. We need to restore grasslands to our river valleys (see Chapter 5 – Wetlands). The restoration of flood meadows (that flood!) should be sought in appropriate locations. These damp grasslands will provide lush grazing for cattle as other pasture becomes increasingly parched and yellow during hot summers. There will be direct benefits to wildlife by linking and expanding existing sites of high wildlife value and allowing the movement of species between sites.

Arable fields, margins and headlands

Although it is important not to forget the entire cropped area, work on field edges by the Game Conservancy, has shown that conservation effort in these areas can bring considerable benefits. This may be achieved by creating grassy margins (beyond the crop edge) or conservation headlands (altering crop management, e.g. not spraying within the outer strip). Margins can

provide a connecting network of wildlife habitats across the farm.

A mixture of field margin types provides a variety of habitats and spreads the workload over the farming year. Good margins need planning but need not cost more. The new 'Arable Field Margins' option within Countryside Stewardship offers financial help.

Margins can eliminate compaction problems in headlands, make use of areas that are awkward to farm, or increase flexibility for operations such as hedge management in winter. They can help remove weed infestations and encourage predatory insects. Whilst the value of bees as crop pollinators and ladybirds as predators of greenfly is well known, the value of natural predators of other pests is less well understood, despite the large amount of scientific data. Aphids are serious pests of cereal crops. If their natural predators such as ground beetles, rove beetles and spiders can be encouraged on arable land then it may be possible to reduce reliance on pesticides. Hedgerows and field margins can provide good breeding and over-wintering habitat for these predators.

However, it must be appreciated that work on margins will not help all farmland species. In some areas, where the ecological needs of key species require, it will be necessary to retain the whole arable field within a less intensive regime. This may apply to farmland birds in particular. The pilot Arable Stewardship has the potential to deliver in this area.

Hedgerows

The loss of hedgerows by direct destruction to create larger fields has slowed and some increase in hedgerow length has taken place. However, it is not so much the actual length of hedge that is important, but rather its physical quality and floristic diversity. With this in mind it is worrying to note that a large part of the hedgerow resource is unmanaged and gradually disappearing. Neglect (no cutting or laying) leads to hedgerows changing into lines of trees and the development of gaps. This reflects modern high labour costs, the loss of traditional skills and, most significantly, the decline in hedge function as a stock-proof barrier. Too frequent and badly timed cutting leads to poor habitat condition and the development of gaps. In addition, inappropriate husbandry, such as the spraying out of hedge bases, also increasingly

Case study – Greys, Therfield

Greys is a family farm managed by Edward Darling. It extends to 230 ha over chalk soils with a thin clay cap. The emphasis is on producing premium cereal crops, especially barley, used to produce malt for brewing and other uses. Milling wheat and a small amount of oats complete the cropping with peas or beans as a break crop.

Edward Darling follows a philosophy of Integrated Crop Management (ICM), combining sound land management with responsible conservation techniques. He has focused on woodland, hedgerow and grassland with the overriding aim of promoting diversity of habitat alongside economic crop management.

The Woodland Grant Scheme is used to progressively clear and re-plant the mainly beech woodlands. Some Sycamore coppice is managed for rotational firewood production. Hedges are rotationally cut, some are being prepared for laying and overall there has been a net gain in hedgerow length. Nearly 1 km of new hedge has been planted to provide corridors for wildlife between woodland pockets. A hedgerow rejuvenation scheme is being undertaken with an ongoing coppice rotation.

Broad grassy headlands are maintained around fields and are left unsprayed to encourage wildlife. This, combined with the imaginative use of set-aside, has assisted an amazing increase in the population of Grey Partridge on the farm.

Greys is The LEAF Association (Linking Environment and Farming) demonstration farm for the area. With the farm abutting Therfield Heath, one of the county's most important semi-natural grasslands, there can be little doubt that the ICM approach is beneficial.

impoverishes the resource. Fertiliser run-off leads to nutrient enrichment. Increased stocking rates, particularly of sheep, leads 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.

There are some data giving evidence of hedgerow loss in Hertfordshire. A study by the RSPB on eight sample tetrads covering 32 sq km in north Hertfordshire showed a 31% loss of hedges from 24036 metres in 1947 to 16457 in 1985. However, during the period 1991/2 to 1994/5, 3161 km of hedge restoration work was agreed in England under Countryside Stewardship agreements. This represents an expenditure of £700,000 per annum. Such schemes clearly need to be expanded.

In June 1997 new rules on hedgerows came into force under the Hedgerows Regulations. This made it an offence to remove a hedgerow without permission, gained through the local planning authority. The Regulations aim to protect the most important countryside hedgrows through a system of notification administered by local planning authorities. However, there are widely expressed concerns about the limitations of the Regulations and the government has initiated a review of the situation.

Roadside verges

Roadside verges are generally managed by the Local Authority but most rural verges are very much influenced by the adjacent farming operations. They often form the vestiges of semi-natural grassland in rural areas and act as a refuge or habitat corridor for many farmland plants and animals. Of the total of about 6,000 kilometres of roadside verge in Hertfordshire, a large percentage has lost most of its wildlife interest, due to a variety of factors. These factors include eutrophication, scrub invasion, chemical weed control, salt spray, ploughing close to the roadside and the lack of appropriate management.

A reduction in flail mowing and the use of chemicals on roadside verges may have had some beneficial effects for wildlife. However, where management has ceased completely, rank grassland, scrub and woodland may be replacing more important semi-natural vegetation particularly species-rich grassland. Small patches of remaining semi-natural grassland are still being lost. There is increasing disturbance of roadside verges to lay and maintain services, such as gas, electricity and telecommunications. Road widening and re-alignment has resulted in the loss of hedgerows and verges.

In many counties roadside verges are designated as nature reserves. In 1994 there were just two designated Heritage Roadside Verges in Hertfordshire (see case study below). Concern about the degradation of verges in the county lead to the Roadside Verges Working Party (RVWP) being established in October 1994. This group aims to develop the ecological features of roadside verges through improved design and management practices. The RVWP has had a positive and successful start. By

Case study – Walkern Heritage Road Verge

The Walkern Road, running from Walkern to Watton-at-Stone, passes through the land of Mr H A Bott of Bennington Lordship. The underlying geology is chalk, much of which is overlain by varying depths of boulder clay. The roadside verge supports a rich mixture of calcareous herbs including Marjoram, Wild Basil, Small Scabious and Large Thyme. In addition, the arable fields adjacent to the verge have long been known as a rich area for arable weeds. Recently recorded species include several species of poppy, including Prickly Round-headed Poppy, as well as other scarce plants such as Toothed Cornsalad, Longleaf and Venus's-looking-glass.

In 1991 the verge was designated as the county's first Heritage Roadside Verge with the permission of Mr Bott. Marker posts were installed and the verge cut to an agreed plan by the County Highways Department.

In addition Mr Bott treats the margins of the fields adjacent to the road as a conservation headland, restricting the spraying of chemicals. In combination these developments have allowed the rich verge and arable field flora to flourish and demonstrate positive action for the conservation of such farmland habitats.

1997 there were six designated Heritage Verges and a further three under sympathetic management. However, although the designation system brings results, it is overly bureaucratic and will only ever affect a minority of the important verges. With the identification of a large number of verges under the Wildlife Sites system, a more direct means of influencing the management of these important sites is urgently required.

9.5 A vision for farmland

The Hertfordshire landscape of the future will be one in which the production of high quality food and a countryside rich in wildlife are maintained in a sustainable manner. A strategy for sustainable agriculture will promote methods which minimise damage to the environment and will include policies for positive environmental and social support.

In the shorter term, those areas requiring the most environmentally sensitive farming will be the targets for agri-environmental support schemes. A new Chilterns Environmentally Sensitive Area (ESA) will have been introduced. These sensitive areas will be based on locally high biodiversity, local distinctiveness in landscape and character, and important natural features such as river corridors. They are likely to include many of the following areas:

The north-east chalklands
The chalky boulder clay plateau
The Bennington and Ardeley plateau
The east Hertfordshire river valleys
The River Stort flood plains
The north Chilterns
The Hitch Wood/Knebworth plateau
The west Chilterns
Wilstone Vale
The Lee Valley
The Mimram Valley and Bramfield plateau
Broxbourne Woods
The River Chess and lower Gade Valley
The North Mymms/Shenley Ridge

Such areas will be central to the vision of extending, linking and buffering key environmental assets in order to maintain and enhance biodiversity. Local distinctiveness will be promoted and enhanced. Demonstration farms will have been established in key areas to promote environmentally sensitive farming methods. Farmers will receive integrated and coherent advice and training on farming for wildlife.

9.6 Ten year targets

To move towards policies that promote sustainable agriculture.

To develop a more strategic approach to agri-environmental support in Hertfordshire and to ensure that a minimum of 2500 hectares (from the current 830 ha) of farmland and 50000 m of grass margins (from the current 9700 m) are entered into such schemes by 2007.

To compile accurate information on the farmland wildlife resource of Hertfordshire.

To seek reductions in chemical use.

To promote the conservation of notable farmland species.

9.7 Farmland Action Pan

Objectives, actions and targets

Generic actions

Objective 1: To promote, actively target and deliver agri-environment schemes to best serve Hertfordshire's biodiversity

Targets: a) Hold two training events by end December 2005 and one promotion event by 2005
b) Guide 60 ELS applications in two years and report on targets annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
FA/A/1.1	Organise two training events for partner advisors in Herts on the new agri-environment schemes	Oct 2004	Dec 2005	DEFRA	CMS, HMWT, FWAG, EA
FA/A/1.2	Co ordinate promoting the uptake of agri-environment schemes to achieve updated HAP/SAP targets and produce a programme	Aug 2004	Dec 2006	Farmland HAP Group	DEFRA, CMS, FWAG, HMWT, NFU
FA/A/1.3	Co ordinate response to the Agri-environment Scheme targeting process to ensure HAP/SAP targets are represented	Aug 2004	Annually	Farmland HAP Group	All HAP working Groups
FA/A/1.4	Report upon the area and location of agri-environment schemes	TBC	Annually	DEFRA	

Rivers and adjoining land

(All of Hertfordshire's rivers are notified as Wildlife Sites except where degraded.)

Objective 2: Protect from pollution and enhance for biodiversity the rivers and adjoining land within the farmland environment of Hertfordshire

Targets: a) Rolling programme established by 2005
b) 5 km of river buffered annually
c) 10 pollution management meetings held annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
FA/A/2.1	Identify key sections of river corridors for biodiversity	Dec 2004	Annually	HBRC, EA	HMWT, CCSP, CMS
FA/A/2.2	Agree a rolling programme of river corridor targets for buffering annually	2004	2005	Farmland HAP Group	

FA/A/2.3	Promote the creation of riparian buffer strips and other agri-environment measures to create suitable marginal habitats through site visits and meetings with identified landowners	2005	Ongoing	CMS, FWAG, DEFRA	HMWT, EA
FA/A/2.4	Promote opportunities to enhance the wider river corridor through flood plain management, including reintroduction of flood meadows and creation of wetland bird habitat	2004	Ongoing	CMS, FWAG, DEFRA	HMWT, EA
FA/A/2.5	Monitor and report upon diffuse and point pollution to inform targeting		Annually	EA	
FA/A/2.6	Provide targeted information on preventing pollution to farmers/landowners		Annually	EA	FWAG
FA/A/2.7	Report upon the length of river buffered through ES monitoring	2005	Annually	DEFRA	Farmland HAP Group

Hedgerows

(Wildlife Site Hedgerows are defined as 'Substantial hedgerow and tree line habitats believed to be ancient with at least 10 woody species in a 30 m length and; (a) features and structure indicative of ancient origins or (b) which support at least six ancient woodland species; and form significant extensions to, or links with, other WS')

Objective 3: Protect and enhance through appropriate management, ancient and species rich hedgerows

Targets: a) Pilot community hedgerow report produced by 2005
b) 2 km of Wildlife Site or BAP quality hedgerow entered in agri-environmental schemes annually

Action code	**Action**	**Target start date**	**Target end date**	**Lead partner**	**Other partners**
FA/A/3.1	Pilot a community approach to identify and map hedgerows on a parish basis and report on the approach	July 2004	March 2005 (report)	CMS-WC	Farmland HAP Group
FA/A/3.2	Ensure local plans include policy protecting ancient and species rich hedgerows	Apr 2004	Ongoing in line with LDF reviews	HBRC	LA's, HMWT
FA/A/3.3	Protect ancient and species rich hedgerows and hedgerow trees through hedgerow regulations and felling licence	Apr 2004	Ongoing	LA's, FC	HBRC, HMWT
FA/A/3.4	Encourage agri environment scheme applications from farmers/landowners to protect and enhance priority hedgerows	Apr 2004	Ongoing	DEFRA, CMS, FWAG, HMWT	Farmland HAP Group

Objective 4: Increase the total length of hedgerows where appropriate within the farmland environment

Target: Plant 5 km of new hedgerows and report upon hedges lost and gained annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
FA/A/4.1	Identify in the Landscape Character Assessment, key Character Areas for targeting new hedge planting	Sept 2004	March 2005	HLU	Farmland HAP Group
FA/A/4.2	Provide advice and grant aid to enable the establishment of 5 km of new hedgerow in appropriate locations	Aug 2004	Annually	CMS, FWAG	HCC, DEFRA
FA/A/4.3	Monitor and report upon hedges lost and hedges gained	Mar 2005	Annually	Farmland HAP Group	HEU

Arable field habitat

Objective 5: Enhance arable field habitats to support a greater biodiversity

Target: Report annually on BAP farmland species

Action code	Action	Target start date	Target end date	Lead partner	Other partners
FA/A/5.1	Maintain, develop and report upon a viable Cornflower population at its only known Hertfordshire location		Annually	HMWT	DEFRA
FA/A/5.2	Identify historic locations for rare arable weeds/key farmland birds and identify targets. Make this information available to advisor organisations	Oct 2004	April 2005	HBRC	Farmland HAP Group
FA/A/5.3	Establish arable margins and in field options; target locations with a history of rare arable weeds/key farmland birds	April 2005	March 2008	DEFRA, CMS, FWAG, landowners	Farmland HAP group, HMWT
FA/A/5.4	Prepare a project proposal to source locally, arable weed seed for priority species	TBC	TBC	Farmland HAP Group	
FA/A/5.5	Report on monitoring of key farmland bird species. Link to CS/ES options		Annually	HBRC	HBC, Farmland HAP Group

Awareness-raising

Objective 6: Raise awareness of the importance of farming and biodiversity

Target: Hold six events per year

Action code	Action	Target start date	Target end date	Lead partner	Other partners
FA/A/6.1	Hold guided walks on farms	May 2004	Annually	CMS, FWAG, ADAS	LEAF
FA/A/6.2	Compile a list of farming and biodiversity champions	Dec 2004	April 2005	Farmland HAP Group	
FA/A/6.3	Agree a programme of targeted articles in the farming press re farming and biodiversity	Sept 2004	Annually	Farmland HAP Group	

Relevant Action Plans:

Hertfordshire Plans
Wetlands; Grassland and Heathland; Woodland; Stone curlew; Tree sparrow; Great Pignut; Natterer's Bat; Water Vole; Otter

National Plans
Cereal field margins; Ancient and/or species-rich hedgerows

Abbreviations (Partners)

CCSP – Chilterns Chalk Streams Project
CLA – Country Landowners and Business Association
CMS – Countryside Management Service
DEFRA – Department of Environment, Farming and Rural Affairs
EA – Environment Agency
FC – Forestry Commission
FWAG – Farming and Wildlife Advisory Group
HBC – Herts Bird Club
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HEU – Historic Environment Unit
HLU – Hertfordshire Landscape Unit
HMWT – Herts & Middlesex Wildlife Trust
LA's – Local Authorities (District and Borough Councils in Herts)
LEAF – Linking Environment and Farming
NFU – National Farmers Union

Contact

The lead for this plan is Countryside Management Service
Tony Bradford
CMS North Eastern Area
Email: tony.bradford@hertscc.gov.uk

10 Urban habitat action plan

10.1 Urban habitats

10.1.1 Introduction

Wildlife is everywhere; some form of natural life is present in almost every environment on earth. In our towns and cities, wildlife is present despite the actions of the human population rather than because of them. It is not always recognised that the value of urban wildlife to biodiversity conservation can be as great as that in the countryside. Great value is also found in the effects it has on the people who encounter it. These effects are not easily quantified but are increasingly understood to be of considerable benefit. Everyday contact with wildlife can lead to an increasing appreciation of nature conservation, as well as environmental policies in general.

Yet there has been an almost unconscious view that nature should not exist in such places; nature uninvited is often perceived of as untidy, unhealthy, weeds or vermin. Recently however, there has been a change in attitudes towards urban habitats, brought about by an increased public interest in the environment and by a necessity for local authorities to reduce costs. Low cost, low input landscapes where nature is less constrained are beginning to develop in a number of ways. The challenge now is to take these ideas forward in order to maximise the benefits for both wildlife and people.

Urban habitats can be divided into a number of categories. This plan will examine urban habitats under the following headings:

Encapsulated countryside. Areas of semi-natural habitat which persist in the urban area from a more rural past.

Managed greenspace. Those areas managed for recreation or amenity such as parks, school grounds and roadside verges, as well as private gardens.

Naturally regenerating habitats and 'urban commons'. Areas of disturbed ground or non-natural substrates which develop their own self-seeded plant and animal communities.

Urban wetlands. Urban rivers and watercourses, ponds, lakes and reservoirs.

Although there can be considerable overlap between categories, and it is recognised that the built environment itself can be important, these broad definitions provide the most convenient means of dealing with the diverse nature of urban habitats. These categories are discussed in more detail following a general overview of the urban environment.

10.1.2 The ecology of urban habitats

Environmental factors affecting urban habitats will vary because of their position within a built-up area. Depending on the depth of the urbanisation in which a particular habitat is situated, the climate it experiences will be altered in the following ways.

Temperature. In the centre of cities the temperature is usually warmer than the countryside on two days in three and four nights in five. Temperature differences in narrow streets and small open spaces that characterise town centres can be up to 10 degrees Celsius warmer when compared with adjacent rural areas. The effect can be most pronounced on clear nights where areas of high building density form what is termed a 'heat island'. The heat stored in buildings and road materials by day is slowly released overnight. Wind speeds over 12-18 mph will destroy heat islands; they are also severely weakened by cloudy weather. The main biological result of these temperature anomalies is that the active growing season for plants is almost three weeks longer in London and other large cities than in nearby open areas.

Wind speed and humidity. Wind speed is reduced by the frictional drag of buildings but also increased in certain areas by the violent eddies around tall buildings. Thrushes have been shown to choose areas of reduced wind speed for roosting and the use of town centre buildings by Starlings in winter is familiar to most people. It may be that the slightly lower air humidity in urban areas increases the survival of hibernating invertebrates by reducing the risk of fungal infection although there is no scientific evidence for this.

Precipitation. Increases in rainfall of the order of 5-10% are normal over cities, with a corresponding increase in cloud cover. However, the rapid run-off associated with urban hard-surfaces more than cancels out the effect of increased rainfall, so urban areas often experience dryer conditions than the surrounding countryside.

Air pollution. Air pollution in the past was largely derived from industrial sources, the main pollutant gas, sulphur dioxide, still occurring to a lesser degree today. In recent decades the growth of road traffic has led to the increasing significance of exhaust emissions. The most significant pollutants are: nitrogen and its oxides, lead and particulates such as finely divided carbon. The impact of these pollutants on natural communities is difficult to assess as few studies have been undertaken. Most research has been done with crop plants in the laboratory. Broadly the results suggest that lead and particulates can significantly affect the plant-life on roadsides. Nitrous oxide and its derivatives influence plants over a wider area.. It would appear from a number of studies that plants which are influenced by vehicle emissions and other pollutants have increased susceptibility to attack by aphids, beetles, *lepidoptera*, sawflies, red spider mite, greenfly and other arthropods.

The cat and dog factor. Research has shown that a new housing development will introduce between 36 and 55 cats per 100 households into the surrounding environment. Cats are voracious, mainly nocturnal carnivores which will hunt within a wide home range. They kill large numbers of birds and small mammals, their most frequent victims being ground nesting birds and fledglings. An individual cat has been recorded as taking up to 700 birds and small mammals in a year. It is widely claimed that Magpies have a large effect on bird populations. However, scientific evidence does not support this and shows that cats have by far the greatest effect. Dogs are kept by 30% of households and they require daily exercise which is usually taken in the nearest available open space, their excreta contributes to nutrient enrichment. Many dogs retain hunting instincts and will actively seek out, birds, deer and other mammals if allowed off the lead. The effect that this has is largely unstudied but circumstantial evidence shows a lack of ground-nesting birds in urban woodlands.

10.1.3 Encapsulated countryside

The term encapsulated countryside is used to describe areas of semi-natural habitat which have remained undeveloped within an urban area. This may be woodland, parkland, areas of grassland or just ancient trees or a hedgerow. Local examples include Norton Common in Letchworth and Harebreaks Wood in Watford. Some surviving by chance and some by design, many areas of encapsulated countryside are now receiving sympathetic conservation management. New developments on the urban fringe are nowadays often created with woodlands, meadows, hedgerows and farm ponds deliberately retained.

Each type of encapsulated countryside considered in this plan is also the subject of a separate habitat action plan. However, whilst it is recognised that there will be some duplication created by this approach, this document takes the view that the ecological conditions, constraints on management and cultural significance of these habitats are so altered within an urban context that they require separate consideration.

Such urban habitats may have a greater *social* value to local people when compared to an area set in a rural environment because of their position within the immediate surroundings of the homes of large numbers of people. Areas of wildlife habitat will be valued by people of all ages and backgrounds for a variety of reasons. Some will wish to conserve the site and its biodiversity, others will study it and because of ease of access the resulting information and understanding, can be high.

However, there may well be increased *ecological* degradation in urban habitats, associated with high levels of recreational pressure from the local

community; large amounts of dog walking, motor-cycling and informal recreation by children.

10.1.3.1 Woodlands

It is important to recognise that the ecology of an urban woodland may well be altered if it is isolated within the urban environment. The adjacent and associated habitats will be different to those alongside rural woodlands. The general ecology of woodland habitats will be found within Chapter 4, this section will deal with the specific differences in urban situations.

The effect of visitors. A report by Hampshire Wildlife Trust, entitled *Woodland Islands* (Cox, 1995) deals with the isolation of woodlands within urban areas with special reference to Milton Keynes. It recognises that urban woods will very likely receive a high level of use by people. Attempts can be made to balance often conflicting demands and to develop strategies which seek to manage the problems of visitor pressure. The provision of formal paths in certain areas can help to reduce trampling. Improved accessibility to classes of visitor such as families and the elderly can have the effect of reducing the amount of vandalism by increasing the chances of vandals being disturbed or witnessed. There are various designs of barrier that can be used to control access at entrances to woodlands by users such as horse-riders or motorcyclists.

Few studies have been undertaken on the effects of disturbance to wildlife in woodlands. 'Woodland Islands' discusses work done in the Netherlands and Milton Keynes on the effects of disturbance on woodland breeding birds. The responses of birds varies according to nesting strategy and general sensitivity to noise. There is a negative correlation between the breeding density of many species and levels of recreational activity.

The loss of the habitat mosaic which surrounds many rural ancient woods may lead in the urban woodland, to the loss of species which use these surrounding habitats for feeding and the woodland for shelter and breeding. However, other species may benefit; for example woodland birds which have become common in private gardens because of their resemblance to rich woodland edge communities, or Pipistrelle bats which form breeding colonies in modern houses and feed over broad-leaved woodland.

Housing developments. Where housing is developed directly against a woodland there are specific problems which occur including:

- the gradual encroachment of private gardens into the woodland through realignment of garden fences;
- the creation of private gateways into the woods from gardens, leading to widespread trampling of the woodland ground flora; and
- assertive woodland management by the property owner, including the felling of trees which obscure views or shade gardens, the planting of alien and sometimes invasive plants within the wood and dumping of garden refuse.

Urban woodland ecology. An urban woodland will be subject to a heavy seed rain of exotic species and the length of time a particular woodland has been within an urban context will have a direct influence on the numbers of immigrant species present. Cities such as Sheffield and London have urban woodlands of very long standing which can provide useful information. Ecologists in these and other major cities are beginning to build up considerable knowledge of the management and ecology of urban woodlands (see Gilbert 1989).

10.1.3.2 Grasslands

The most important semi-natural grasslands can be divided into three main groups according to soil type: acidic, neutral or calcareous grasslands. These are considered in detail in Chapters 6, 7 and 8 respectively.

The best urban grassland sites will occur in areas of relatively intact encapsulated countryside, these will often be commons, parts of old parkland or grounds of country houses. Also many town parks have their origin in these land uses and the grassland contained within them can often reveal its history through relic flora which have persisted under the later management regime.

10.1.4 Managed greenspace

Managed greenspace includes town parks, gardens, allotments, cemeteries, churchyards, roadside verges and street trees. Such areas are now recognised as being capable of supporting rich wildlife communities. In consequence, there has recently been a wider adoption of more sensitive and informal management practices on such areas. This can range from a reduced use of pesticides, to changes to mowing regimes, planting of bird and invertebrate food plants or even relatively large scale habitat creation. Local examples include Valley Road Open Space at Welwyn Garden City and Butts Close at Hitchin.

10.1.4.1 Town parks

Grassland communities normally occupy between 75% and 95% of a park. By far the majority will be the standard grass sward dominated by Perennial Ryegrass. Mown on average once a fortnight these areas have little value to biodiversity at present. Urban parks can frequently contain good numbers of trees including veteran trees of both native and exotic origin depending on the land-use history. Locally, in Broxbourne, town parks with old timber are important for the declining Stag Beetle. However, in general, trees are normally managed in a very tidy manner in which all dead or diseased wood is removed, leading to a lost opportunity for biodiversity conservation.

Habitat creation within parks and other public open spaces presents opportunities for the enhancement of biodiversity. The types of habitats created will nearly always have low maintenance costs. New areas of scrub, wetlands, hedgerow and woodland could be developed to fit in with areas of more formal design and those set aside for recreation.

10.1.4.2 Gardens

The need people feel for contact with nature together with a growing interest in the environment, and increases in leisure time, have been reflected by the recent popularity of wildlife gardening. In addition to private gardens, the grounds of schools, community centres and housing developments are being gardened for wildlife. This is of considerable significance to nature conservation.

Gardens are generally a mosaic of small habitats formed by lawns, shrubberies, rockeries, old trees, vegetable patches, fruit trees and bushes, hedges, walls, ponds, compost heaps, and the houses and other buildings. It is this variety of habitat that is a key factor in creating the richness of the garden ecosystem.

Gardens can be particularly rich habitats for insects. The abundance of flowers provide nectar and pollen and the mixtures of light, shade and aspect produce a range of micro-climates. Consequently they are particularly good hunting grounds for predators of insects such as birds and bats.

The feeding of garden birds is an increasingly popular activity. Many garden birds are adaptable and the ability to utilise new habitats and food sources is a key aspect of their ecology. Blue Tits opening and feeding from milk bottles on doorsteps is the classic example. Suburban gardens are believed to support the highest density of breeding birds of any habitat in Britain. The regular breeding birds of suburbia are mostly those of open woodland, presumably because the patchwork of garden habitats resembles the richest of woodland margins.

The Song Thrush is a familiar bird of parks and gardens which is currently undergoing a rapid decline in the wider countryside. The reasons for this are not yet clear but the use of molluscicides in agriculture is suspected to be a major factor. Molluscicides are used in gardens as well but on a much smaller and less consistent manner, and it would appear that the Song Thrush population of gardens is not suffering the same decline. Other species common to gardens, which feed substantially on molluscs, are Hedgehogs and Frogs. The use of poisons to kill slugs and snails will have harmful effects on these species and the case for their uncontrolled use by gardeners has to be questioned.

The Fox will live in areas throughout cities including industrial areas and even the inner city but the habitat where their numbers are greatest is suburbia. Their preference is for long quiet gardens with a shed, hedges or other cover to lie up in. The urban fox suffers a high death rate and much-reduced life expectancy compared with its rural counterpart, the largest cause of death is being hit by cars, accounting for nearly 50% of all deaths. This causes significant

Case study – Green Action leaflet

Welwyn Hatfield Council have produced a series of leaflets which aim to help local residents look after the environment. One of these 'Green Action' leaflets is on the subject of nature conservation. The leaflet notably includes a number of ideas on how to improve a garden for wildlife, including pond creation, bird boxes, planting native trees and shrubs, creating a wildflower area, use of a compost heap and reduced use of chemicals.

The leaflet also gives useful contact names and addresses for further information. The leaflet is supplied free to local residents.

differences between fox social structure in urban areas and rural areas where foxes normally live in stable family groups and pair for life.

The Pipistrelle Bat is frequent in suburban areas, selecting with preference modern semi-detached houses, flats and garages in which to establish summer breeding colonies. These can be under hanging tiles, behind barge and facia boards, between soffits and walls or in the apex of gables. Colonies in Hertfordshire average around forty individuals.

10.1.4.3 Road verges

The conservation literature relating to roadside verges is almost entirely concerned with rural verges. However, there are many aspects that both urban and rural verges have in common. Through changes in management and increases in traffic pollution the biodiversity of verges in both the countryside and towns has declined. The effects of car exhaust pollution and de-icing salt is common to both.

A major concern is the maintenance of visibility for traffic. Any planting on bends or at junctions is restricted by specific recommendations that it should not exceed 60 cm in height for a distance which matches the stopping distance of vehicles (60 m at 30 mph). Planting and maintenance of low growing shrubs is costly and so the usual solution is an amenity grass mix. This leads to the 'sterilisation' of large areas of verge. There is the potential for enhanced management of many of these large areas of amenity grass verges. Some sites are already under conservation management, for example, Martins Way at Stevenage.

10.1.4.4 Street trees

Suburban street trees can simulate an open woodland habitat. In recent decades most urban street tree planting has been of smaller ornamental trees, including: Japanese Cherry, Pissards Plum, Purple Crab, Japanese Crab, Birch, Rowan and Swedish Whitebeam. These trees have disadvantages which include the need for regular pruning to lift them above people and traffic, as well as the fruits making a mess and getting trampled into homes. New species and cultivars are continually being investigated in an effort to find the ideal street tree for each situation. The advantages of street trees include their effect on moderating the climate, filtering out pollution and dust in the air, and reducing noise. They support birds and invertebrates and provide an impressive and tangible contact with nature which connects people with culture, mythology and religion.

Recently, threats to street trees have come to the fore with the increase in trenching operations to install cable technology and the repair of underground utilities infrastructure. Tree roots have been damaged and the effects have been compounded by severe drought and pollution stress caused by record traffic and high sunlight levels.

10.1.4.5 Allotments

The open spaces provided by allotments can provide a significant wildlife resource in urban areas. Many species of birds will breed or feed in such areas. Compost heaps will support a variety of invertebrates and not infrequently, Slow-worms or even Grass Snakes. The regular cultivation of allotment plots has also provided a refuge for certain arable weeds. The variety of the wildlife will depend on the state of

cultivation of the allotments and their situation. In St Albans for example, the Riverside Road allotments adjacent to the river Ver contain old watercress beds and a rich mixture of wetland and urban wildlife has developed.

10.1.4.6 Churchyards and cemeteries

Commercial cemeteries began to be developed in the nineteenth century when churchyards could no longer cope with the needs of an expanding population. They were followed by hundreds of local authority cemeteries which did not need the prestigiously designed layouts of the private sites to attract the custom. These public cemeteries tend to be formally laid out and maintained to 'park' standards, allowing less room for the development of wildlife-rich habitats. The private cemeteries went into decline however, and became neglected. Those, which remain, form characteristically wild and overgrown areas of great wildlife value.

Cemeteries often contain areas of old grassland and woodland, which survive alongside the newer communities of sycamore, bramble and ivy, which colonise neglected corners. These mixtures of old and new, together with areas of mown grass and various stone-based habitats can support a rich variety of wildlife. The walls and gravestones in particular can support valuable populations of lichens and mosses. Nearly all churchyards will pre-date the cemeteries and may contain some very ancient features. Some abandoned cemeteries and churchyards are now cared for by voluntary groups who have wildlife conservation as one of their main aims. A prime example is Highgate cemetery in north London.

10.1.5 Naturally regenerating habitats and 'urban commons'

Where 'uninvited' nature is concerned, perceptions are also beginning to change. The habitats that developed along canals and railways were amongst the first to be recognised as of value but now there is growing awareness of 'urban commons' (Gilbert 1991). They are characterised by plant communities, which naturally regenerate on the rubble of demolition sites, disturbed ground and industrial wastes. In such situations new habitats and associations of species are arising, providing a rich resource for study.

10.1.5.1 Urban commons

The greatest concentration of urban commons is to be found in the inner cities, where land for redevelopment lies unused for long periods. However, most towns contain some areas of wasteland that is covered with naturally colonising plant communities, often including a high proportion of garden escapes and naturalised exotics. These plants grow alongside native species recruited from a wide range of habitats. The succession first described by Gilbert (1991) is from early colonisers to tall herb, to grassland and then scrub, which develops into open woodland. The importance of this vegetation is that it is composed of an assemblage of species, which are well adapted to urban conditions. Factors which determine their composition, include the substrate (commonly brick rubble, concrete or cinders), the level of disturbance and the local seed sources.

10.1.5.2 Spontaneous secondary woodlands

Spontaneous secondary woodland is not particularly common in towns, as new woodland, where required, is usually planted. The best examples occur on neglected sites such as abandoned allotments, railway land, old cemeteries and strips beside roads and rivers. The most important factor in determining the composition of the plant community is the range of nearby seed donors. However, underlying geology, soil substrates, hydrology, disturbance and regional climate will all also have an influence. It is assumed by many that spontaneous secondary woodland in urban areas will be dominated by Sycamore. However, this is not the case and although dense stands of young Sycamores can be found there is not much evidence that they convert to Sycamore woodland.

10.1.5.3 Railway land

The use of a wide variety of materials to make the ballast on which railway tracks were supported led to the creation of new habitats. The ballast was designed to be exceptionally free draining, unyielding and open in structure. The origin of this material was sometimes local but often distant. Along with this material came seeds of plants new to the county, notably coastal plants established with the importation of seaside ballast. Other sources of introduction were the cargoes

of freight wagons, seed from grain, hay, wool waste and straw used as packing material.

The habitats formed along the track, on cuttings and embankments, allowed the spread of plant and some animal species into the heart of towns and cities. A classic case is that of the Oxford Ragwort which was introduced into Oxford from Europe in the 18th century and spread throughout the railway system in the 19th century.

At first the habitats were very open. Regular maintenance and frequent fires caused by cinders from steam engines favoured those plants adapted to the harsh conditions of the ballast and the thin-soiled steep-sloped cuttings. With the increase in labour costs and the decline of the railways, most of the old herb-rich grassland and open rocky habitats have been succeeded by the rank grassland and scrub that is familiar to those who travel by train today. Maintenance is kept to the minimum required by safety, the track kept clear of vegetation by spray trains using powerful herbicides.

10.1.5.4 Urban walls

Britain's mild wet climate supports some of the finest examples of wall vegetation in Europe. Vegetated urban walls can provide wildlife interest and local character in an otherwise heavily built-up area. Wall habitats have provided a number of native plant species, usually restricted to coastal cliffs or upland Britain, with a means of colonising the lowlands. At least a dozen introduced plants have their British strongholds on walls. Assemblage composition is determined by geology and the local seed sources and so may reinforce the local distinctiveness of wall communities.

The colonisation of walls is favoured by age, the presence of lime mortar, any aspect other than south, exposure to rain and angle of inclination. Most true wall species are found only on vertical walls; as the gradient decreases an ever-widening range of common species are able to colonise.

10.1.6 Urban wetlands

Chapter 5 deals with wetlands, their ecology and conservation in the wider countryside, this section is intended to highlight the particular aspects of urban wetland ecology.

10.1.6.1 Urban rivers

Rivers form important corridors of mixed habitat as they flow through urban environments. Where their channels are not too severely engineered and water pollution not too intense, they can be the richest of all urban wildlife sites. Some of the habitats are extremely complex, with conditions changing with each variation in water depth, flow rate, substrate type and aspect.

Amongst the restrictions on the full development of riverine wildlife are pollution, scour, unstable substrates, low flows, artificially lined channels, culverting, disturbance by anglers and dominance by aggressive alien plant species. In order to reach its maximum vitality the continuity of the watercourse should not be interrupted so that it becomes a series of isolated sections. In the urban environment there is extremely rapid run-off of rainfall. The ‘flashy’ nature of urban watercourses is further accentuated by the loss of water recharge to the ground water-table, which means base flow decreases; as a result water courses are subject to severe scouring followed by drying out.

10.1.6.2 Water quality

Water quality deteriorates with increasing urbanisation as surface run-off carries with it increasing loads of pollutants and sediments. Rain falling onto towns has the beneficial effect of washing away much of the accumulated dirt from the previous dry period. However, the result is that stormwater may contain a wide variety of pollutants including suspended solids, nutrients (nitrogen and phosphorus), toxins (including heavy metals and pesticides), pathogenic micro-organisms (bacteria, viruses and others), oil, detergents and de-icing chemicals. The problems of pollution by sewage and industrial wastes is not confined to urban areas. However they more often have their origins in urban areas and so the effects are most concentrated there.

10.1.6.3 Canals

Canals in urban areas can be wildlife resources of outstanding value. Developed mainly between 1758 and 1805 they are amongst the oldest structures in

towns and have had a long time to develop interesting communities of plants and animals. Their early origins mean that they often pass through the centre of towns, especially industrial areas. Canal systems have been the point of introduction and main route of spread for many plant and animal species. The factors which have the greatest effect on the biodiversity of canals are water levels, boat traffic and water quality. Boat traffic increases turbidity, which inhibits the growth of submerged plants whilst the emergent and floating vegetation is effected by the direct physical action of boats and their wash.

10.1.6.4 Amenity lakes

The artificial lakes of public parks are often required to meet heavy recreational demand and as a result may be put under severe ecological stress. The problems common to such water bodies include: over-enrichment with nutrients; turbid green water due to high algal content; blooms of toxic blue-green algae in hot weather; banksides in need of repair and devoid of vegetation; a lack of submerged or bankside aquatic plants; and high populations of waterfowl, particularly Canada Geese.

Over-enrichment of water-bodies has many sources, including: supply from nutrient-rich waters of urban rivers; surface run-off; heavy sediment loads from leaf fall from surrounding deciduous trees; and the droppings of large numbers of waterfowl. Much larger numbers of waterfowl are often attracted than would naturally occur due to ‘feeding the ducks’. They also cause problems through fouling and trampling the banks and over-grazing of vegetation.

Areas of open water act as a magnet to many people, especially children. This can lead to trampling of waterside margins, causing erosion and loss of specialist ground flora. They are also often the focus for dumping and littering. This rarely has a significant effect on the ecology of these habitats but is mainly a problem through making them appear unpleasant and uncared for.

10.1.6.5 Ponds

Urban ponds have two principal origins. Firstly there are those of encapsulated countryside, where villages which have become merged with towns through the expansion of the urban fringe. These ponds can often be of considerable age and may be of great wildlife value. They may also act as sources of colonisation for the second type of pond; the large number of specially created ponds in gardens or parks.

Ponds vary greatly in their ecology as a result of their morphology, surrounding habitat and their stage in the process of succession. Ponds are naturally ephemeral, starting from a newly created depression filled with water. They are colonised by plants and animals adapted to the particular conditions present. Organic matter builds up in the pond and silt deposits accumulate. Plants around the margin move progressively towards the centre of the pond. The pond succeeds to damp ground and eventually woodland. All the different stages in pond succession have value for the maintenance of biodiversity, some have more aesthetic appeal than others.

Unfortunately the fashion in wildlife gardening is to create a standard ‘multi-purpose’ pond which attempts to produce a small amount of each of several micro-habitats. The habitat conditions are suitable for common species of pond wildlife but do not cater for those with more specialist habitat requirements.

Garden ponds are typically small and shallow, get topped up with tapwater and have a surface area of less than six square metres. Most are lined with polythene, fibre glass or concrete. Being newly created and of artificial origin they are usually stocked with a variety of plants bought from commercial suppliers to which others collected from the wild are added later. However, natural colonisation is frequently rapid. Midges lay their eggs, water boatmen, pond skaters and water beetles fly in, whilst molluscs hatch from eggs introduced with water plants.

Garden ponds have turned out to be ideal habitats for several amphibians. The Common Frog, declining in rural parts of Britain, is thriving in garden ponds.

Newts prefer ponds which do not contain fish, have a surface area of less than 200 square metres, a 5-50% cover of vegetation and a depth of 0.5 to 1.0 m. Amphibians in general like a dense vegetation around part of the perimeter of the pond. The abundance of such habitats in suburbia, together with a fair amount of introduction, has enabled Smooth Newts to become

widespread in urban areas. At the same time loss of breeding habitats in the countryside has led to a national decline. Newts live on land for long periods of time and are as likely to be found in moist nooks and crannies, amongst moss and in rockeries as in the pond. Great Crested Newts are more particular in their choice of breeding sites, preferring larger, deeper ponds. Fewer garden ponds are suitable habitat for this species.

10.2 The history of urban habitats in Hertfordshire

The urban pattern of Hertfordshire is the result of the long-term expansion of the older settlements together with the planned location and development of newer areas. Most of the major towns in Hertfordshire were little more than villages at the beginning of the nineteenth century. There is also considerable difference in terms of ecology, structure and development between real villages and the old market towns characteristic of the county. The impact of the Industrial Revolution was mainly through the need for increased transport access to London, provided by railways, canals and roads. The railways facilitated the expansion of London commuter settlements, especially in the south of the county, and the overflow developments of Garden Cities and New Towns. As the importance of the railways declined, roads increased in recent decades with the M1, A1M, M10 and M25 all passing through the county and supported by a comprehensive network of re-engineered 'A' roads.

The Victorian zeal for social reform led to the creation of city and town parks. Their original purpose was to improve the health and enjoyment of working people, partly through altruism and partly through the self-interest of the rich and powerful who thought the benefit would be to reduce social unrest and increase efficiency and productivity. The social engineering philosophies of the Garden Cities and New Towns follow on from these Victorian concepts.

Many of the older parks in urban areas have their origins in the private grounds of eighteenth and nineteenth century houses, donated by philanthropic individuals. The landscape design of these parks was inherited from the private estates whose design philosophy had been based on the picturesque style, drawing from the concepts of French landscape painters such as Claude and Poussin. The concept was one of 'Man in harmony with nature' although in reality nature was controlled and constrained.

When the parks in Hertfordshire's towns were created, this concept was already established and a number follow this idea. However, this concept was not followed in all cases by any means and a variety of origins are to be found. Fine examples of parks occur in Gadebridge Park, Hemel Hempstead (based around a house), Fairlands Valley Park, Stevenage (originally farmland) and Letchworth (laid out in the fashion of Versailles). Stevenage, Hemel Hempstead and Welwyn Garden City were all developed with deliberately 'encapsulated countryside'.

Civic pride was a determinant of the character of parks and a very high standard of maintenance was achieved. However, as the 19th century progressed the parks began a long period of decline. Increasing needs for active recreation were met to some degree but the training of park staff remained horticulturally based. The role of parks became uncertain as people's incomes and mobility increased and leisure opportunities diversified. Today the resource allocation to parks continues to be run down, increasing opportunities for the introduction of low-cost informal management which favours wildlife. A new vision of people in harmony with nature needs to be created, with designs and management techniques which fit in with modern values and aesthetics.

The garden has a long tradition in Britain dating back to the pre-industrial era. The stable political system compared to the situation in continental Europe meant that cities were not compact and fortified and there was space for gardens. The pattern of the countryside could be maintained, that of single-family houses with garden plots. Consequently there is a much higher provision of gardens in England and Wales compared to other European countries with an estimated 15 million gardens covering 3% of the land surface. In

towns, residential areas may cover over 60-70% of the total built up area.

Throughout the Industrial Revolution single-family dwellings continued to be the norm but garden space was limited. It was during this period that the creation of urban allotments began. The major influence, which reinstated the private garden to its former, or perhaps greater, prominence was the 'Garden City' movement pioneered by Ebenezer Howard and Raymond Unwin at the turn of this century. They promoted the idea of 12 dwellings per acre (28/ha) by practical example in Letchworth.

In 1918 the *Tudor Walters Committee Report* officially recognised the importance of gardens and from then on their provision was almost universal. The early New Towns were characterised by low density building and generous garden provision. Hertfordshire, with a number of Garden Cities and New Towns, is therefore particularly well endowed with gardens and managed open space.

10.3 Urban habitats in Hertfordshire – current status, trends and threats

10.3.1 Current Status

Nearly 90% of the population of Hertfordshire live in urban areas (towns with populations over 5000) and 60% live in the 10 major towns each with a population of over 30,000. The majority of the ten major urban centres fall into two main categories: New Towns or Ancient Market Towns. Outside of these categories are the more industrial areas around Watford and the conurbations of the Lee Valley close to London (Cheshunt/Waltham Cross and Hoddesdon).

The ancient market towns have densely built centres with old established walls and other architectural features, built from natural materials, which often support specialist communities of ferns, lichens and invertebrates. They are frequently built on the banks of rivers, which have undergone modifications such as the formation of weirs and watermills for light industrial uses.

The outer suburbs of the ancient market towns have much in common with the New Towns, with large areas of low density housing with gardens and substantial amounts of open managed greenspace. With the growth of urban development during the twentieth century being largely areas of housing, the character of much of the built environment is suburban. Compared with large industrial towns and cities in other areas of the country, the urban areas of Hertfordshire can be characterised by the low proportion of 'urban commons' and self-regenerating scrub and ruderal communities of vacant land. This may be explained by the prosperity of the county and it's proximity to London, with high land prices and strong competition for vacant land. This is increased by the restrictions on town expansion imposed by the Green Belts, ensuring that few areas remain undeveloped for long. In Hertfordshire the Green Belt covers 40% of the county and envelops all the main towns except Royston. Hertfordshire's urban areas are further characterised by the presence of one or more watercourses.

The following section is not a comprehensive catalogue but highlights some of the urban habitats present in the county. Part of the difficulty in quantifying the urban habitat resource is its variability and the limited study of these habitats.

10.3.1.1 Stevenage

The predominant superficial geology underlying Stevenage (population 75,000) is decalcified Chalky Boulder Clay, and in areas where this is disturbed, such as along major road developments, the underlying chalk is exposed. A good example of this is the chalk bank on Martins Way, noted for its valuable plant community. The urban area of Old Stevenage has a distinct ecology when compared to the rest of the town.

Encapsulated countryside. Substantial amounts of encapsulated countryside were deliberately incorporated into the New Town layout in Stevenage, including woodlands, grasslands and several river corridors. The woodlands are of special significance including fine examples of Oak-Hornbeam stand-types

which support key species such as Dormouse, Violet Helleborine Orchid and Bluebell. The grasslands have generally declined under unsympathetic intensive mowing regimes but still include some important sites.
Key sites: Monks and Whomerly Woods, Whitney Wood, Ridlins Wood, Ridlins Mire, Stevenage Lodge Grassland and Shackledell Grassland.

Managed greenspace. The Stevenage District Plan adopted in 1994 only recognises a limited range of greenspace in listing sites of local importance. In general, areas such as school grounds and allotments, are not considered for their wildlife value. However, the town includes a large area of amenity and verge grassland with variable amounts of wildlife value. There is considerable potential for enhancement with the adoption of more sympathetic management regimes. This is particularly true at Fairlands Valley where such management could link and buffer Wildlife Sites.
Key sites: Fairlands Valley and lakes, Martins Way verge, Pin Green School.

Naturally regenerating habitats. The industrial area to the west of the railway contains areas of urban common and other industrial habitats. These areas have received little or no attention, the railway land itself needs surveying, but are known to support some scarce species. For example, Hertfordshire's only Black Redstarts nested amongst the building works on the Glaxo Wellcome site. An area of post-industrial rubble and hard standing off Gunnels Wood Road was the site for a pair of nesting Little Ringed Plover in recent years.
Key sites: Norton Green tip.

Urban wetlands. Apart from their landscape and natural habitat value, the encapsulated river corridors serve an important role in controlling the surface water run-off from the town. The district plan describes how the natural floodplains of the river corridors have in places been converted into 'water meadows' and storage ponds, which temporarily store run-off during storms. These areas present valuable opportunities for habitat enhancement or creation.
Key sites: Fairlands Valley lakes, Elder Way flood meadows, Stevenage Brook.

Building development on the north-east of the town, known as Wellfield Park, is likely to 'encapsulate' several ancient woodlands and bring them under increasing influence of an urban environment. Brooches, Hangbois, Claypithills Spring, Pryor's Wood and Box Woods will be affected. The latter sites in particular are of high wildlife value. The greatest threat will come from the potential disturbance from people and the 'cat and dog factor'. There are opportunities for habitat creation within this scheme. The proposed development to the west of Stevenage will likewise increase pressure on the highly significant Knebworth Woods SSSI as well as a number of smaller Wildlife Sites. Should this development proceed, it is imperative that effective buffering of these sites is incorporated, as well as greenspace within the development.

10.3.1.2 Hemel Hempstead

The underlying superficial geology of Hemel Hempstead changes from Clay with Flints on the higher ground, to chalky or gravelly deposits and then recent river alluvium as the land dips into the valleys of the rivers Gade and Bulbourne.

Hemel Hempstead New Town (population 80110) was built around the same time as Stevenage and has a similar character with large amounts of encapsulated countryside. In 1992 the Herts Environmental Records Centre produced a survey and assessment of the sites of urban wildlife importance in Hemel Hempstead.

Encapsulated countryside. The survey identified 18 sites, which it classed as being of Borough Importance, Grade A. The majority of sites of this highest classification fit into the category of encapsulated countryside and include some of the town's best examples of grassland, woodland and wetland. Typically the ancient woods in this area are of Oak-Hornbeam, usually with a rich ground flora which includes Bluebell and Wood Anemone.
Key sites: Shrubhill Common, Boxmoor, Paradise grassland, Howe Grove and Widmore Wood.

Managed greenspace. The larger examples of this category form the bulk of the second level classification of the survey, Grade B. They include most of the secondary school sites, some of the primary school sites and several of the major playing fields.
Key sites: Playing field south of Queensway, Highfield

Lane, Northridge Park, Warners End playing field, Piccotts End Lane playing field and Gadebridge Park.

Naturally regenerating habitats. One site representing self-sown habitats of recent origin was listed as being of Borough Importance but is now largely developed. Jarmen's Fields comprised 8 ha of tall herb and scrub, only remnants remain. Other areas of scrub such as the disused railway line, bus garage car park and filter beds contribute to a combined area of scrub which totals less than 10 ha.

Urban wetlands. Amongst the many wetland areas of the town there are five balancing tanks and reservoirs, three of which were surveyed. These wetlands represent an important under-utilised resource for the enhancement and creation of areas of high biodiversity.
Key sites: Maylands balancing tank, Redbourn Road reservoir, Bennetts End balancing tank.

Several areas are threatened to various degrees, particularly Paradise grassland where built development is proposed. The retention of a wildlife corridor to maintain 'green links' has been suggested.

A major area of opportunity exists at Bunkers Lane where the development of a public open space adjacent to the Wildlife Trust's Long Deans nature reserve is including the creation of woodland, hedgerow and grassland habitats. The site will be managed to maximise benefits to both wildlife and local people.

10.3.1.3 Letchworth Garden City

Begun in 1903, Letchworth was the world's first 'Garden City'. Designed as a compact urban development, it incorporates the advantages of both town and country living. It has an agricultural estate, designed as a source of industry and a major contributor to the town's economy. It forms a surrounding 'green belt'; although today the Letchworth and Baldock conurbations are only separated by the A1M Motorway and so could be considered as one single urban area.

The total area of wildlife-rich habitat within the urban areas is relatively low. This can partly be explained by the compact nature of the built-up area and it's relatively recent and even-aged development. However, it is also a reflection of the lack of such features in the landscape on which it was built. Most of the preceding features (hedges, shelterbelts etc) still exist in the urban environment. It is worth noting that the same cannot be said of the surrounding countryside. Dominated by arable agriculture on the productive chalky soils, the effects of modern agriculture have led to there being few wildlife habitats of value remaining. Habitats around the urban fringe have sometimes avoided the effects of the agricultural changes for various reasons. Grassland, for example, has all but disappeared from the wider countryside, but is retained in and around the urban areas.

A Habitat Survey for Letchworth Garden City (HMWT 1996) included both the built-up area and its surrounding agricultural estate. It found that encapsulated countryside and managed greenspace were well represented but that 'urban commons' were all but absent.

Encapsulated countryside. Grasslands are particularly well represented. Neutral grassland forms the largest ecologically valuable habitat and represents 1.28% of the estimated 946 ha of the remaining resource in Hertfordshire. Calcareous grassland is relatively scarce considering the geology of the area with only three fields of semi-improved calcareous grassland: two at Norton and the third, which is developing an increasingly diverse flora, at the edge of the industrial estate. The majority of chalk grassland was found on road verges and on a railway cutting forming linear habitats of 1350 m in extent.
Key sites: Norton Common, Radwell Meadows, Letchworth Golf Course. Norton Common is a classic example of encapsulated countryside with high wildlife and historic interest, whilst Radwell Meadows and Letchworth Golf Course are on the urban fringe.

Naturally regenerating habitats. Very few sites are present which fall into this category.
Key sites: Playing fields north of Sollershot.

Urban wetlands. Two ponds are known to support Great Crested Newt; Willian Pond and Norton Pond, both being remnant countryside features on the urban fringe.

The incorporation of biodiversity objectives into the management of the rural estate has the potential to significantly enhance the urban fringe habitats.

10.3.1.4 St. Albans

The historic city of St Albans is centred largely on glacial and river terrace gravels together with areas of clay-with-flints and Argillic Brown Earths. The city has a dense medieval centre surrounded by areas of up-market housing.

Encapsulated countryside. St Albans is well endowed with large gardens and mature trees but has very little encapsulated countryside.
Key sites: Bernard's Heath, Beech Bottom Dyke, the Wick woodland.

Managed greenspace. The major area of managed greenspace in St Albans is Verulamium Park. This site has great potential for habitat enhancement in the current relatively sterile landscape. This is particularly relevant to the river Ver as it flows through the park and beyond (see below). The Riverside Road watercress beds and allotments, which are associated with the river Ver corridor are being managed as a nature reserve by a local community group.
Key sites: Verulamium Park, Fleetville Cemetery, Clarence Park, Riverside Road allotments, Sandpit Lane.

Naturally regenerating habitats. The Alban Way is disused railway line designated as a foot and cycle path. It has good mature scrub communities and is associated with other areas of open greenspace along its length, including the river Ver and associated habitats, a golf course, allotments, gardens, and a number of small urban common sites.
Key sites: Smallford gravel pit, Alban Way.

Urban wetlands. The lake in Verulamium Park suffers from many of the problems typical of amenity lakes, although good efforts have been made to redress them. The river Ver has a poor diversity of habitats along the section which flows through the park and neighbouring urban areas. At present, the condition of the river in St Albans presents a break in the continuity of habitats and thus a barrier to the recolonisation of species lost from upstream during the dry period.
Key sites: Ver corridor, Verulamium Park, Sopwell Meadows.

The Alban Way is an excellent example of a green transport link joining a number of open spaces and perhaps providing an alternative travelling route to and from work. However there is a need to take up the opportunities that this good start now presents. Continuity of route needs to be established with Verulamium Park and the city centre. The original facilities should be refurbished and then connections could be made with other green transport links across the city. Other key issues include the retention of greenspace in the hospital re-developments and the management of the Smallford gravel pit area. Ecological principles should figure prominently in both.

10.3.1.5 The Lee Valley

The Lee Valley conurbation (population 77,576) consists of Cheshunt, Broxbourne and Hoddesdon, forming a linear development along the western fringe of the valley. The majority of the built environment consists of housing. The River Lee Navigation was formerly a transport route into London. Market gardening and glasshouse culture were major industries in the past, but are now in decline and much of the land they once occupied is being re-developed for housing. The conurbation is 'sandwiched' between two areas of international significance for conservation – the Broxbourne Woods complex and the Lee Valley. Urban fringe habitats are therefore of high value.

Encapsulated countryside. Amongst the glasshouses along Hammondstreet Road in west Cheshunt there are significant areas of unimproved grassland, hedgerows and other relic features of countryside. It is important that these features are retained and conserved during any future developments, particularly where they are in close association with the Broxbourne Woods complex.
Key sites: Hammondstreet Road grasslands, Bonneygrove Wood, Silvermead.

Managed greenspace. On the western edge of Cheshunt there is a concentration of the nationally scarce Stag Beetle (see Chapter 22). Gardens are amongst the habitats it is known to utilise but the significant number of old town parks within the conurbation are also important. There may be as yet

unrecognised features of urban areas, possibly climate-related, which favour the survival of this species. Areas of glasshouses may have similarities in their ecology to allotments; some of the now scarce agricultural weeds may survive amongst the patchwork of cultivated and fallow areas.
Key sites: Cedars Park, Whithern Park, Barclay Park, Albury Walk, gardens, New River corridor.

Naturally regenerating habitats. Much of this section of the Lee Valley has areas of industrial and post-industrial habitat. Consisting largely of extensive gravel extraction sites, there are also sewage treatment works, horticultural sites and a power station with associated pulverised fuel ash (PFA) dumps. The remaining PFA areas are at Cheshunt gravel pits and Rye House Power Station. Post-industrial habitats are often rich in invertebrates. Thistly Marsh, an in-filled gravel pit next to the railway line at Cheshunt, is one of the best sites in the county for grasshoppers. Of particular note are the riverbank and canal towpath margins, which support an unusual flora, although this becomes more distinctive further down into London. These waterway corridors form a linear habitat connection with the River Thames and the London docks, and act as a channel for the spread into Hertfordshire of species introduced with imported goods and materials.
Key sites: Rye House Power Station, River Lee Country Park, Lee Valley.

Urban wetlands. Several amenity lakes, small reservoirs and, most significantly, the New River are to be found within the urban area. This important site is rich in aquatic life and supports a large population of the nationally scarce River Water-dropwort. At present the integrity of this river corridor is being threatened by continuing development.
Key sites: Cheshunt Reservoirs, New River.

This area contains an unusual abundance and diversity of significant sites. Development in the west of Cheshunt and along the New River corridor may well conflict with nature conservation if due care and attention is not paid. The parks and amenity areas are already of value and have great potential for enhancement.

10.3.1.6 Watford

Situated on an area of glacial river terrace gravels, Watford is the most truly urban area in Hertfordshire. It has a population of 109,503. There are extensive and valuable areas of all the typical forms of urban habitat.

Encapsulated countryside. Woodlands and wetlands are particularly well represented. The woodlands are predominantly classified under Beech stand-types with Cherry, Hornbeam, Ash and Oak being present. Whippendell Woods is a key component of a complex of highly important woodlands on the urban fringe. Cassiobury Park contains wet woodland of alder and willow, as well as areas of marsh and grassland.
Key sites: Whippendell Woods, Cassiobury Park, Harebreaks Wood, The Lairage Land.

Managed greenspace. Cassiobury Park is a large and important site which has areas of managed greenspace in association with encapsulated river corridor habitat. There is considerable scope for improved conservation management and habitat enhancement.
Key sites: Cassiobury Park, North Watford Cemetery.

Naturally regenerating habitats. There is a particularly good example of ‘urban common’ at Croxley Green Junction between a dismantled railway and the river Colne. This is a very species-rich and diverse site, different parts having undergone disturbance at different times. It displays the full range of successional stages between bare ground and secondary woodland. A fine example of naturally regenerating woodland links North Watford Cemetery to Stanborough Park. This site, based on the remains of ancient woodland at Gullet Wood, has an unusual character which it gains from its canopy species mix with dominant Wild Cherry, Birch and Oak, while also including Elm, Sycamore, Beech and Ash.
Key sites: Croxley Green Junction, woodland at North Watford Cemetery.

Urban wetland. The rivers Colne and Gade form significant wetland corridors with associated wetland habitats. The river Colne passes through Oxhey Park and then turns north through an industrial area to where it used to flow along the edge of Watford. Here it has now effectively become ‘encapsulated’ by a new M1 link road, built by Hertfordshire County Council. An

enhancement scheme for this stretch was carried out by the NRA. Meanders were re-created with the help of blockstone deflectors. The river's recovery has been quite dramatic, large numbers of fish have returned and both bankside and in-stream plantlife has recovered. Other stretches of the Colne are still suffering from similar problems to that caused by the M1 link road construction and it represents an under-utilised resource for both its biodiversity and amenity value. An enhancement scheme extended from that described above could include the development of public access along the length of the river's urban course.

Key sites: Rivers Colne and Gade.

A survey of public open space in Watford in 1987 showed an overall provision of 216 ha in the Borough, just short of 0.405 ha per 1000 population. These figures do not include school playing fields, ornamental parks and gardens, allotments or the Whippendell Woods on the west of the town. The open space is not distributed evenly with two wards being particularly deficient and one ward containing Cassiobury Park, which itself accounts for two-fifths of Watford's total open space. The unevenness of the distribution is one of the key issues in the town. Infill development since 1987 will have further reduced the provision.

One particularly damaging development has been that of housing built in Tunnel Woods. This valuable urban woodland had developed on the land beneath which railway tunnels passed through the chalk, as well as on the cuttings alongside the tunnel entrances. Mainly old secondary woodland but containing some plant species indicative of ancient woodlands, this woodland was ecologically very valuable given its context. A particularly large roost of Pipistrelle Bats used the wood as a feeding area, as did Badgers and Foxes, which have their setts and earths in the part of the woodland which extends onto the cuttings at the tunnel entrances. A thorough assessment of the remaining greenspace in Watford is urgently required in order to prevent further such losses.

10.3.2 Trends

Urban habitats are unique amongst wildlife habitats in that an increase in their distribution is not seen as desirable (at least if it is at the expense of open countryside). In 1970, the residential area in Hertfordshire was 11.1%, just over 18000 ha, and this increased to 11.7% in 1980. By 1990 residential development occupied over 19600 ha (12% of the county) with other urban uses amounting to over 5%. More detailed figures are available for Hertsmere Borough. They show a net land-use change to residential use between 1970 and 1990 of 112 ha, with half having been formerly what the planners term 'derelict or vacant land'. Between 1980 and 1990, 13 of the 42 hectares developed were in the Green Belt.

Development within urban areas (either on so-called 'brownfield' sites or 'in-filling' on managed greenspace) provides an alternative to development of the Green Belts, but may destroy a site that has a greater biodiversity than average farmland. A continuing turnover of urban sites becoming vacant, developing wildlife value, and then being re-developed can be seen as a 'natural' cycle of urban ecology. (Although occasionally certain sites develop outstanding value and may merit some form of protection.)

10.3.3 Threats

Distinct threats can be recognised through infill development (described above), incorrect management and 'improvement' through the use of top soil, planting schemes and pesticides. It is the infilling of areas which have never been developed; areas of encapsulated countryside or green space of long standing, which causes irreplaceable losses to the wildlife resource. The re-development of 'urban commons' (brownfield sites) of long standing can also lead to a significant loss of urban biodiversity. There are many threats to urban habitats and their biodiversity, but this is a complicated and imprecise subject area. Many plant and animal species have become adapted to urban conditions. The conditions which determine the unique urban communities which are so valuable to the study of ecology often include those which would normally be considered hostile to wildlife e.g. pollution or large scale tipping of industrial wastes.

10.4. The future for urban habitats in Hertfordshire

10.4.1 The value of urban habitats to people

Nature conservation in towns and cities is not just about the enhancement of biodiversity or how people can protect wildlife. It is also very much about how wildlife can enhance the lives of the people who live and work in these places. Benefits brought by wildlife can be found in looking at individual plants or animals, in an appreciation of patterns of movement, colour and smell. Wildlife makes a considerable difference to people's feelings of health and well-being. Natural areas are more peaceful and quiet. Wildlife sites are known to be valued as escapes from the noise and pressures of the harsh environments of concrete and tarmac.

Local distinctiveness. The ecological management of urban greenspace can emphasise ecological and cultural differences, and provide local character or distinctiveness. This may sometimes require changes in the expectations and aesthetic preferences of local people. However the public of today are receptive to new thinking about the environment and are sympathetic to the principles of biodiversity conservation. As a result such changes may be readily brought about with the correct approach to public information.

10.4.2 The future practice and approach of urban conservation

10.4.2.1 A strategic approach

Local Authorities are now committed to the production of sustainable policy frameworks under the Agenda 21 agreement. This is to be done through the Local Plan process and should be done with full consideration for nature conservation.

In order to conserve and enhance biodiversity in towns and cities considerable emphasis should be given to improving the quality of the urban environment in general; the water quality in rivers, the maintenance of their natural processes, air quality, restriction in the use of pesticides, appropriate management of trees and protection of wildlife from disturbance. If sustainable development means recognising the environmental limits to growth then it is essential that development plan strategies are environmentally led.

Each urban area should prepare a conservation strategy that sits within the wider district and county framework. The strategy will contain clear targets for the level and distribution of greenspace. The greenspace will be made up of components of encapsulated countryside, managed greenspace and self-sown habitats. Although the resource may not be static, especially with self-sown habitats, a minimum level for each should be set.

Local Authorities should show their recognition of the wildlife value of the non-traditional sites (self-sown habitats, 'urban commons', post-industrial sites etc) by recognising them in the Local Plan alongside traditional sites (woodlands and grasslands). Where re-development occurs, each site should be judged on its individual merits and the very best sites may well justify protection. The opportunity for 'designing' and managing appropriately (see below), new 'urban commons' to maintain a minimum level of habitat should be sought.

Planning and development strategies should integrate informed conservation principles. Where sites do come up for redevelopment then the possibilities of maintaining and enhancing biodiversity should be investigated and appropriate measures made a part of the planning agreement. This is particularly relevant to river corridors.

Local authorities should design networks of Green Transport Corridors which link greenspace within urban areas. These would be along dismantled railways, towpaths, and other linear features where

people could walk or cycle between urban nature reserves, parks and other greenspace, avoiding stresses of traffic and commerce. The management of all areas of greenspace should be reviewed to see if more sympathetic regimes can be implemented.

There is frequently much emphasis placed on wildlife corridors in urban conservation. This may lead to the assumption that land outside of such corridors will be of no value for wildlife. This is usually not the case. Except when they follow a river corridor or other natural feature, such as linear tracts of similar habitats such as woodlands or grasslands, wildlife corridors are a distraction from the need to improve the environment and enhance biodiversity *throughout* our towns and cities. The countryside to which these corridors are to link is often no more valuable to biodiversity conservation than the habitats within the urban areas. Immobile species will very rarely be provided with the conditions required for their spread to a suitable habitat by a green corridor.

Issues relating to the need and opportunities for environmental interpretation and education are of increased importance in urban areas, not only as objectives in themselves but as strategies for the maintenance and enhancement of biodiversity. Links between schools and the wildlife habitats in their areas generate a sense of ownership and care. Interpretation and education are usually the most appropriate measures of reducing the adverse effects that visitors may have on a site. High value should be placed on sites where studies on the environment can be carried out. School grounds have a key role to play.

10.4.2.2 Assessment of the resource – Total Natural Assets

In order for planning for wildlife in towns and cities to be fully effective, sound assessments need to be made of the wildlife resource. The recent Hertfordshire Habitat Survey identified all remaining areas of semi-natural habitat within the county. It also revised the criteria used for selecting sites of importance, known as ‘Wildlife Sites’.

Most urban areas in the county require surveys that specifically look for important areas of urban waste ground and managed greenspace. The value of such areas should be recognised in the local plan.

Traditional surveys have concentrated on habitats or botanical communities of a rural past, for example, amenity grassland with areas which are more species-rich. In fact, the surrounding gardens, street corners and odd patches of land will probably have a much greater value for biodiversity.

It is essential to carry out baseline surveys in order to determine the overall biodiversity resource of an area (in terms of habitats and species). This can be termed the ‘Total Natural Assets’ of a borough. These can then be assessed and the levels to which they are to be maintained can be set. This will include the hectarage covered by different habitat types (including garden habitats, ponds, watercourses and urban commons), by SSSIs, other statutory designations and by non-statutory sites. Lists of nationally and regionally rare species could also be held together with estimates of the diversity of species and numbers of individuals, for each local area. The total natural assets can then be reviewed at regular intervals with ‘profits’ and ‘losses’ assessed, and threats and opportunities identified.

In this way the old site based approach can be integrated into a more comprehensive and strategic approach to the conservation of urban biodiversity. The effects of proposed developments should be measured against these totals, and measures to maintain biodiversity levels incorporated into the development plans before they are implemented. The effects of developments on land outside of the actual development site should also be made. For example, the effects on flow and water quality in watercourses receiving discharges, or changes in air quality which may in turn affect the species growing on a wall or in a woodland. This approach would allow the integration of biodiversity conservation into environmental quality targets and the criteria for sustainable development.

Because of the difficulty in surveying gardens and other privately owned grounds, a method needs to be developed to assess the biodiversity of these areas. Surveys for specific species have been proposed in Chapters 18 (Song Thrush) and 22 (Stag Beetle). The distribution patterns of other species can also be clarified by this sort of survey, which relies on tapping into the knowledge of the general public; for example the occurrence of bat roosts in urban buildings.

10.4.3 Management of habitats in the urban environment

The conservation of urban biodiversity requires a different approach to that traditionally undertaken in the wider countryside. Even in areas of encapsulated countryside it has been established that there are different ecological, as well as cultural factors at work.

10.4.3.1 Urban woodland management

Management of woodland in an urban context has to take account of local ecological and cultural conditions. Coppicing, for example, is likely to be inappropriate in a small, deeply urbanised wood where there is high visitor pressure. The level of disturbance, nutrient inputs and exotic seed-rain would mean that any conservation objectives would almost certainly be damaged by coppicing.

The case of Sycamore serves as an example of the need for a different approach to woodland management in urban environments. Sycamore is a characteristic tree of urban woodlands, sometimes introduced by planting. It behaves very much as a typical urban species. In the past it has received considerable attention from conservationists, frequently seen as a harmful alien which must be eradicated in order to protect the ecological integrity of the woodland. However, harm may only occur where it invades long-standing habitats such as ancient woodland or species-rich grassland.

Sycamore is a pioneer species of somewhat weedy character springing up in odd corners and areas of disturbance. Few of the numerous seedlings become saplings and fewer of the saplings turn into mature trees. Disturbance such as that caused by the 'conservation action' of 'Sycamore bashing' only serves to maintain the early successional stages during which it is naturally dominant. However, the species is now so well established that nothing can stop it taking its place as an honorary native in fertile urban woodland. A native of southern Europe, the Sycamore occurs naturally with Ash on fertile soils especially in river valleys. Similar communities are developing in urban woodlands.

In order to balance the different interests in the management of urban woodland it may be appropriate to assess the overall woodland resource of an urban area and then assign different roles and therefore management to different areas. In this way recreational needs can be balanced with those of conservation, either within each area of woodland or throughout the woodland resource as a whole. Certain areas may require a management which attempts to ensure non-disturbance, others may be designated for the focus for certain forms of recreation, interpretation or education.

Where possible woodlands should be buffered by creating an area of greenspace around them. This can provide an alternative focus for some of the more damaging forms of recreation. These areas will protect the woodlands from tipping, garden encroachment, and assertive woodland management from neighbouring properties. If a development near to a woodland cannot be avoided then buffering should be designed as part of the development. Some form of fencing should be included to protect strips adjacent to the woodland, to allow a graded woodland edge of self-regenerating scrub and young trees.

New areas of woodland should be created through natural regeneration where suitable seed sources are present. The advantage over planting is that the species which occur will reflect the local ecological conditions. The communities which arise will be the natural products of association and competition between species, and will exhibit local distinctiveness. With planting, this naturalness cannot be replicated and the earlier stages of succession, with mosaics of associated habitats, such as bare ground or damp hollows, are lost. The cost of the trees, planting and maintenance is high and such management can be detrimental to other species through the use of herbicides or the cutting of vegetation.

Veteran trees. There is a tendency to condemn old trees growing in public areas on safety grounds. Local authorities and landowners allowing public access are caught in an awkward position between their obligations under law and a desire to allow nature to take its course, allowing the greatest biodiversity to develop.

The Forestry Commission leaflet, *The Recognition of Hazardous Trees*, takes a responsible approach by informing of a landowners liability for any damage

caused by a tree breaking or falling where it shows external evidence of decay or structural weakness. However, problems arise in that the nature of the guidance in recognising hazardous trees is such that almost every tree within an urban area could be said to show external evidence of decay or structural weakness.

The frequency of instances where trees cause injury to people by shedding branches or collapsing is very low, but the perceived risk is exaggerated because the wording of the law is unspecific. Consequently, insurance companies will insist on a very strict interpretation of the law by local authorities and others in order to minimise their own risks. The Forestry Commission leaflet therefore will encourage the pruning, felling and general 'sanitisation' of a great majority of trees in areas where people or property may conceivably be at risk.

A fresh view on the value of veteran trees is required. Such trees should be allowed to stand and not felled at the first sign of ‘old age’. Where genuine risk is felt to exist, one solution may be to fence off rather than fell or severely lop the ‘offending’ tree. Fencing, and management within the fenced area can be designed to give an aesthetically appealing appearance and to enhance biodiversity. Fallen boughs should be left amongst long grass, where reduced trampling and mowing favours fungi and invertebrates. Where older trees have to be felled or are windblown, opportunities should be sought to retain dead wood, such as trunk sections. These may be best left lying on the ground in shady areas. Stumps should not be ground out or chemically treated as they provide a valuable resource for insects such as the Stag Beetle.

The creation of new pollards could provide a way in which management for amenity and public safety could fit in with the development of veteran trees and associated habitats in the longer term.

10.4.3.2 Urban grassland management

The best forms of management for grasslands are likely to be the traditional practices under which they evolved. More often than not this will involve grazing. Although this is often seen as conflicting with the use of the area by the public there are many examples where people happily accept grazing animals as it brings extra interest to the site. Where grazing cannot be used in a management regime, then mowing treatments, although second best, can be designed to conserve the biodiversity of a grassland. Such treatments are likely to involve some form of rotation, with areas left uncut each year, or cut at different times of the year.

In many managed greenspaces, the key issue is the intensity of mowing. In cities such as Sheffield, the council has implemented changes to the existing management regimes to make them more sympathetic to wildlife. This usually involves changing from regularly short mown turf to maybe one or two cuts per year. Grasslands have come up with masses of wildflowers, including orchids, and these are attracting butterflies and birds. Long term monitoring of these sites is demonstrating the benefits to wildlife, to local landscapes and is saving money on grass cutting. There is great scope for such management to be adopted in Hertfordshire in the extensive areas of grassland in the new towns and garden cities, as well as the verges of new link and ring roads. Where possible, areas of longer grass should buffer or link existing sites of value such as woodlands or older grasslands.

However, a common problem is that the public complain that areas of grassland managed in this way have an untidy and neglected appearance. Part of the problem is one of aesthetics and fashion determining people’s perceptions. In the long term the advantages of different, more ecologically sympathetic, regimes become apparent. However, immediate practical solutions include maintaining close mown margins along edges, paths and even significant sight lines. Interpretation and communication is essential.

10.4.3.3 Self-sown habitats

In the naturally regenerating habitats occurring on urban ‘waste ground’, the conservation thinking of the countryside is even less appropriate. Such areas should be seen by conservationists as a delight, a release from the worry of protecting species and habitats. This is where the thrill of watching nature evolve can be enjoyed with all its surprises and irreverent abandon. New plant associations can, and should, be allowed to develop.

The Pulverised Fly Ash (PFA) tips of the Lee Valley, now covered in orchids are a delight. Where it is easily achieved there is great value in managing such areas for the enjoyment of the public, as shown at the River Lea Country Park, Cheshunt. However, this is a special case, and in general it should be recognised that many self-sown habitats will be temporary in nature and it would be a mistake for conservationists to put too much emphasis on areas of urban industrial dereliction which have become important for wildlife and call for all such areas to be protected from development. Each site should be judged on its merits. The aim should be to manage and appreciate such sites for their biodiversity during their period of availability and seek to maintain a rotational resource as sites become developed.

To take an approach which is overly reliant on site-based conservation is a mistake in an urban context. Where established semi-natural habitats are scarce, and there is a constant pressure on those that do exist, it is understandable to want to conserve them. However, nature has already taught us that there is already a great deal of wildlife which has adapted to the urban environment and a mix of traditional and new sites will be of most value.

What will increase the opportunities for orchids, and other less common species within towns and cities, is to resist the urge to enrich, plant and sow the soils in every development site. Top-soiling and ornamental shrubberies should be avoided! Instead nature should be left to take its course. New spontaneous communities of plants and animals should be allowed to develop as and when opportunities occur.

The appearance of some of these naturally regenerating sites, particularly ‘urban commons’, are sometimes perceived as being unpleasant. The profusion of plants, colourful flowers and insects is overlooked by many people. Their attention is focused on the broken and neglected industrial structures they associate with decay. A number of different treatments which attempt to retain the best features of these areas, whilst giving them an appearance of being cared for, have been assessed (Gilbert 1989). With ‘urban commons’ the creation of a sown and mown grassland strip around the perimeter of the site has proved to be the most satisfactory treatment. This may be combined with the use of rows of posts to prevent vehicle access.

The need to arrest successional change on naturally regenerating sites should be questioned. Although many characteristic plants and animals are naturally adapted to cope with disturbance this is already frequent enough in the urban environment. Allowing areas to remain undisturbed for longer periods in these new environments could yield further interesting discoveries.

The opportunities that disused railway lines present for public access to wildlife are great. This has been recognised by many local authorities who have converted them to footpaths and cycleways, allowing pleasant car-free links to the centres of towns. The restoration of these old railway lines to form new 'green routes' has not always been done in a way which ensures an optimal outcome for wildlife and people. The opening of a central path for example could give rise to increased habitat diversity and conditions which resemble those of a woodland ride. However if the path is surfaced with an impermeable material and it is so wide as to occupy the entire level surface then biodiversity opportunities will be lost. Solutions may lie in adopting maintenance techniques which are adapted from the original methods used by the railway maintenance gangs. The aim would be to maintain the open conditions of the past and therefore conserve something of the unique plant communities they supported.

10.4.3.4 Urban wetlands for stormwater control and nature conservation

Increasingly, storm water drains are being designed so that they no longer discharge directly into streams and rivers. Instead they flow into specially constructed basins known as balancing tanks, lakes or ponds. They are a feature particularly associated with New Towns. In appropriate circumstances these ponds can be enhanced to maximise their value for wildlife, providing that the constraints imposed by pollution are taken into account

There is considerable scope for creativity and invention to be applied to the design of these balancing ponds, and other urban wetlands, to enhance the environment. It may be possible to

Case study – River Hiz Development Guidelines (Hitchin)

The River Hiz Development Guidelines, produced by North Herts District Council, are the culmination of work instigated by the Hitchin Rivers Society, who prepared a draft of the document.

The society recognised that many of the problems in relation to the rivers flowing through Hitchin could only be solved by co-ordinated long term planning. The River Hiz in particular is severely degraded in stretches, is culverted in part and lacks natural features. With the adoption of the development guidelines by North Hertfordshire District Council future re-development along the river Hiz corridor will need to ensure that the opportunities for environmental improvements are not lost, and that the continuity of the open watercourse and public access is enhanced.

The development of an integrated publicly accessible corridor along the river is seen as 'key to both maintaining and enhancing the attractiveness of Hitchin town centre for shopping, business, recreational and residential purposes'. However, it is unfortunate that the original strong emphasis of the draft plan on the wildlife conservation aspects has been weakened. Despite that, there is a section on wildlife, and the document makes important points about the desirability of correcting the mistakes of the past and of protecting existing species. However, where nature conservation measures are concerned the wording is that 'the Council *will encourage*' the various measures, but with respect to aspects such as the provision of a walkway the wording is 'the Council *will normally expect'*.

The development of a traffic free riverside walk providing access into the town centre is very important and has been developed with success in other parts of the country (The Five Weirs Walk along the River Don in Sheffield, for example). However the protection and enhancement of biodiversity should not be placed second to the considerations of public access and townscape aesthetics.

include reedbeds in association with balancing tanks, sewage works outflows, or even along watercourses themselves. These will provide valuable habitat, visual amenity and a sustainable method of water quality improvement. The National Rivers Authority (now The Environment Agency) set up a project in 1995 to test the idea of placing reedbeds at strategic points in streams to intercept and treat surface water run-off. Two small rivers, the Ingrebourne and the Wantz Stream, both receiving substantial amounts of surface run-off, were chosen for the test. A full programme of pre and post-scheme surveys have been designed to monitor improvements in water quality and the effects on wildlife.

10.4.3.5 River enhancement

In the past, rivers in an urban setting, especially in industrial areas, have commonly been treated purely as channels for carrying away water. River engineers have considered it essential to build into rivers the ability to cope with dramatic increases in flow in order to prevent flooding. This has often been at the expense of the associated wildlife habitats such as aquatic vegetation, bankside trees, pools and islands, all of which impede the smooth and efficient flow of water in the river. Frequently this means that rivers are made to flow in wide, straight, deepened channels with steep sides made of concrete. In extreme cases the river is completely enclosed so that it flows through an underground tunnel, sometimes for considerable distances. Also in many instances buildings are constructed directly onto the waters edge, preventing access to the river and restricting the possibility of bankside habitats being created for many years into the future.

The sudden change from permanently wet channel to dry banks in urban canalised watercourses means a loss of marginal vegetation and associated damp habitats. Deepening and widening leads to low flow levels, deposition of urban sediments within the channel and loss of habitats. Channel destabilisation is

caused downstream and upstream of the altered watercourse.

Opportunities for river restoration and rehabilitation must be seen as a priority both in terms of engineering and wildlife benefits. They not only offer the opportunity to reduce past damage but may also reduce costly levels of maintenance. Local Plan policies should stipulate that where riverside re-development takes place, a certain level of environmental enhancement will be expected.

River enhancement has to be designed according to the particular site conditions. Ideally the establishment of a two or multi-staged channel to accommodate increased discharges at peak flow whilst maintaining a low flow sequence of pools and shallows to enhance habitat. Wherever possible the river should be allowed to flood freely into associated floodplain habitats. Where steep banks cannot be avoided, the use of natural bank protection should be made e.g. woven willow or geotextiles instead of sheet pilling. Overall the aim must be to restore the continuity of aquatic bankside habitat.

10.4.3.6 Ponds

There is room for expansion of the ecological approach to wildlife gardening, and in particular the creation and management of ponds. Space may be a limitation in many private gardens but there is an increasing interest in the creation of ponds and wildlife areas in the grounds of schools, hospitals and community centres where the possibilities are much greater

Surveys of ponds in urban areas, including those in gardens, will provide an inventory and allow their mapping. Where ponds of particular value are found, the creation of other ponds nearby to provide extended habitat would be beneficial. Where a shortage of ponds is revealed this can also be addressed by the creation of new ponds.

The maintenance and creation of different types of ponds should be planned for. This will allow some ponds to follow the full course of succession, while others may remain largely unchanged for long periods. As well as the ‘standard’ pond, seasonal pools which lose their water in the height of summer, or ponds heavily shaded beneath trees will bring additional wildlife benefits.

As with woodlands, buffering can be important. In this case, the major concern will be the protection of water quality. All new developments should be designed so that they protect water quality, the surrounding habitat and do not interfere with water supply.

10.5 A vision for urban habitats

In 50 years time the idea of urban wildlife in its widest sense will be taken for granted. It will be expected that the needs of wildlife will be included in the planning and design of towns and cities, not as a desirable bonus but as an essential pre-requisite. Each urban area will have its own nature conservation strategy which will include an account of the total natural assets within the borough together with targets for their maintenance or expansion. Planning decisions will take full account of the effects of any development on biodiversity conservation and the wider environment, such that any development will not have an overall negative effect on the total natural assets of the town or city.

The Agenda 21 process will have borne fruit, such that decades of sustainable development will have brought environmental improvements to towns and cities. Buildings will feature innovations such as solar heating, turf roofs or roof gardens. Traffic calming schemes will have improved the green environment in streets. Water and effluent treatment will use green technology, such as reedbeds, which will benefit wildlife. All open spaces, encapsulated countryside and managed greenspace will be monitored and managed under the nature conservation strategy of each urban area.

Every urban resident will be able to enter a greenspace with wildlife value within 280 metres of their home.

Every urban area will have Local Nature Reserves at a minimum level of one hectare per 1000 population.

Every school will have its own wildlife area or access to a place within ten minutes walk where field studies on the environment can be carried out. Urban wildlife habitats will be used extensively for study, teaching, interpretation and recreation, both formal and informal. People will have grown up with a knowledge and attachment for local wildlife habitats since being introduced to them at school and through local authority services.

Environmental information, performance indicators and species information will be freely available to individuals, schools, newspapers and other media. This will allow people to find out and communicate what is going on in their local and the wider environment. They will be able to respond to threats and changes to the habitats and the environment surrounding them.

Urban rivers will have continuity of open water and marginal vegetation throughout their course. Water quality will be protected by the appropriate control of urban run-off and discharges. Urban stormwater run-off will be reduced by the use of permeable paving and road surfaces and the extended use of green technology in building construction. All urban areas will have extensive networks of green transport corridors which will encompass rivers, canals and abandoned railways and even disused roads.

10.6 Ten year targets

Each urban area of population over 5000 to have achieved the three English Nature targets:

1. To see that every urban resident can enter a greenspace with wildlife value within 280 m of their home.

2. To see that every urban area has Local Nature Reserves at a minimum level of one hectare per 1000 population.

3. To see that every school has its own wildlife area or access to a place within ten minutes walk where field studies on the environment can be carried out.

10.7 Urban Action Plan (Draft)

Objectives, actions and targets

Objective 1: To protect urban habitats and protected species within the urban areas of Hertfordshire

Target: 50% of urban Wildlife Sites, in public ownership to have management plans in place by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
UR/A/1.1	Ensure policies to protect and enhance urban biodiversity are incorporated into Local Development Frameworks (LDFs) and Local Plans	2005	Annual Report	HBRC	HMWT, Urban working group, LA's
UR/A/1.2	Ensure urban biodiversity is addressed in Community Strategies and through the Local Strategic Partnerships role	2005	Annual Report	BAP Officer	HMWT, HBRC, LA's
UR/A/1.3	Ensure that urban biodiversity objectives are addressed in District LBAPs	2005	2007	BAP Officer	HMWT, HBRC, LA's
UR/A/1.4	Review the urban Wildlife Sites criteria	2006	2006	WSO	WSP
UR/A/1.5	Identify and map the boundaries of all settlements with populations over 5000	2006	2007	HBRC	
UR/A/1.6	Identify the total number of urban wildlife sites in settlements with populations over 5000	2006	2007	WSO	WSP
UR/A/1.7	For each of the urban areas mapped, identify the wildlife sites, ecological sites and protected species	2007	2008	WSO	WSP
UR/A/1.8	All urban Wildlife Sites to be notified	2006	Annually	WSO	WSP
UR/A/1.9	Ensure 50% of urban Wildlife Sites in public ownership have management plans/statements in place	2006	2008	WSO	CMS, HMWT, HBRC, LA's
UR/A/1.10	Through the Wildlife Sites Project, monitor and report annually on the loss of urban wildlife sites	2005	Annual Report	WSO	WSP
UR/A/1.11	Identify five suitable urban wildlife areas for LNR designation.	2006	2007	HMWT	EN, LA's
UR/A/1.12	Designate one LNR every two years	2007	Annual Report	HMWT	EN, LA's

Objective 2: To increase the biodiversity of existing urban greenspaces and promote opportunities for biodiversity gain in all appropriate developments

Target: 50% of all urban greenspaces to have ecological management plans by 2011

Action code	Action	Target start date	Target end date	Lead partner	Other partners
UR/A/2.1	Carry out Phase 1 and Phase 2 surveys for all urban areas in Hertfordshire that have not already been done to determine all sites of wildlife importance	2005	2010	HBRC	HMWT, LA's
UR/A/2.2	Identify an officer in each Local Authority to be a key point of contact for urban greenspaces	Mar 2005	End 2005	BAP Officer	HMWT, LA's
UR/A/2.3	Identify the current extent of greenspaces within all urban areas of Hertfordshire	2005	2007	LA's Forward Planning Team	Urban working group
UR/A/2.4	Identify areas of greenspace deficiency to feed into LDF process	2005	2007	LA's Forward Planning Team	Urban working group
UR/A/2.5	Ensure urban biodiversity is incorporated into the *Herts Sustainability Design Guide*	2005	End 2005	Urban working group	HCC Forward Planning Team
UR/A/2.6	Disseminate *Biodiversity by design – a guide for sustainable communities* to all planning departments and promote to developers	2006	2007	BAP Officer	
UR/A/2.7	Through the planning process, seek to integrate biodiversity or 'green gain' (eg green roofs, green walls, nesting and roosting boxes, ecologically appropriate landscaping) into all new developments in Hertfordshire	2006	Ongoing Annual Report		
UR/A/2.8	Identify key indicator species of urban areas (e.g. Swifts, House Martins, House Sparrows, bats)	2006	2006	Urban working group	
UR/A/2.9	Initiate a programme of monitoring of the key urban indicator species	2006	2008, 2010 Two-yearly reports	WSO	RSPB, HNHS
UR/A/2.10	Seek biodiversification of urban parkland by running bi-annual training events in urban ecology for parks and grounds maintenance managers	2007	2009, 2011	HMWT	CMS, Gwk
UR/A/2.11	Secure the preparation of management plans with ecological objectives and their implementation for 50% of urban greenspaces	2006	2011 Annual Report	CMS	HMWT, Gwk

Objective 3: Raise awareness of urban biodiversity and promote opportunities for involvement in urban conservation

Target: Hold five public events annually highlighting the importance of urban areas for biodiversity

Action code	Action	Target start date	Target end date	Lead partner	Other partners
UR/A/3.1	Provide advice on the incorporation of biodiversity into the management of urban greenspace, including school grounds	2005	2007	BAP Officer	LA's, Gwk, CMS, HMWT, HBRC
UR/A/3.2	Encourage local authorities and schools to recognise their role in raising awareness of urban biodiversity issues	2005	2007	BAP Officer	LA's, Gwk, HMWT, HBRC
UR/A/3.3	Ensure the installation of signage and interpretation at LNRs	2005	2007	BAP Officer	LA's, Gwk, CMS, HMWT
UR/A/3.4	Hold 5 public events, supported by articles and newsletters, to highlight the importance of urban areas for biodiversity	2006	Ongoing Annual Report	HMWT	All partners
UR/A/3.5	Provide opportunities for people (adults and children) to learn about biodiversity through involvement in practical conservation work	2005	Ongoing Annual Report	HMWT	CMS, RSPB, LA's, Gwk
UR/A/3.6	Produce a directory of Friends of groups within each urban area	2007	2007	CMS	
UR/A/3.7	Promote Friends of groups in those urban areas where they are not currently available	2007	Ongoing Annual Report	CMS	
UR/A/3.8	Highlight available literature on the creation and maintenance of school grounds for wildlife on the Herts LBAP web site	2005	2007	Gwk	HBRC, HMWT
UR/A/3.9	Promote wildlife gardening via websites and public events	2006	Ongoing Annual Report		HMWT, RSPB
UR/A/3.10	Publicise the HMWT wildlife garden at St Allbans as a best practice demonstration site	2006	Ongoing Annual Report	HMWT	

Relevant Action Plans:

Hertfordshire Plans
Grassland and Heathland; Great Crested Newt; Song Thrush

National Plans
Urban Habitat Statement

Abbreviations (Partners)

CMS – Countryside Management Service
EN – English Nature
Gwk – Groundwork Hertfordshire
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
HNHS – Hertfordshire Natural History Society
LA's – Local Authorities
RSPB – Royal Society for the Protection of Birds
WSO – Wildlife Sites Officer
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The Lead for this plan is

11 Water Vole species action plan

11.1 Introduction

The former widespread distribution and numbers of the Water Vole *Arvicola terrestris* has meant that until recently it has attracted little or no conservation interest, but its accelerating decline in numbers and resulting fragmentation of its populations is now of great concern. The species has been little studied and little is known of its conservation management requirements.

However, the Water Vole is potentially an excellent indicator species whose presence reflects both healthy riverine habitats and plant communities. It is a well liked and familiar animal amongst the general public, and watercourse users in particular, as it is not overly sensitive to the presence of people and is easily seen during the day. This public profile presents opportunities to bring its plight to the attention of the public, to publicise the progress of its conservation, and to develop public participation.

11.2 Current status

The Water Vole was once an abundant inhabitant of riparian (river corridor) habitats throughout Britain. Anecdotal reports suggesting that the Water Vole had undergone a considerable decline in both population numbers and distribution prompted an inquiry into its status in Britain. This initial investigation conducted by Jefferies *et al.* (1989), concluded that the Water Vole had suffered long term decline in Britain, probably since at least 1900.

The work of Jefferies prompted a national survey in 1989/90 which failed to find signs of voles in 67% of sites which were previously documented as positive. In addition, Strachan (1993), concludes that the total loss of formerly occupied water vole sites could be as high as 94% by the year 2000, making this the most dramatic population decline of any British mammal this century (Harris *et al*, 1995).

By 1996 a number of interest groups in Hertfordshire felt that Water Vole populations in the county had suffered further decline since the 1989 national survey. During 1996 Hertfordshire Biological Records Centre forwarded a proposal to conduct a further Water Vole census in Hertfordshire. Louise Molloy revisited stretches of river and the results estimated that the percentage of positive sites has declined by 72.9% since 1989 (Molloy, 1996).

11.3 Current factors causing loss or decline

11.3.1 Fragmentation and isolation of habitats and populations

This is viewed as being perhaps the major factor of concern for the County. In counties such as Yorkshire, where the majority of the research in this country has been carried out, there is a great deal more riverside terrestrial habitat than in Hertfordshire, which the Water Vole can utilise for feeding and shelter. This facilitates their dispersal along watercourses (Woodroffe, 1988). Observation would appear to indicate that the level of marginal, emergent and in-stream vegetation has increased significance to Water Vole habitat in Hertfordshire as a consequence of the general paucity of the associated terrestrial wetland habitats.

11.3.2 Predation by Mink

Although it is now accepted that mink predation is a major threat to Water Voles in this country (the colonisation of an area by mink has been shown to have a direct negative impact on Water Vole populations) there is still a great deal that is not

understood about the interaction between the two species. The level of mink predation is difficult to assess for particular sites but it appears certain that the effects of mink predation on a Water Vole population is influenced and exacerbated by other threats.

11.3.3 Disturbance of riparian habitats

In the past the most significant form of disturbance was caused by channelisation and subsequent dredging operations as part of flood defence management. These modifications have had a drastic effect on Water Vole habitat, with the destruction of burrows, emergent and in stream vegetation and the re-profiling of banks leaving them unsuitable for burrow formation. While the environmental standards of river engineering works have improved in recent times, they are still a potential threat if carried out insensitively.

Today, a major cause of habitat disturbance is from intensive livestock grazing, resulting in poaching of river banks and therefore loss of suitable habitat, though ploughing of fields to the edge of the riverbank is also detrimental.

Other forms of disturbance are caused by the moorings of riverboats and by the activities of anglers where vegetation is removed and alterations to banks made.

11.3.4 Deterioration of water quality and reduction of flow

Water Voles are relatively tolerant of low water quality but the full impacts of differing types of pollution such as biocides are unknown. Low flows and droughts such as those caused by over-abstraction of groundwater can lead to the loss of Water Voles from the stretches of watercourses affected. Conversely, high flows, flashy rivers and prolonged flooding can also be detrimental.

11.3.5 Rodenticides

The use of poisoned grain and similar rat and mouse poisons are not specific and will be taken by Water Vole when they are placed within their range.

It should be noted that none of the above factors operate in isolation. Acting together, they present a major threat to the Water Vole.

11.4 Current action

The Water Vole has been added to Schedule 5 of the Wildlife and Countryside Act (1981). This qualifies the species for consideration in Recovery Programs limited to other Scheduled species; and, ensure the consideration of the species before habitat is destroyed, e.g. when planning permission is sought.

A national species action plan for Water Vole has been produced.

Research funded by Oxford University and the Environment Agency, is now underway on the relationship between mink and Water Vole, on movements, winter activity and on the management of habitats for Water Vole.

The Vincent Wildlife Trust is resurveying the 2970 sites that comprise the Water Vole Survey of Britain, over 1997-98.

The Wildlife Trusts have launched Water Vole Watch, a national public participation survey.

The Hertfordshire Mammal Group are carrying out ongoing investigations into the status, habits and requirements of the Water Vole in the county. Key Sites are being identified for a constant effort monitoring to be implemented. Data is passed to HBRC and will enable future standardised monitoring to be implemented.

A Water Vole habitat management and conservation handbook providing practical advice has been commissioned by EN/EA and should be available by January 1998.

11.5 Water Vole Action Plan

Objectives, actions and targets

Objective 1: Maintain range of Water Voles in Hertfordshire (measure by 5 km squares)

Target: Set up a countywide survey and monitoring programme by 2005 and promote measures to protect existing colonies

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WV/A/1.1	Maintain funding of the Hertfordshire Water Vole Project, including project officer costs and grants for capital works	January 2006	Annual report	HMWT	EA, LVRPA, BW, TW
WV/A/1.2	Collate all current survey information and map onto GIS. Display range by 5 km squares. Compare with historic distribution. Publish results	July 2004	October 2005	HWVP	HBRC, EA, HMWT
WV/A/1.3	Develop and implement a three-year monitoring programme, prioritising areas under threat. Publish results	July 2004	October 2007	HWVP	HBRC, HNHS, EA, LVRPA
WV/A/1.4	Train 30 volunteers per year to carry out water vole surveys	July 2004	July 2007	HWVP	CMS, HBRC, HNHS, EA
WV/A/1.5	Identify 'key areas' for water voles in Hertfordshire. Publish results on a map to all key partners	July 2004	December 2005	HWVP	HBRC
WV/A/1.6	Ensure Water Vole County Wildlife Sites and other existing sites are protected through local plans and development control processes	July 2004	March 2007, Annual reports	WSP, HBRC, EA	HMWT
WV/A/1.7	Identify and contact landowners of all known existing sites to offer habitat management advice	March 2005	July 2007, with Annual reports	HWVP	CMS
WV/A/1.8	Develop and implement a Mink control strategy for Hertfordshire to promote Mink-free refuges in key areas	July 2004	July 2009, with Annual reports	HWVP	EA, BW, RSPB

Objective 2: Expand range of Water Voles in Hertfordshire (measure by 5 km squares)

Target: Encourage re-establishment of Water Voles at restored sites within former range

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WV/A/2.1	Identify potential areas for expansion of current population within former range based on 'key areas'	July 2005	July 2006	HWVP	HBRC, EA, WSP, BW, LVRPA, TW, RSPB, TVW, Lafarge
WV/A/2.2	Ensure Mink control is supported in potential expansion areas	July 2005	July 2009, Annual report	HWVP	All wetland managers
WV/A/2.3	Identify and contact land managers in potential expansion areas to provide advice on restoration of habitat	July 2005	July 2007, Annual report	HWVP	CMS, EA, BW
WV/A/2.4	Establish a minimum of one demonstration site per year to illustrate best practice habitat management for Water Voles	January 2005	Annual report	HWVP	CMS, HMWT, LVRPA, TW, RSPB, TVW, Lafarge
WV/A/2.5	Establish six Water Vole refuges across Hertfordshire	July 2005	July 2007, Annual report	HMWT	LVRPA, landowners

Objective 3: Maintain population size

Target: Ensure numbers of Water Voles at existing colonies does not decrease by conserving and enhancing their habitats

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WV/A/3.1	Promote good riparian and wetland habitat management sympathetic to water voles in 'key areas' by producing a leaflet guide to distribute to land managers and organisations with responsibility for watercourse management	July 2004	July 2007, Annual report	HWVP	CMS, EA, BW
WV/A/3.2	Ensure that habitat at existing sites is not degraded by inappropriate developments	July 2004	Annual report by wetland managers	HBRC, WSP	HMWT, EA, BW
WV/A/3.3	Produce guidance notes to highlight problems with translocation schemes and the ecological requirements of meta-populations, for use by local planning officers, etc	July 2005	July 2006	HBRC	EA, HMWT

Objective 4: Increase population size

Target: Increase the number of individuals at existing and new sites by enhancing habitats

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WV/A/4.1	Restore or create 500 metres of stream, ditch or lake banks annually to provide habitats for water voles	July 2004	Annual report on progress	HWVP	HMWT, EA, CMS, RSPB, LVRPA, Lafarge, TW, TVW
WV/A/4.2	Restore or create 5 ponds per year in 'key areas'	July 2005	Annual report on progress	HWVP	CMS, WSP, TVW
WV/A/4.3	Assess feasibility of water vole re-introduction schemes in Hertfordshire Produce a report	January 2008	January 2009	HWVP	HMWT, EA, BW, LVRPA, HBRC, RSPB, Lafarge, TW, TVW

Objective 5: Raise awareness of Water Voles

Target: Inform the public and land managers of the need to conserve Water Voles in Hertfordshire

Action code	Action	Target start date	Target end date	Lead partner	Other partners
WV/A/5.1	Hold a minimum of one public event on Water Voles annually	July 2004	Annual report	HWVP	HMWT, LVRPA, HNHS, CMS
WV/A/5.2	Hold one Water Vole conservation workshop for land managers annually	July 2004	Annual report	HWVP	HMWT, HEF
WV/A/5.3	Achieve two articles on Water Voles in Hertfordshire media annually	July 2004	Annual report	HWVP	All partners
WV/A/5.4	Achieve one article in local annually to target house-owners with gardens on river margins	July 2005	Annual report	HWVP	CMS, EA, BW
WV/A/5.5	Encourage members of the public to report sightings of Water Voles by production and distribution of leaflet with recording form	July 2004	July 2007	HWVP	HBRC, EA, LVRPA, BW
WV/A/5.6	Identify pest control officers in Herts and promote Water Vole friendly control methods in key areas	July 2004	July 2007, Annual reports	HWVP	EA, LA's, CMS, BW
WV/A/5.7	Establish sections on Water Vole conservation on websites of Hertfordshire conservation organisations	July 2005	July 2006	HWVP	HBRC, LVRPA, HEF, TVW, HNHS
WV/A/5.8	Establish a Water Vole discovery trail	April 2005	March 2007	HWVP	LVRPA

WV/A/5.9	Establish Water Vole interpretation on all key sites with one site achieved annually	July 2004	Annual report	HWVP	HMWT, LVRPA, CMS, RSPB

Relevant Action Plans:

Hertfordshire Plans
Wetlands

National Plans
Water Vole; Reedbeds; Chalk Rivers; Coastal and Floodplain Grazing Marsh

Abbreviations (Partners)

BW – British Waterways
CAONB – Chilterns AONB
CMS – Countryside Management Service
EA – Environment Agency
EN – English Nature
HBRC – Hertfordshire Biological Records Centre
HEF – Hertfordshire Environmental Forum
HMS – Herts Mammal Society
HMWT – Herts & Middlesex Wildlife Trust
HNHS – Hertfordshire Natural History Society
HWVP – Hertfordshire Water Vole Project
LVRPA – Lee Valley Regional Park Authority
RSPB – Royal Society for the Protection of Birds
TVW – Three Valleys Water
TW – Thames Water
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The Lead for this plan is Herts & Middlesex Wildlife Trust
Alison Washbrook
Hertfordshire Water Vole Project
Email: alison.washbrook@hmwt.org

12 Common Dormouse species action plan

12.1 Introduction

The Common Dormouse *Muscardinus avellanarius* can easily be recognised by its small size, bright golden-brown colour, large eyes and bushy tail. It is a woodland species with rather specialised feeding requirements and is found in deciduous woodland and hedgerows. It feeds on flowers, pollen, fruits, insects and ripe nuts such as Hazel.

Dormice are strictly nocturnal and spend the summer nights foraging for food, often high in the treetops. Many of these foods are only present for a few weeks a year, so Dormice have to have a wide range of suitable foods available within a small area. During the day Dormice occupy nests, which may be woven out of grass stems or honeysuckle bark and are often situated within a few feet of the ground. They also use old birds nests or tree cavities and are readily attracted to special nesting-boxes.

Perhaps the Dormouse is best known for its habit of hibernating for up to seven months of the year. As the weather turns colder in October, the animals will seek out a suitable place at ground level, curl up in a ball, go to sleep and not emerge until the following April or May. Even in mid-summer they may enter a torpid state (with lowered temperature and slower movement) during periods of food shortage or bad weather.

Dormice live at low population densities, but can live up to five years in the wild, much longer than is normal for other small mammals. They have few predators: owls take Dormice occasionally, so might Weasels, but no predator kills significant numbers regularly.

12.2 Current status

The Dormouse is found in lowland England and Wales but does not occur in Scotland or Northern Ireland. In Wales, there are few known populations and in England it has become extinct in up to seven counties in the past 100 years. It is absent from the north, except for small populations in Cumbria and Northumberland, and are patchily distributed in southern counties. Population densities everywhere are less than 10 adults per hectare.

The distribution of the Dormouse in Hertfordshire is probably limited by the fragmented nature of appropriate habitat such as ancient coppiced woodland. All records are lodged at the Hertfordshire Biological Records Centre. Pre-1985 records show concentrations in woodlands around Stevenage in central/north Hertfordshire, the Broxbourne/Northaw Great Wood complex in the south-east and Ashridge in the extreme west. Other scattered sites include Bricket Wood/London Colney, Bramfield/Tewin Woods, Brocket Park and in the north-east Scales Park. This distribution shows most association with major areas of woodland rather than woodland type, though no structured survey has been undertaken.

The jointly run survey by The Wildlife Trust and the Herts Mammal Group that began in 1993 suggests that Dormice may now have declined. Current records show populations around Stevenage, Ashridge, Breachwood Green, Scales Park and Broxbourne Woods. There are also a few scattered sites outside this. However, the survey effort to date has not been great enough to determine to what extent Dormice have declined in the county or whether their distribution has reduced.

The Dormouse is listed on Appendix 3 of the Bonn Convention and Annex IVa of the EC Habitats Directive. It is protected under Schedule 2 of the Conservation Regulations, 1994 and Schedule 5 of the Wildlife and Countryside Act 1981. The Act and Regulations make it illegal to:

- intentionally or deliberately kill, injure or capture Dormice
- deliberately disturb Dormice (whether in nest or not)
- damage or destroy Dormouse breeding sites or resting places
- possess or transport a Dormouse or any part of a Dormouse, unless acquired legally
- sell, barter or exchange Dormice, or parts of Dormice.

12.3 Current factors causing loss or decline

12.3.1 Loss of habitat

There has been a 44% loss of ancient semi-natural woodland in Hertfordshire over the last 50 years, which when suitably managed provides optimum habitat for the Dormouse. Loss of overgrown hedgerows also removes habitat and removes corridors between otherwise isolated woodland areas.

12.3.2 Decline in woodland management

The sharp decline in coppicing this century has led to a senile shrub layer and heavy shading by taller trees, reducing habitat suitability.

12.3.3 Inappropriate woodland management

Large-scale coppicing renders extensive areas unusable for up to five years by creating open ground which the animals are reluctant to cross. Depending on the pattern of felling coupes, on small sites this can act as a barrier to Dormice reaching potentially important food resources. This can put pressure on individuals and reduce a population to vulnerable levels. On larger sites where sufficient quality habitat remains this is not such a problem.

Too short a rotation coppice (e.g. 10-12 years) may not allow Hazel to grow old enough to produce much food, but left longer Hazel gets shaded out. As long as there is a wide range of coppice within a wood, suitable habitat will be present. This is only likely to occur in well managed coppice.

Plantation forestry produces areas of low species diversity, with little understorey under tall, upright trees. This results in unsuitable habitat except where there are shrubby areas at the margins.

Even where there are shrubby margins, lack of management of these, particularly on favoured sunny south and west sides, may result in the loss of the ideal dense tangled conditions as the shrubs grow taller.

12.3.4 Fragmentation and isolation of remaining habitat

Isolated populations are very vulnerable due to their low reproductive potential and limited powers of dispersal. This reduces the chance of immigrants reinforcing existing populations or colonising suitable empty habitats leading to local extinctions.

Retention and management of hedgerows, as links between woodlands and suitable habitat in their own right, is a key factor in maintaining local populations.

12.3.5 Climatic factors

The Dormouse is at the limit of its range in Britain. Variations in length of seasons for both activity and hibernation, low summer temperatures and heavy rain all play havoc with hibernation, breeding, and feeding strategies better suited to the more predictable continental climate of warm dry summers and cold dry winters.

12.3.6 Grazing animals

The presence of too many deer in a wood suppresses regeneration and severely damages the vital shrub understorey that provides so much of the food resources needed by Dormice.

12.3.7 Other threats

There is no evidence of significant illegal persecution or collecting. There are no predators which regularly take Dormice. Road deaths appear to be infrequent and there is no sign of epizootic disease. Warfarin, put out to control squirrels, may be a danger locally. It is also thought that competition with grey squirrels for food may be an important issue.

12.4 Current action

In 1992 the Dormouse was added to English Nature's Species Recovery Programme. Funding from this allowed the Herts & Middlesex Wildlife Trust to set up the Hertfordshire Dormouse Project. This later became a joint Wildlife Trust and Herts Mammal Group project. The aim is to establish a clear idea of the status of the Common Dormouse in the county and to develop a strategy for their survival. Following several years of survey work a nestbox scheme has been established in a selection of woods known to contain Dormice, aimed at monitoring the dynamics of these populations.

A public participation exercise (the ‘Great Nut Hunt’) – to encourage people to hunt for signs of Dormice in their local area – began in 1996 to increase awareness and to improve knowledge of Dormouse distribution. The Herts Mammal Group helped promote this locally.

Ecological research at a national level, has led to practical proposals for conservation management. In 1996 English Nature published 'The Dormouse Conservation Handbook'

.

12.5 Common Dormouse Action Plan (Draft)

Objectives, actions and targets

Objective 1: To update our knowledge of Dormouse distribution in Hertfordshire

Target: Set up a countywide survey programme by 2007

Action code	Action	Target start date	Target end date	Lead partner	Other partners
D/A/1.1	Collate all current survey information and map onto GIS	2003	2004	HBRC	HMWT, HMG, County Mammal Recorder
D/A/1.2	Produce a historical and recent distribution map	2003	2004	HBRC	
D/A/1.3	Re-develop survey methodology and distribute to surveyors	2004	2004	HBRC	
D/A/1.4	Survey existing sites with recent records to verify continued presence	2004	2005	HMG	CMS, HMWT, NT, LA's, HBRC, volunteers
D/A/1.5	Survey historic sites to verify continued presence	2005	2006	HMG	CMS, HMWT, NT, LA's, HBRC, volunteers
D/A/1.6	Survey suitable areas where there are no known records for Dormice	2006	2007	HMG	CMS, HMWT, NT, LA's, HBRC, volunteers

Objective 2: To gain a better understanding of habitat usage by Dormice in the County

Target: Produce detailed study report by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
D/A/2.1	Develop a project proposal for a detailed site specific habitat usage study	2006	2007	HMG	
D/A/2.2	Carry out Dormouse habitat study	2006	2008	HMG	
D/A/2.3	Produce report and disseminate results	2007	2008	HMG	
D/A/2.4	Continue to monitor existing populations	2006	Annually	HMG	

Objective 3: To maintain and enhance the current county population

Target: Secure appropriate habitat management on all existing sites and surrounding areas by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
D/A/3.1	Ensure Dormouse Wildlife Sites are protected in local plans and through the development control process		As reviewed	HBRC	LA's
D/A/3.2	Identify and contact landowners of existing sites to provide habitat management advice	2005	2007	WSP	HMG
D/A/3.3	Secure appropriate habitat management on existing sites	2005	2008	CMS	HMG, LA's, HMWT

Objective 4: To raise awareness of the conservation needs of the Dormouse to key target audiences, such as woodland owners/managers, mammal enthusiasts and the general public

Target: Establish a demonstration site by 2008 and establish annual training visits

Action code	Action	Target start date	Target end date	Lead partner	Other partners
D/A/4.1	Hold a survey techniques training day	2004	2004	HMG	HMWT
D/A/4.2	Co-ordinate public participation in the national 'Great Nut Hunt'		Annually	HMWT	
D/A/4.3	Establish a Dormouse conservation demonstration site	2004	2008	HMG	
D/A/4.4	Organise training visits to demonstration site for woodland practitioners	2008	Annually	HMG	

Relevant Action Plans:

Hertfordshire Plans
Woodland; Farmland

National Plans
Dormouse; Ancient and/or species-rich hedgerows; Broadleaved, mixed and yew woodland Habitat Statement

Abbreviations (Partners)

CMS – Countryside Management Service
HBRC – Hertfordshire Biological Records Centre
HMG – Herts Mammal Group
HMWT – Herts & Middlesex Wildlife Trust
LA's – Local Authorities
NT – National Trust
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:

The Lead for this plan is the Herts Mammal Group
Martin Hicks
Email: martin.hicks@hertscc.gov.uk

13 Natterer's Bat species action plan

13.1 Introduction

The basic requirements of the Natterer's Bat *Myotis nattereri* are common to all bat species. They involve the need for breeding roosts, places to hibernate and suitable feeding habitats. It is a species that can be found in broadleaf woodland, along waterways, parkland and farmland. Maternity colonies are formed during the summer months when the female gives birth to a single young during June or July. Natterer's colonies tend to be mobile and need multiple roost sites. They frequently roost in the mortise joints of old large timber-framed buildings (e.g. barns and manor houses) but will also use tree cavities and occasionally bat boxes. During the winter months the bats seek out a suitable place to hibernate usually in the small crevices that can be found in cool, humid, underground structures. They require access to feeding areas that provide a suitable number and variety of insect prey; needing to move economically and safely between roost and feeding sites along the 'commuting routes' that can be found along riparian vegetation, hedgerows and woodland edge.

13.2 Current status

Natterer's Bats are found throughout the United Kingdom but it is a scarce and poorly known species. The distribution of the Natterer's Bat is probably limited by the fragmented nature of appropriate habitat. Very few summer breeding roosts are known in the UK and it is a rare species in Europe. The UK is the stronghold for Natterer's Bats and is probably of international importance. The UK population estimate stands at about 74000 (Speakman, 1991). This species is protected under the Bern Convention (Appendix II) and listed on Annex IVa of the EC Habitats and Species Directive; it is included under the Agreement on the Conservation of Bats in Europe (Bonn Convention) and is protected under the Wildlife and Countryside Act 1981 (Schedule 5).

In Hertfordshire, since 1990 there have been nine summer Natterer's Bat maternity roosts discovered and 25 winter roosts. During the summer, they mainly favour barns that are more than 100 years old with thick beams containing hollow mortise joints. The barns usually have open or absent doors, unimpeded flying space within the barn and are close to woodland. 50% of the listed barns used by bats in Hertfordshire had evidence of Natterer's Bats and 25% had breeding roosts of this species (Briggs, 1995). Hibernation sites used by this species locally include chalk mines, tunnels, wells, icehouses, old lime kilns, a grotto and an artificial hibernaculum.

13.3 Current factors causing loss or decline

13.3.1 Loss of roosts

The recent growth in the number of barn conversions in Hertfordshire is posing a threat. Large numbers of old barns are now redundant and being converted into luxury dwellings resulting in the loss of suitable roost sites. Many bats may be affected by timber treatment chemicals, accidentally entombed in the timbers or are driven out.

During woodland clearance schemes many old trees suitable for roosting bats may be felled or have their branches lopped particularly if they possess rot holes and are regarded as unsafe or untidy.

Many underground hibernation sites are lost to bats by demolition, infilling, closure or use for other purposes. Some may be unfavourably modified and others may suffer from excessive disturbance. A study in Norfolk showed that in 10 years, 26% of about 100

underground sites suffered loss or damage (Goldsmith, 1988).

13.3.2 Fragmentation and Isolation of habitats and populations

Fragmentation of colonies occurs if discouraged from using their traditional roosts. Isolated populations are very vulnerable with the result that breeding is unlikely to occur leading to local extinction's.

Loss and disruption of flightline features such as hedgerows can separate the roost from the feeding area causing the colony to die out. A study in the Netherlands has suggested that a break of 10 metres introduced into a hedgerow will force a similar species of bat (Daubenton's Bat) to find an alternative, uninterrupted route to a preferred feeding ground (Hutson, 1993).

13.3.3 Loss and degradation of insect-rich feeding habitats

In Hertfordshire there has been a considerable decline in wetlands, hedgerows, unimproved pastures and ancient woodland. Modern farming practices and inappropriate habitat management have caused a reduction in numbers and variety of insects available for bats.

13.3.4 Climatic factors

Natterer's bats need warm dry summers and cold wet winters. Variations in the length of the seasons such as cold wet springs and summers can cause sudden crashes in the insect population causing increased mortality following emergence from hibernation and affect their breeding success. Global warming along with excessive water abstraction may have led to the lowering of the water table. As a consequence, the humidity in underground sites may change the suitability of these sites for hibernation.

13.3.5 Disturbance

Disturbance during the breeding season may cause bats to leave the roost and abandon their young. Any structural work to a building roost site such as rewiring/plumbing an attic, re-pointing of walls, refelting of roofs, remedial timber treatment may pose a major threat to a summer maternity colony.

Disturbance during the winter months may arouse the bats from hibernation causing them to utilise essential fat reserves. Hibernation areas used for recreational purposes in the winter lower the bats chances of survival.

13.3.6 Persecution

Since the introduction of The Wildlife and Countryside Act (1981) deliberate persecution of bats has decreased although persecution still does occur mainly through ignorance of the law.

Some people still have the mistaken perception that bats are a nuisance or even a pest. Most 'problems' stem from unfamiliarity and often have simple solutions.

13.4 Current action

The Hertfordshire and Middlesex Bat Group are carrying out ongoing investigations into the County status, habits and requirements of the Natterer's Bat. Key sites are being identified and entered onto a Geographical Information Alert System by the Hertfordshire Biological Records Centre. Some sites have been designated important Wildlife Sites and incorporated into District Local Plans.

Some planning applications are being checked for barn conversions. Planning lists are provided direct to the Bat Group by North Hertfordshire District Council, East Hertfordshire Council and Hertsmere Borough Council.

A study conducted by Patty Briggs in East Anglia showed that 82% of the old barns with suitable features had evidence of use by bats; of these 37.5% had evidence of Natterer's Bats (Briggs, 1995).

The Bat Group continues to provide support to English Nature in its advisory capacity, and in survey, monitoring and education activities. Practical conservation management is carried out such as the protection of underground sites and creation of suitable roosting and hibernation sites.

Nationally during 1996 The Bat Conservation Trust launched the National Bat Monitoring Programme which aims to develop monitoring strategies for seven species of bat including the Natterer's Bat. The Hertfordshire and Middlesex Bat Group is providing information to assist this scheme.

13.5 Natterer's Bat Action Plan

Objectives, actions and targets

Objective 1: To clarify post 2000 status and establish base line population information on the Natterer's Bat in Hertfordshire

Target: Disseminate a current status report by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
NB/A/1.1	Collate all known records and map onto GIS	2004	2005	HBRC	HMBG
NB/A/1.2	Ensure all records are sent to the County Mammal Recorder		Ongoing	CMR	EN, HMBG
NB/A/1.3	Re-survey known sites (e.g. summer roosts, hibernation and potential swarming sites)		Annually	HMBG	Landowners
NB/A/1.4	Carry out standard counts at known sites		Annually	HMBG	Volunteers
NB/A/1.5	Set up a long term monitoring programme at key sites	2005	2007	HMBG	Volunteers
NB/A/1.6	Produce a current status report	2005	2008	HBRC	

Objective 2: To protect, enhance and create roost sites and suitable connecting and feeding habitats

Targets: a) Habitat usage study completed and disseminated by 2007
b) Four new roosting opportunities, in different areas, created annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
NB/A/2.1	Strengthen the planning system for barns, listed properties and timber framed house surveys, through provision of information	2004	Ongoing	HBRC	LA's, EN
NB/A/2.2	Conduct a habitat usage study so that Natterer's Bat main habitat requirements can be identified	2005	2007	HBRC	HMBG
NB/A/2.3	Create more roosting opportunities through trialing artificial mortise joints and provision of boxes suitable for Natterer's Bat		Ongoing	HMBG	Volunteers, licence holders

Objective 3: To raise awareness among key audiences, specifically landowners, planners, architects and churches

Target: To hold one seminar for key audiences annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
NB/A/3.1	Disseminate BCT leaflets whenever possible	2004	Ongoing	HBRC	EN, BCT
NB/A/3.2	Provide occasional seminars on general bat issues to key audience	2005	Annually	HMBG	Consultants

Relevant Action Plans:

Hertfordshire Plans
Farmland; Woodland; Wetlands

National Plans
Ancient and/or species-rich hedgerows; Lowland mixed deciduous woodland; Rivers and streams Habitat Statement

Abbreviations (Partners)

BCT – Bat Conservation Trust
CMR – County Mammal Recorder
EN – English Nature
HBRC – Hertfordshire Biological Records Centre
HMBG – Hertfordshire and Middlesex Bat Group
LA's – Local Authorities

Contact:
The lead for this plan is Hertfordshire Biological Records Centre
Sarah Postlethwaite
Email: sarah.postlethwaite@hertscc.gov.uk

14 Otter species action plan

14.1 Introduction

As a 'top predator' the Otter *Lutra lutra* is naturally scarce and also highly sensitive to the health of the whole ecosystem that supports it. As such, the Otter is an important indicator species in riparian habitats. As recently as the 1950s it was widespread. However, a significant decline in numbers took place in the 1960s and 1970s, which was attributed to the use of persistent organochlorine pesticides, especially Dieldrin and Aldrin. While other factors are likely to have been involved, such as habitat loss, the detailed reasons for decline are not fully understood.

The Otter has high public appeal. Otter-related events generally attract much attention. The value of such an animal in raising awareness generally about nature conservation, and the water environment in particular, is considerable.

14.2 Current status

National surveys showed an actual or effective extinction over most of the Midlands and south-eastern counties as numbers reached an all time low in the 1980s. Otters became extinct in Hertfordshire in the late 1970s. Viable populations remained in Scotland, Wales and south-west England. This decline also occurred on the continent and the UK populations are one of the best left in Europe.

Recently there has been an encouraging expansion in range and (probably) numbers, notably from the south-west. This spread has taken place despite increasing numbers of Mink, indicating that the establishment of wild Mink populations and consequent food competition was probably not a cause of Otter decline, as is often suggested. However, expansion has been mainly from the regions least affected by decline, other areas such as Yorkshire and Northumberland have not shown the same trends.

The re-introduction of Otters to former haunts has also taken place in recent years, notably in East Anglia. In Hertfordshire six Otters were re-introduced to two sites in 1991/92 by the Otter Trust. Their subsequent movements were monitored by the Wildlife Trust and the Herts Mammal Group. Currently it is known that these animals have bred at least once, at Rye Meads in 1995, and that Otters are still present along the valleys of the Stort and lower Lee. However, their movements appear to be restricted to a small area, probably as a result of poor quality river habitat and the numbers of Otters present is unknown.

The Otter is protected under the Wildlife and Countryside Act 1981 (Schedule 5) and is listed on Annexes 2a and 4a of the EC Habitats Directive, Appendix 2 of the Bern Convention and Appendix 1 of CITES.

14.3 Current factors causing loss or decline

14.3.1 Water quality

Pollution of water courses, especially by polychlorinated biphenyls (PCBs) is thought to be a major issue. PCBs incorporate a wide range of substances which are likely to act as pollutants, and the complex way they interact in the aquatic environment, and with Otters, is still poorly understood. Low flows can concentrate pollution levels adding to the problem and potentially reducing food availability.

14.3.2 Insufficient food

Insufficient prey (low fish stocks) associated with poor water quality and poor river habitat quality may be relevant in some areas.

14.3.3 Loss of habitat

Impoverished bankside features needed for breeding and resting, due to the continuing loss or degradation of wetland habitats, is likely to be a contributory factor.

14.3.4 Accidental death

Incidental mortality, primarily by road deaths forms a significant issue locally. Drowning in fish/eel traps, may also be an issue in some areas, but is not an important factor locally.

14.4 Current action

The JNCC has prepared a 'Framework for Otter Conservation in the UK 1995-2000'.

National Surveys have been conducted at 5-7 year intervals and may be repeated in the future. Local surveys by Wildlife Trusts and others have established the present distribution and the potential for future spread.

Practical conservation management (e.g. river enhancement schemes, creation of logpiles and artificial holts) is in progress. Corporate responsibility for Otter Conservation and management has been accepted and acted upon by the Environment Agency – formerly the National Rivers Authority (NRA). In Hertfordshire, the NRA and BT supported an Otter Habitat Project from 1991-3 which surveyed river catchments in the county and drew up a priority list of river enhancement schemes.

Releases of captive bred Otters have successfully reinforced fragmented wild populations in East Anglia and Yorkshire, although success elsewhere is unproven and the whole issue of releasing Otters has become controversial. Research on the implications of heavy metal and PCB contamination in fish and the wider environment is in progress.

14.5 Otter action plan objectives

To maintain the existing released Otters in order to achieve a viable population in Hertfordshire within 10 years.

To achieve a regular presence of Otters throughout Hertfordshire river catchments by 2010.

To enhance river habitat quality through a programme of river enhancement schemes with at least three schemes completed annually for the next 10 years (to overlap with Water Vole and White-clawed Crayfish Action Plans, Chapters 11 and 23).

14.6 Proposed action

14.6.1 Policy and legislation

OT1. Ensure all wetland Wildlife Sites regularly used by Otters are recognised and protected through Local Plans and LEAPs, at the next review. At the same time, endeavour to strengthen river corridor policies where appropriate.
Action: LA's, EA, HBRC, HMWT.

14.6.2 Site safeguard and management

OT2. Seek to include action for Otters in all LEAPs covering Hertfordshire by the next review. This will include specific river enhancement projects at a target level of three per year throughout the county, one of which should include specific features for Otters.
Action: EA.

OT3. All riparian nature reserves and country parks to consider the requirements of Otters within the management plan by 2000 and subsequently to implement actions if appropriate.
Action: HMWT, RSPB, LA's, LVRPA.

OT4. A list of key river corridor sites forming a refuge network for Otters in Hertfordshire should be drawn up by 1998 (from Otter Habitat Project Report). Secure appropriate management of these sites over 10 years.
Action: HMWT, HMG, EA, LA's.

14.6.3 Species management and protection

OT5. The merits of a further release of captive bred Otters (to agreed national framework) to boost the survival chances of existing animals, should be considered and if appropriate, initiated. Discussion paper by 1998.
Action: HMWT, EA, HMG.

OT6. Attempt to reduce accidental deaths by identifying key sites for the provision of road underpasses or similar and fencing. Present list to the Environment Agency and HCC by 1999. Seek to undertake remedial work on 50% of sites within five years.
Action: HMWT, HMG, EA.

14.6.4 Advisory

OT7. All conservation advisers operating within the county to be aware of the requirements of Otters and the aims of this plan, and to promote this when in contact with riparian landowners. Arrange a meeting/training seminar by 1999 for conservation advisers.
Action: HMWT, CMS, FWAG, GCT, FRCA.

14.6.5 Research and monitoring

OT8. Review existing monitoring arrangements during 1998, with a view to covering the movements of the released Otters and likely entry points to the county of 'wild' Otters as a minimum. Ensure local monitoring is structured to allow inclusion in national dataset.
Action: HMWT, HMG, HBRC.

OT9. Contribute to national Otter surveys, as appropriate.
Action: HMG, HMWT, HBRC.

OT10. Review and update by 1999 the list of enhancement schemes prepared as part of the Otter Habitat Project to ensure degraded stretches of river are highlighted (particularly regarding rivers of the Ouse catchment as they were excluded from the OHP).
Action: EA, HMWT.

OT11. Monitor effectiveness of implemented enhancement schemes, by 2000.
Action: EA.

OT12. Collate information on prey productivity, biomass and pollutant levels. Report as appropriate.
Action: EA.

OT13. Continue studies on the diet of the released Otters in the county.
Action: UH, EA.

14.6.5 Communication and publicity

OT14. Organise at least one meeting annually with all interested local parties to discuss progress and agree future actions.
Action: HMWT, HMG, EA.

OT15. Progress reports on the released Otters to be sent at least once every two years to all interested parties.
Action: HMWT, EA, HMG.

OT16. Use this popular species to publicise the importance of water quality and riparian habitats to biodiversity, through events, press releases and articles. At least one event annually.
Action: HMWT, EA, EN.

15 Tree Sparrow species action plan

15.1 Introduction

The Tree Sparrow *Passer montanus* is a similar bird to the more familiar House Sparrow but with a chestnut cap rather than a grey one, black spots on the ear coverts and a neat black bib. It is a bird of open farmland with well spaced mature deciduous trees in hedges or on roadsides, isolated small woods, or pollarded willows along slow flowing rivers and ditches. In winter it gathers in mixed flocks with finches and buntings on farmland stubbles and other weedy areas. The Tree Sparrow is a colonial nester, mostly in holes in trees but it will use nestboxes. It feeds on small seeds and insects.

Along with many other farmland birds the Tree Sparrow has declined sharply in recent years, disappearing from many of its former haunts. The reasons for this are unclear but are thought to be linked to the ever increasing intensity of agricultural practices.

15.2 Current status

Nationally, Tree Sparrows have declined by 86% on farmland over the last 20 years. This decline is mirrored in Hertfordshire with the number of occupied tetrads (2 x 2 km grid squares) declining from 88% during 1967-73 to 35% in 1988-92 (Smith *et al*, 1993). It is estimated that only around 320 pairs remain thinly spread throughout the county. Many recent records come from the St Albans area, although this may reflect observer bias.

15.3 Current factors causing current decline or loss

The following factors may be involved in the decline of Tree Sparrows.

15.3.1 Changes in agricultural practices

The move towards autumn rather than spring sowing has reduced the amount of winter stubbles and thus the available food sources.

15.3.2 Increasing use of pesticides

The increasing use of insecticides and herbicides on farmland has reduced the quantity of arable weeds and insects. Fat-hen is thought to be an important food source (T. James pers. comm.), but this has declined rapidly.

15.3.3 Inappropriate hedgerow management

Many hedges have lost their traditional function of stock control. Management often means little more than keeping them short, neat and tidy, far removed from the tall bushy hedges favoured by Tree Sparrows. In addition, hedgerow and scattered farmland trees are increasingly neglected. There has been a major loss of mature hedgerow Elms due to Dutch Elm disease. Dead and veteran trees with suitable nesting cavities are being felled but not being replaced. The maximum occurrence of Tree Sparrow coincided with the wide availability of dead elms about 1970, though there had been a dramatic increase 10 years previously, before that outbreak of Dutch Elm Disease.

15.3.4 Population fluctuations

There have previously been several long-term fluctuations in Tree Sparrow populations. It has been suggested that UK populations reflect those on the continent, being supported by immigration when continental numbers are high (Summers-Smith, 1989).

15.4 Current action

The RSPB, in association with FWAG, ADAS and the Game Conservancy, has published a series of information sheets on the management of farmland birds, including the Tree Sparrow.

Nest boxes have been erected at two key sites, Beech Farm, St Albans and Coursers Road, London Colney. Studies of breeding Tree Sparrows are being carried out and discussions have been had with local farmers on improvement to habitats at these sites.

15.5 Tree Sparrow Action Plan

Objectives, actions and targets

Objective 1: To protect and reverse the decline of the Tree Sparrow in the County

Target: a) Relocate known existing population by 2011
b) Double the breeding population by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
TS/A/1.1	Set up a Tree Sparrow Working Group to oversee the review of the species action plan	2003	2003	HBC	BTO, RSPB, HCC Minerals, HBRC, landowners
TS/A/1.2	Liaise with the national Tree Sparrow projects to find best available information for winter feeding and nest box schemes	2001	2003	HBC	RSPB, Rutland Water
TS/A/1.3	Monitor the breeding success and maintain winter feeding stations at Coursers Farm and Tyttenhanger Farm	2000	Annually	HBC	
TS/A/1.4	Survey for and identify other potential breeding areas (including habitat quality) in the location from Shenleybury eastward to Colney Heath	2003	Ongoing	HBC	Volunteers
TS/A/1.5	Draw up a relocation strategy to protect the only known breeding colony (Coursers Farm)	2004	2005	Tree Sparrow Working Group	
TS/A/1.6	Contact relevant landowners to provide habitat management advice. Discuss the potential of Environmental Stewardship; Entry Level and Higher Level Schemes	2004	Ongoing	HBC	Farmland HAP Group, FWAG, CMS
TS/A/1.7	Set up three new nest box schemes and winter feeding stations at appropriate sites	2005	2008	HBC	Landowners

Relevant Action Plans:

Hertfordshire Plans
Farmland

National Plans
Tree Sparrow; Ancient and/or species-rich hedgerows; Arable and horticulture Habitat Statement

Abbreviations (Partners)

BTO – British Trust for Ornithology
CMS – Countryside Management Service
FWAG – Farming and Wildlife Advisory Group
HBC – Herts Bird Club
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
RSPB – Royal Society for the Protection of Birds

Contact:
The Lead for this plan is Hertfordshire Bird Club Scientific Committee
Jim Terry
Email: jim@wanadoo.co.uk

16 Bittern species action plan

16.1 Introduction

Bitterns *Botaurus stellaris* are secretive birds which are confined almost entirely to lowland marshes dominated by Common Reed. They feed predominantly on fish (notably eels) but they also take a wide variety of other foods such as amphibians, insects, small birds and mammals. The males advertise their territories by a characteristic deep booming noise which allows the breeding population to be well known.

Up to the 17th century bitterns were widespread throughout England but land drainage and hunting led to a steady decline. By the 1880s they were extinct as a breeding species in this country. They recolonised in the early 1900s. At that time there were estimated to have been around 80 booming males. Since then there has been a steady decline linked to the loss of suitable habitat. There were only 16 booming males in the UK in 1994.

In the winter the resident population is increased by the arrival of birds from the continent. The size of the influx is dependent on the severity of the weather but is never great. The total wintering population is generally less than 100 birds.

Nature conservation organisations have given a high priority to efforts to arrest and then reverse the decline. English Nature, the RSPB and others are putting a great deal of effort into managing existing breeding sites for Bitterns and the creation of new sites. In Hertfordshire, the Lee Valley is particularly important for wintering Bitterns and has the potential to make a significant contribution to their conservation. It regularly supports three or four Bitterns throughout the winter and it could with appropriate management support breeding Bitterns.

16.2 Current status

The total European population of Bitterns was estimated to be 2500-2700 pairs in 1976. There was a 30-50% decline after the 1978/79 winter. Bittern numbers appear to be declining in 17 countries, stable or fluctuating in nine, and increasing in only three. In the UK the Bittern is a declining, localised and rare breeding species. Breeding pairs are confined almost entirely to lowland marshes in Norfolk, Suffolk and Lancashire. In 1994 there were only 15 or 16 booming males. Numbers are boosted in winter by continental immigrants when between 30 and 100 birds are recorded each year.

Records published in the annual *London Bird Report* and *Birds of the Lee Valley* show that until the late 1960s the Bittern was an irregular visitor to the Lee Valley. During the 1970s between one and two birds wintered in the Lee Valley below Ware, with the same pattern during the 1980s. Exceptions to this were extremely harsh winters such as 1978/79 and 1981/82 when seven and six birds were recorded. Since 1991 the number of wintering Bitterns has increased with four or five birds present in recent winters, and five to seven in 1995/96.

In recent years the majority of records have come from Rye Meads/Rye House Marsh and Cheshunt gravel pits – particularly 70 Acres Lake where up to four birds have been present at one time. The largest areas of reedbed in the Lee Valley are at Rye Meads and one would expect this to be a favoured area. The birds feed extensively in the reed fringes of the sewage treatment lagoons and in ditches around the lagoons. During the day they roost in the larger reedbeds of the Herts & Middlesex Wildlife Trust nature reserve or the RSPB Rye House Marsh reserve. Occasional records come from other sites in Hertfordshire, most notably from Tring Reservoirs and Stocker's Lake.

16.3 Current factors causing loss or decline

16.3.1 Loss of habitat

The quantity of reedbed is declining. Surveys indicate only 5000 hectares of reed in the UK and only 53 sites greater than 20 ha. There was a greater than 50% decline in the Norfolk and Suffolk Broads between 1946 and 1977. Increased awareness, conservation and protection in recent years have not stopped the decline. There has been a loss of 5-10% in England over the last decade and further losses are predicted. The main causes have been uncontrolled natural succession leading to drier habitats, conversion to grassland by grazing, and salt water, incursion due to the failure of sea defences.

In Hertfordshire the situation is slightly different in that the major loss of reed is historical. In recent years small reedbeds have developed around wet gravel workings but these are now under threat. The total area of reedbed is only about 12 hectares.

16.3.2 Declining reedbed quality

The quality of reedbed is also declining. If Bitterns are indicators of reedbed quality, then 19 out of 30 sites, which have held Bitterns are no longer of sufficient quality. The principal cause appears to be natural vegetation succession leading to drier and /or more wooded habitat, and a lack of management to control it. Few of the reedbeds in Hertfordshire are in ideal management regimes.

16.3.3 Water quality

Water quality is also important. Eutrophication (high levels of nutrients) can cause reed die-back and problems of rehabilitation. High nitrate and phosphate cause the breakup and degeneration of floating reed-mats, and lead to anoxic (without oxygen) sediments, which do not support food or reed colonisation. Algal blooms can decrease feeding efficiency because of turbidity (cloudiness) and direct fish kills. Pollution, which contaminates their food, may also contaminate Bitterns.

16.3.4 Other factors

Other factors, which may affect Bitterns include hard weather, excessive water abstraction, persecution and egg collecting.

16.4 Current action

Bitterns and reedbeds are given high priority for action within *Biodiversity: The UK Steering Group Report*, which includes costed action plans for both.

English Nature has a Species Recovery Programme for Bitterns. Key actions are to improve the management of existing reedbeds and to encourage the creation of new, large reedbeds.

The RSPB has a species action plan for Bitterns and a habitat action plan for reedbeds.

The Lee Valley Conservation Group have prepared a Bittern Action Plan for the Lee Valley. The principal partners in this plan are the RSPB, the Lee Valley Park Authority, The Wildlife Trust, English Nature, Thames Water Utilities and the Environment Agency. This Bittern Action Plan for Hertfordshire is largely a summary of the Lee Valley plan.

16.5 Bittern Action Plan

Objectives, actions and targets

Objective 1: Maintain, enhance and create sufficient quality and quantity of reedbed in Hertfordshire to enable Bitterns to overwinter and breed

Targets: a) Produce at least a minimum of 10 ha of new reedbed across Hertfordshire by 2014
b) Increase the number of wintering Bitterns to 15 by 2014; increase the number of regular wintering sites to five by 2014 and attract one booming male/breeding pair by 2014

Action code	Action	Target start date	Target end date	Lead partner	Other partners
B/A/1.1	Conduct a countywide reedbed condition assessment to ascertain the most appropriate management for each reedbed for Bitterns	2003	2005, then every five years	HMWT	HBAPSG
B/A/1.2	Identify opportunities for extending reedbeds using AH criteria: sites to include Stanborough Reedmarsh, Wilstone/Marsworth (including sewage works), Stockers Lake, Springwell Reedmarsh, Tewinbury, Hilfield Park and Aldenham Reservoirs (Distinction between existing reedbed and new)	2003	2005	HMWT	HBAPSG, HCC
B/A/1.3	Identify and contact site owners regarding the reedbed assessment/extension project to gain their involvement	2003	2005	HMWT	HBAPSG
B/A/1.4	Extend all existing reedbeds, where possible, creating at least 2 ha at Turnford and Cheshunt Pits (North Met Pit), 1 ha at Stanstead Innings, 6 ha at Rye Meads and 1 ha at Amwell	2003	20013	HBAPSG	Landowners/ managers, EU LIFE Nature Fund
B/A/1.5	Identify and create four blocks of 0.2 ha reedbed across the county on opportunity sites (0.2 ha from AH wintering project)		Identify by 2005, then one a year	HBAPSG	Landowners/ managers, CMS
B/A/1.6	Continue active management of reedbeds in favourable condition for Bitterns, improving habitats for fish populations and spawning in existing areas and stocking where appropriate; at Turnford and Cheshunt Pits, Rye Meads, Amwell and Tring (from AH criteria)		Report annually at meetings	HBAPSG	RSPB, LVRPA, HMWT, BW
B/A/1.7	Conduct a site survey for the potential for new reedbeds		Every three years a report	HBAPSG	RSPB, LVRPA, HMWT, BW

B/A/1.8	Write site management plans/statements for all reedbed sites including management for Bitterns. To be updated after reedbed criteria. Sites to include: Amwell, Rye Meads, Stanstead Abbotts, Turnford and Cheshunt Pits, Tring (Wilstone and Marsworth), Tyttenhanger, Panshanger, Stockers Lake, Stanborough Reedmarsh, Hilfield Park Reservoir, Aldenham Reservoir		As reviewed	HBAPSG	RSPB, LVRPA, HMWT, BW, TVW, HCC, CMS
B/A/1.9	Designate new reedbed areas as SSSI/SPA if Bittern usage is confirmed			EN	
B/A/1.10	Carry out baseline fish survey, Lee Valley (Amwell, Rye Meads, 70 Acres, North Mat Pit, Abbotts Lake) and Tring. Monitor and act on fish population data i.e. management plan		Annually	HBAPSG	RSPB, LVRPA, HMWT, RMRG, BW, Cemex, FoTR

Objective 2: Monitor for and collate all records of Bitterns

Target: Maintain an annual summer and winter monitoring programme

Action code	Action	Target start date	Target end date	Lead partner	Other partners
B/A/2.1	Conduct roost watches and summer booming monitoring		Annually	HBAPSG	RSPB, HMWT, RMRG, LVRPA, HBC, FoTR
B/A/2.2	Carry out reactive counts if new sightings occur		Ongoing	HBAPSG	RSPB, HMWT, RMRG, LVRPA, HBC, FoTR
B/A/2.3	Monitor all reedbed sites during the winter (Jan/Feb), at least three times		Annually	HBAPSG	RSPB, HMWT, RMRG, LVRPA, HBC, FoTR
B/A/2.4	Collate records and publish findings		Annually	HBAPSG	HBC

Objective 3: To increase knowledge of Bittern ecology

Target: Carry out a research project by 2004

Action code	Action	Target start date	Target end date	Lead partner	Other partners
B/A/3.1	Carry out research into the feeding ecology and habitat preferences of wintering Bittern	2003	2004		RSPB, HMWT, RMRG, LVRPA, AH
B/A/3.2	Assess the feasibility of colour-ringing, radio-tagging, wing tagging and satellite tagging/implants, to investigate Bittern movements and use of sites within the Lee Valley	2003	Every three years	HBAPSG	RSPB, RMRG, LVRPA, TW

Objective 4: Raise awareness for Bittern and reedbed conservation in Hertfordshire

Target: Maintain an annual programme of public events

Action code	Action	Target start date	Target end date	Lead partner	Other partners
B/A/4.1	Use the Herts Bittern Action Plan Steering Group to exchange and disseminate information on Bitterns and reedbeds		Ongoing	HBAPSG	
B/A/4.2	Issue a post winter press release each March on the progress of the Bittern, ensuring that it goes on steering group members' websites		Annually	HBAPSG	FoTR, HBC, LVRPA, RMRG, RSPB
B/A/4.3	Develop interpretative programmes and media to communicate reedbed and Bittern conservation to the public		Ongoing	HBAPSG	HMWT, BW, RSPB, LVRPA, HBC, RMRG, FoTR
	LVRPA Bittern Discovery Trail		2006	LVRPA	
	Aren't Birds brilliant again	2004	2005	RSPB	LVRPA
	Autumn/winter bittern walk/roost watch		Annually	FoTR	
	Hold a county Bittern SAP day (joint with Tring)		2005/06	HBAPSG	
	Interpretation panels at Tring reservoirs to include Bittern/reedbed information		2004	BW	
	Aren't Birds Brilliant Outreach Schools	Winter 2004/05	Winter 2005/06	RSPB	
	IEEM reedbed course for Bitterns		Dec 2005	HMWT	
B/A/4.4	Publish reports on Bittern ecology in *British Birds* and *British Wildlife*		2005	RMRG (AH)	

Relevant Action Plans:

Hertfordshire Plans
Water Vole; Otter; Wetlands
Lee Valley Regional Park Authority BAP

National Plans
Bittern; Reedbeds

Abbreviations (Partners)

BW – British Waterways
CMS – Countryside Management Service
EA – Environment Agency
EN – English Nature
FoTR – Friends of Tring Reservoirs
HBC – Herts Bird Club
HBAPSG – Herts Bittern Action Plan Steering Group
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
LVRPA – Lee Valley Regional Park Authority
RMRG – Rye Meads Ringing Group (AH) – Alan Harris, RMRG
RSPB – Royal Society for the Protection of Birds
TVW – Three Valleys Water
TW – Thames Water

Contact:
The Lead for this plan is Herts & Middlesex Wildlife Trust
Ellie Minns
Bittern Project Officer
Email: eminns@leevalleypark.org.uk

17 Stone-curlew species action plan

17.1 Introduction

The Stone-curlew *Burhinus oedicnemus* was once a widespread and familiar farmland and downland bird over much of southern England but it has undergone a significant decline in recent decades. The birds are largely nocturnal, feeding on invertebrates in short grass habitats and dry, stony ground. Open farmland on light soils has increasingly been used in recent years. Nest scrapes are usually situated just below the top of a ridge, which give long distance, all round vision. This allows incubating birds to slip away, rather than flying, if danger approaches.

17.2 Current status

The Stone-curlew is a rare and declining species, numbers of which have fallen by 85% in the past 50 years, and more than 50% since 1960, reaching an all-time low of 160 pairs in 1985. It is now largely restricted to two areas of the UK: Breckland and Wessex. However, conservation action has raised the current UK population to more than 300 pairs, meeting the national Biodiversity Action Plan target five years ahead of schedule. A new target will be adopted in 2006.

In Hertfordshire, Stone-curlews formerly bred, quite numerously, in the north of the county. In 1877 it bred regularly on the hills west of Hitchin, but was beginning to decline by 1899. By 1927 birds bred regularly in rough pastures around Clothall, Wallington and Kingswood and this status prevailed until 1942 when birds still bred fairly commonly in the vicinity of Bygrave, Wallington, Clothall, Cromer and towards Buntingford. A pair, were thought to have bred near Baldock in 1949 and a pair bred annually on Pegsdon Hills between 1949 and 1953 when at least two pairs were present. Records came from Pirton of one pair breeding in 1953, two pairs in 1954 and one pair in 1955. A pair was located in 1955 two miles east of Barkway and a nest was found between Baldock and Royston in 1957. At the time of the first breeding atlas (1967-73), birds were still regularly breeding on open farmland in the north of the county, when breeding was confirmed from six tetrads, was probable in four tetrads and possible in a further two. The last proven breeding was in 1981. However, single birds continue to occur in the north-east of the county, almost on an annual basis.

17.3 Current factors causing loss or decline

The national decline of Stone-curlews is attributed to habitat loss through the abandonment of low-intensity mixed and pastoral agriculture and the loss of dry grassland in favour of intensive arable farming, with the emphasis on autumn sown cereal crops.

On arable land, mechanised farming operations (inter-row hoeing of root crops and rolling of cereals) seriously affect breeding success and many eggs and chicks are lost. Nesting birds are also at risk from pesticides; carbamate compounds are a possible cause, but this has yet to be proven.

Egg collecting continues to be a threat at a localised level. The main recorded cause of death for adult birds is collisions with utility wires and fences, and shooting in Europe when the birds are on migration or at their winter locations.

17.4 Current action

17.4.1 Legal status

The Stone-curlew is listed on Annex 1 of the EC Birds Directive and Appendix II of the Berne Convention. It is

also protected under Schedule I of the Wildlife and Countryside Act 1981.

17.4.2 National and county status

The Stone-curlew is a national Red List species, and a national Biodiversity Action Plan (BAP) species. In Hertfordshire, it is a Red List species and a county BAP species with its own Species Action Plan (SAP).

17.4.3 Mechanisms targeting the species

It is a priority to increase the availability and suitability of semi-natural grassland for stone-curlews as a nesting habitat. Where birds occur on arable farmland, annual monitoring and nest protection is critical. Therefore, raising awareness amongst farmers and encouraging them to assist in nest protection is crucial. Nests can be located and chicks picked up and held during farming operations, then replaced in the nest scrape. Such co-operative work has increased breeding success.

Environmental Stewardship can play an important role in the conservation of stone-curlews.

Environmental Stewardship – Entry Level Scheme:
- Manage permanent grassland with very low inputs (EK2 and EK3).

Environmental Stewardship – Higher Level Scheme:
- Fallow plots for ground-nesting birds (HF13)
- Cultivated fallow plots or margins for arable flora as enhanced set-aside option (HF16)
- Fallow plots for ground-nesting birds as an enhanced set-aside option (HF17)
- Maintenance, restoration and creation of species-rich, semi-natural grassland (HK6, HK7, HK8).
- Maintenance, restoration and creation of semi-improved or rough grassland for target species (HK15, HK16, HK17).

17.5 Stone Curlew Action Plan

Objectives, actions and targets

Objective 1: To ascertain the presence and/or breeding of Stone-curlews in the County

Target: Set up an annual monitoring programme by 2003

Action code	Action	Target start date	Target end date	Lead partner	Other partners
SC/A/1.1	Carry out play back surveys in a selected area of North Herts	2003	2005	HBC	RSPB, EN (licences)
SC/A/1.2	Liaise with key partners to establish a process for monitoring and undertake measures to protect any breeding attempts	2004	2004	Stone-curlew Working Group	RSPB, landowners, CMS, FWAG
SC/A/1.3	Encourage key landowners to report sightings	2004	Annually	Stone-curlew Working Group	RSPB, CMS, FWAG

Objective 2: To re-establish the Stone-curlew as a regular breeding bird

Target: Create suitable breeding habitat in North Hertfordshire by 2010

Action code	Action	Target start date	Target end date	Lead partner	Other partners
SC/A/2.1	Set up a Stone-curlew Working Group to help oversee the implementation of the plan	2004	2005	HBC	CMS, DEFRA, FWAG, HBRC, HMWT, RSPB, landowners
SC/A/2.2	Identify and map suitable target areas for re-establishment	2004	2005	HBC	EN, FWAG, HBRC, HMWT, LA's
SC/A/2.3	Identify, contact and visit landowners to provide habitat creation advice	2004	2007	Stone-curlew Working Group	CMS, FWAG, RSPB
SC/A/2.4	Create and maintain at least three nesting plots on three key sites	2007	2010	Landowners	Stone-curlew Working Group

Relevant Action Plans:

Hertfordshire Plans
Farmland; Grassland and Heathland

National Plans
Stone-curlew; Lowland calcareous grassland; Lowland heathland

Abbreviations (Partners)

CMS – Countryside Management Service
DEFRA – Department for Environment, Food and Rural Affairs
EN – English Nature
FWAG – Farming and Wildlife Advisory Group
HBC – Herts Bird Club
HBRC – Hertfordshire Biological Records Centre
HMWT – Herts & Middlesex Wildlife Trust
HNHS – Hertfordshire Natural History Society
LA's – Local Authorities
RSPB – Royal Society for the Protection of Birds

Contact:
The Lead for this plan is Hertfordshire Bird Club Scientific Committee
Graham Goodall
Email: graham.goodall@hertscc.gov.uk

18 Song Thrush species action plan

18.1 Introduction

The Song Thrush *Turdus philomelos* is a species with wide ranging habitat requirements, being found in both rural and urban situations, in gardens, parks, open farmland, hedgerows and woodlands. It has a close relationship with human habitation. It breeds in almost any habitat with trees or bushes for nesting. Nesting takes place over a long season with nests usually within 2 m of the ground. Two or more broods are raised, each consisting of an average of five eggs. Feeding occurs on open ground with the main prey item being invertebrates, particularly snails, in dry summer periods and late spring when berries and fruit have finished. The species is a partial migrant, with large numbers of continental breeders over-wintering in Britain and with many birds which breed in the UK wintering further south in Europe.

18.2 Current status

The Song Thrush is protected under the EC Birds Directive (EC/79/409) and the Wildlife and Countryside Act (1981).

This is a common and widespread species, but one which is steadily declining throughout the UK. The decline began around the mid 1970s, with the most marked decline in cereal farming areas. There has been an estimated 73% reduction in farmland and 49% in woodland habitats (*Biodiversity: The UK Steering Group Report*, 1995).

Locally in Hertfordshire, the species is also declining, with confirmed breeding in only 84% of tetrads between 1988-92, compared with 91% between 1967-73 (Smith *et al*, 1993). This small distributional decline probably masks a larger decline in breeding density and a continuation of this trend could see the bird disappear as a breeding species from some areas of the county.

18.3 Current factors causing loss or decline

Reasons for the decline are poorly understood, but may relate to a combination of the following factors (*Biodiversity: The UK Steering Group Report*, 1995).

18.3.1 Changes in farming practices

The switch from spring to autumn sowing of cereals and possibly the increased use of pesticides may have reduced the availablity of food.

18.3.2 Severe winter weather

Prolonged cold weather may result in shortages of food supplies, which could particularly hit juveniles.

18.3.3 Hunting

Hunting in southern France may affect the part of the UK population which migrates south.

18.3.4 Use of molluscicides

These potentially have a major impact in farmland, gardens and public parks. They are used most in late spring, a time when snails form a major part of the diet.

18.3.5 Hedge management

The increase in mechanical hedge trimming and the change to lower, less bushy hedges may be partly responsible, as may be the loss of hedgerow trees which provide suitable song posts.

18.3.6 Other factors

Predation by corvids, Sparrowhawks and foxes and may also be partly responsible for the decline. However, these must be largely accepted as natural influences. Likewise, competition with blackbirds may be partly responsible, though there is no evidence for this.

18.4 Current action

RSPB and BTO have initiated surveys and research into the species ecology and the causes of the decline. The decline is not a result of reduced nesting success but is thought likely to be the result of reduced survival of over-wintering adults and juveniles. The reasons for this are still unknown, but this tends to rule out Magpie predation (as is often suggested), though the increased use of molluscicides are a possibility.

A national species action plan has been prepared by the RSPB, in collaboration with the JNCC and country agencies.

18.5 Song Thrush action plan objectives

Halt further decline of Song Thrush in Hertfordshire, maintaining population at 1996/97 levels as a minimum.

Return species to 1970 population levels by 2020.

18.6 Proposed actions

18.6.1 Policy and legislation

No action proposed.

18.6.2 Site safeguard and management

ST1. Promote better management of hedges to all landowners, including farmers, local authorities, schools and individuals with gardens, through existing work.
Action: CMS, FWAG, HMWT.

ST2. Local Authorities to review their hedgerow management with a view to improving the wildlife value of hedgerows under their control, by 2000.
Action: LA's.

ST3. Review, and aim to reduce, use of molluscicides in gardens, public parks, schools and in agriculture by 2000.
Action: LA's, MAFF.

18.6.3 Species management and protection

No action proposed.

18.6.4 Advisory

ST4. Disseminate results of national research and follow these up by advising landowners and the general public of the conservation requirements of this species.
Action: RSPB, HMWT.

ST5. Encourage people with gardens and schools to put out fruit during cold winter spells as food for Song Thrush amongst other species.
Action: BTO.

18.6.5 Research and monitoring

ST6. Undertake national research initiatives into the ecology of this species and links to agricultural changes and use of pesticides.
Action: RSPB.

ST7. Maintain the current level of monitoring in Hertfordshire of breeding Song Thrush populations through the national BTO/JNCC/RSPB Breeding Bird Survey.
Action: HBC, RSPB groups.

ST8. Initiate a 'wildlife in gardens' survey (see Chapter 10) to involve the wider public in monitoring the health of 'urban' species such as Song Thrush, by 2000. This can include the RSPB/BTO 'Garden Bird Survey'.
Action: RSPB, LA's.

18.6.6 Communication and publicity

ST9. Raise awareness of the plight of the Song Thrush and possible links between this and human activities by the publication of information leaflets, articles, press releases and events. A wildlife gardening leaflet (see Urban Action Plan, Chapter 10) could also promote this species.
Action: RSPB, BTO, LA's, Capel Manor, HMWT.

ST10. Organise a conference in 1998 to promote work on the bird species targeted through the local biodiversity action plan.
Action: HBC.

19 Great Crested Newt species action plan

19.1 Introduction

The Great Crested Newt *Triturus cristatus* usually spends most of its life within about 200-500 metres of its breeding pond and requires a suitable mix of habitats to support a viable population. The newts feed on land and in water eating a variety of invertebrates. Ponds are used for breeding and the development of eggs and tadpoles and are typically occupied between early spring and late summer. They favour a breeding pond with a pH of 6.0 or above, usually more than 100 square metres in size, over 50 cm depth and with well developed aquatic and emergent plant communities. Great Crested Newts are more likely to be found where there is a cluster of ponds and it is a species often associated with ponds which periodically dry out completely. This is probably because of the effect this has on predators of this species, particularly fish and waterfowl.

The requirements of this species on the surrounding habitat are the most exacting of all the native amphibians. The main habitat requirements are that it should contain a variety of vegetation under different management regimes, especially lightly grazed pasture and scrub or woodland. Gardens, derelict industrial sites and town parks may also provide suitable habitats. These habitats provide the invertebrate food source that forms the bulk of the adult Great Crested Newts diet. Other essential features include secure frost-free conditions for hibernation and a lack of fertilizers and pesticides, which the newts are particularly sensitive to.

Adult Great Crested Newts spend the majority of the year on land and immature newts remain on the land until they reach sexual maturity at between two and four years. They will then find a breeding pond, often the one they were hatched in.

19.2 Current status

19.2.1 UK status

This species is a lowland animal in Britain, widespread over most of England (although rare in the south-west) and much rarer in Scotland and Wales and absent from Ireland. The British population is estimated to be amongst the largest in Europe, where it is threatened in many countries.

The loss of this species has been dramatic over the last 50 years. Studies in the 1980s indicated a national rate of colony loss of 2% over five years. It is estimated that there are a total of 18,000 although only 3000 of these have been identified.

The Great Crested Newt is listed on Annexes 11 and 1V of the Bern Convention. It is protected under Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations, 1994 (Regulation 38) and Schedule 5 of the Wildlife and Countryside Act 1981.

19.2.2 Hertfordshire status

In Hertfordshire, the species shows a widespread distribution. Since 1980, fifty breeding ponds have been identified, but many of these sites may no longer support a viable population. Of a small sample of pond sites (10) revisited during may 1996, only five still supported Great Crested Newts and of the ponds where their presence was confirmed, only one area supported a reasonable population. The indication from this small sample is that the population of Great Crested Newts in Hertfordshire is in severe decline. A total of 18 ponds have had the presence of newts confirmed since 1990.

A more recent report in nearby London, suggests that 42% of Great Crested Newt populations in the London area have been lost in 20 years. From these figures a rate of 0.4-2% annual loss of ponds can be assumed.

If Hertfordshire has an estimated 250 populations (applying the same ratio as that found nationally, i.e. identified sites representing 20% of estimated existing populations, para 1.2) then between one and five populations are being lost each year.

19.3 Current factors causing loss or decline

19.3.1 Habitat loss

Many breeding ponds and or the suitable habitat surrounding them have been destroyed by drainage schemes, over abstraction of groundwater, agricultural intensification, management, neglect and development.

The *Hertfordshire Pond Report* (1987) revealed that in just one hundred years the total number of ponds in the County had almost halved to an estimated total of 3595 in 1978. Work in the early 1980s documented a 2% national decline in the number of ponds every five years.

The largest known local population at Berkhamsted Castle moat is severely threatened due to the recent drought and over-abstraction. No breeding has been recorded in either 1996 or 1997, with the moat completely dry.

19.3.2 Management

Where ponds still exist, the pond itself or the surrounding habitat has often changed to such an extent that there is too little food or shelter for the newts to survive. Less than half a hectare, even of ideal habitat is unlikely to sustain a viable population (English Nature).

However, because of the threatened status of all the diverse forms of pond habitats in Hertfordshire it is important that ponds are properly managed for all species present and not just the requirements of a 'Flagship Species' such as the Great Crested Newt. Where possible management should be designed around the rotational management of several (at least two) closely spaced ponds allowing the full range of successional stages to be experienced by each pond in turn and so allowing for the needs of other species reliant on these habitats.

19.3.3 Fragmentation of populations and isolation

Clusters of ponds have been shown to be important in supporting a viable population of Great Crested Newts (Swan and Oldham, 1993). In Hertfordshire, ponds are becoming increasingly isolated with the result that local extinctions are more likely to occur. For example, Norton Pond (an ancient pond) on the outskirts of Letchworth has become surrounded by development. Great Crested Newts are still present but numbers are small (observations of only 1-2 animals).

Where possible creation of new ponds should be near existing sites to compensate for local losses and increase chances of successful colonisation of Great Crested Newts and other pond wildlife.

In some areas the low populations or total absence of Great Crested Newts will mean that translocation or re-introductions are the only option for conserving the species. Where such programmes are undertaken, they must be done in accordance with accepted scientific criteria and there must be a commitment to ongoing management and monitoring by the landowner/manager.

19.3.4 Pollution

Pollution and toxic effects of agrochemicals, or run-off from roads, may make breeding ponds unsuitable, preventing the healthy growth of tadpoles.

19.3.5 Predation

Fish (even small species such as sticklebacks) eat the eggs and tadpoles of Great Crested Newts. Stocking of a pond with fish is likely to be a severe threat to the newt population. Ducks can also cause problems, as they eat the waterweed and may also eat tadpoles. Predation by released terrapins may also be a problem in some areas.

19.4 Current action

The Joint Nature Conservation Committee (JNCC) has published a five-year framework (1994-1999) for the conservation of amphibians and reptiles in the UK, in collaboration with statutory nature conservation organisations and voluntary bodies.

The Countryside Commission for Wales, English Nature and Scottish Natural Heritage support a post within the NGOs to develop further local amphibian and reptile local groups, and support surveys and conservation initiatives.

All known breeding sites for Great Crested Newts have been designated as important Wildlife Sites and entered onto the Geographical Information Alert System by the Hertfordshire Biological Records Centre. Some of these sites have been incorporated into District Local Plans.

19.5 Great Crested Newt Action Plan (draft)

Objectives, actions and targets

Objective 1: To ascertain and maintain the distribution, status and viability of existing Great Crested Newt (GCN) populations

Target: Establish a countywide pond survey and monitoring programme by 2010 and promote measures to protect GCN breeding ponds and their surrounding terrestrial habitat

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GCN/A/1.1	Collate current survey information and map onto GIS. Make information on the distribution of great crested newts available where needed for conservation purposes	Jan 2000	Annual reports	HBRC	HAR, GCN licence holders
GCN/A/1.2	Ensure all records are sent to the County Amphibian Recorder	Jan 2000	Ongoing	HAR	HBRC, HNHS, Froglife, EN, HMWT, CMS, GCN licence holders
GCN/A/1.3	Ensure that all GCN habitat qualifying as Wildlife Sites are identified in district local plans and protected through the development control processes	Nov 2000	Annual reports	HBRC	HMWT, EA, EN, LA's
GCN/A/1.4	Notify appropriate owners and site managers of GCN Wildlife Sites of their conservation importance and legal protection	Jan 2001	Ongoing	WSO	LEHART, GCN licence holders, WSP
GCN/A/1.5	Ensure all landowners and managers of Great Crested Newt sites are offered site management advice and sources of grant aid	Jan 2001	Ongoing	WSO	HMWT, CMS, LEHART, HARG*, GCN licence holders
GCN/A/1.6	Survey all remaining ponds within a 500 m radius of known sites	Jan 2007	Jan 2013	HBRC	GCN licence holders, LEHART, HARG*, HAR, landowners
GCN/A/1.7	Identify and survey key areas in the County with high pond densities with previously unsurveyed ponds	Jan 2007	Jan 2013	HBRC	GCN licence holders, LEHART, HARG*, HAR, landowners
GCN/A/1.8	Undertake GCN monitoring before and after pond management work	Jan 2001	Ongoing	EN	LEHART, HARG*, HAR, GCN licence holders
GCN/A/1.9	Re-survey all ponds where data is known to be 10 years old	Jan 2006	Jan 2013	HBRC	LEHART, HARG*, HAR, GCN licence holders

GCN/A/1.10	Set up a monitoring programme at high population sites (where counts are >100 since 1995)	Jan 2007	Ongoing	HARG*	LEHART, County licence holders, HAR
GCN/A/1.11	Identify sites where 500 m radius spans the County border and if required notify appropriate County contact	Jan 2003	Jan 2006	HAR	HBRC, County recorders, County Biodiversity Officers

Objective 2: Restore degraded ponds, ensure surrounding terrestrial habitats are favourable and create new ponds within the range of existing populations to allow for natural re-colonisation

Target: Restore/create five Great Crested Newt zone ponds per year on different sites by 2014

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GCN/A/2.1	Identify ponds within existing GCN areas in need of restoration	Jan 2006	Jan 2008	HARG*	HBRC, CMS, HMWT, HAR, LEHART, GCN licence holders
GCN/A/2.2	Promote pond creation within existing GCN zones	Jan 2006	Ongoing	CMS	HMWT, HARG*, LEHART, FWAG, Gwk
GCN/A/2.3	Promote pond restoration and management through Agri Environment Schemes	Jan 2006	Annually	CMS	WSP, HMWT, FWAG
GCN/A/2.4	Report on number of ponds targeted for restoration advice	Jan 2006	Annually	CMS	HMWT, LEHART, HARG*, FWAG, Gwk, HBRC
GCN/A/2.5	Report on number of ponds created in GCN zones	Jan 2006	Annually	CMS	HBRC, LEHART, HARG*, FWAG, Gwk
GCN/A/2.6	Where existing populations still occur, restore former or degraded GCN sites	Jan 2006	Annually by 2014	CMS	LEHART, HARG*, land managers, HMWT, Gwk

Objective 3: Promote greater awareness, understanding and support for great crested newt conservation to key target audiences, particularly planners, developers, Police Wildlife liaison Officers and general public

Target: Develop volunteer involvement and provide at least one training event annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GCN/A/3.1	Set up a local Herpetofauna group to	Jan 2006	Jan	HAR	Froglife, HMWT,

	develop volunteer involvement		2008		HNHS, HBRC, CMS
GCN/A/3.2	Continue to promote public pond survey and provide appropriate advisory leaflets	Jan 2006	Ongoing	HBRC	Froglife, LA's, HMWT, CMS, Gwk, EN, HAR
GCN/A/3.3	Provide occasional seminars on GCN issues to key audiences	Jan 2005	Ongoing	HAR	HBRC, EN, LEHART, CMS

Relevant Action Plans:

Hertfordshire Plans
Wetlands; Grassland and Heathland; Woodland; Farmland; Urban

National Plans
Great Crested Newt; Ancient and/or species-rich hedgerows; Eutropic standing waters; Lowland mixed deciduous woodland; Lowland calcareous grassland; Lowland dry acid grassland; Lowland heathland; Lowland meadows; Lowland wood-pasture and parkland; Wet woodland

Abbreviations (Partners)

CMS – Countryside Management Service
EA – Environment Agency
EN – English Nature
FWAG – Farming and Wildlife Advisory Group
Gwk – Groundwork Hertfordshire
HAR – Herts County Amphibian recorder
HARG – Herts Amphibian & Reptile Group* (group to be established)
HBRC – Hertfordshire Biological Records Centre
HMWT – Herts & Middlesex Wildlife Trust
HNHS – Hertfordshire Natural History Society
LA's – Local Authorities
LEHART – London, Essex, Hertfordshire, Amphibian and Reptile Trust
WSO – Wildlife Sites Officer
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The Lead for this plan is the County Amphibian Recorder (HNHS and Herpetofauna Groups for Britain and Ireland (HGBI)).
Dr Jenny Jones
Email: jenny@jonez.info

20 Chalkhill Blue species action plan

20.1 Introduction

The Chalkhill Blue butterfly *Lysandra coridon* lives in discrete, isolated colonies, which may contain tens of thousands of individuals or only tens. Adults, particularly males can fly for over a kilometre, but females are usually more sedentary limiting colonisation of new sites. The species has only one generation a year in Britain. The adults emerge in mid-late July and will be on the wing until the end of August or start of September.

Eggs are laid singly, low down on large vigorous clumps of Horseshoe Vetch *Hippocrepis comosa*, which is the only larval foodplant. The larvae hatch the following spring, feeding at night. Pupation occurs after about two months on the ground. Older larvae and the pupae make secretions which attract ants, including the Yellow Meadow Ant *Lasius flavus*, a species which requires bare ground. The ants give them protection at this vulnerable stage of the life cycle and may take the pupae below ground.

As the name of this butterfly implies, it is the typical species of the southern English chalklands and in Britain breeds solely on unimproved chalk grasslands. The species prefers a short, sparse vegetation, with patches of bare disturbed chalk soils, where the larval foodplant, Horseshoe Vetch, thrives.

20.2 Current status

The Chalkhill Blue is found throughout Europe as far north as Britain and south to central Spain, France and Italy. In Britain it used to occur as far north as Lincolnshire, but today is found on the chalk and limestone hills from the Cotswolds and Chilterns southwards, with northern outlyers around Cambridge. Its stronghold is Dorset, Wiltshire and the Isle of Wight, but it is still locally common in the Chilterns and on the South and North Downs.

At the beginning of the century, the Chalkhill Blue was common in the three main chalk areas (around Tring, west of Hitchin and Therfield Heath) in Hertfordshire. Major sites at this time included Aldbury Nowers, Lilley Hoo (and Telegraph Hill) and by far the largest colony at Therfield Heath, where there were thousands. This colony was nationally famous, particularly for the colour variations found amongst the population. However, it is thought that shortly after the First World War, over-collecting at Therfield significantly reduced the numbers, though the population was still several hundred strong.

Colonies elsewhere continued to be lost throughout the century so that by the 1980s the only breeding colony was a much-reduced one at Therfield Heath. This population has since increased dramatically in size, with peak numbers now well over 100. Other small colonies are also now known from the Bedfordshire border at Telegraph Hill and Hexton Chalk Pit nature reserves. The species no longer breeds at Aldbury Nowers, but a colony is established on the adjacent Pitstone Hill in Bucks.

20.3 Current factors causing loss or decline

20.3.1 Loss of habitat

The 90%-plus loss of species-rich chalk grasslands throughout this century was the major reason for the decline of this species. Conversion of chalk grassland to arable resulted in direct loss of suitable habitat conditions and the foodplant of this species. Direct loss to other land uses is no longer the major threat it was.

20.3.2 Decline in habitat quality

Where chalk grasslands have remained unploughed, the habitat has often deteriorated as a result of changing management. The sheep grazing which maintained the ideal short, sparse turf for this species declined as a major land use from the First World War onwards. Rabbit grazing maintained suitable conditions for a while. However, the dramatic decrease in the rabbit population during the 1950s, resulted in an increasingly rank sward on many chalk grasslands and the loss of suitable habitat conditions for the foodplant, the caterpillar and the ant species with which it is associated. While the remaining colonies are not currently threatened by lack of grazing, it remains a potential threat. Lack of suitable habitat conditions on other remaining chalk grasslands is also a hindrance to the future expansion of this species.

20.3.3 Fragmentation and isolation of remaining habitat

Many small colonies would have been lost as a result of being isolated. The sedentary behaviour of the females limits the potential for re-colonisation of the remaining fragmented and isolated chalk grasslands.

20.4 Current action

The Chalkhill Blue is included in the UK Biodiversity Action Plan Steering Group report, as a species of conservation concern because of its national decline in the last 25 years. It has been identified as a species which needs monitoring, but is not a priority for species for production of a national species action plan.

Within Hertfordshire, the three remaining populations are all on chalk grasslands being managed as nature reserves, where management objectives cater for this species. Aldbury Nowers, is also being managed as a nature reserve and the management plan recognises the possibility of the species colonising from neighbouring Pitstone Hill. There is no current action aimed at improving the status of this species on other sites.

The ecology of this species is well understood and practical management requirements are known. Appropriate management is moderate to heavy grazing by sheep. However, creation of suitable conditions on possible recolonisation sites is difficult, because of the demanding requirements of the foodplant, Horseshoe Vetch, and the complex interaction between the vegetation, caterpillars and ant species.

20.5 Chalkhill Blue action plan objectives

To maintain the existing breeding colonies of Chalkhill Blue at Therfield Heath, Telegraph Hill and Hexton Chalk Pit.

To increase the size of existing colonies. Increase the Therfield Heath colony to a minimum of 500 individuals.

To restore the Chalkhill Blue as a breeding species to all three major chalk grassland areas in Hertfordshire, within 10 years.

In 50 years time to have restored the species to at least half a dozen self-sustaining colonies or groups of colonies, with three of greater than 250 individuals.

20.6 Proposed actions

20.6.1 Policy and legislation

CB1. Ensure all existing, and any new chalk grassland sites, with Chalkhill Blue are recognised in relevant Local Plans at the next review.
Action: LA's.

20.6.2 Site safeguard and management

CB2. Ensure management of all existing sites incorporates management for this species with other conservation priorities and interests, by 1998.
Therfield Heath – Continue current management regime (grazing and cutting) on main Chalkhill Blue breeding areas.
Telegraph Hill – Restore grazing to site by 2000. Seek opportunities for expanding area of chalk grassland.
Hexton Chalk Pit – Continue current management regime (grazing and selective scrub control).
Aldbury Nowers – Manage site to increase area and improve quality of chalk grassland.
Action: Therfield Conservators, HMWT.

CB3. Encourage restoration of suitable breeding habitat on sites within former range, where there is the potential for re-establishing viable networks of populations, by 2002. Suitable sites include Aldbury Nowers, Tring Park, Tingley Down and Coombe Bottom, Kelshall.
Action: HMWT, WT, CMS, owners.

CB4. Seek opportunities to increase the area of chalk grassland around key sites (Therfield Heath, Telegraph Hill and Aldbury Nowers) to encourage the re-colonisation and spread of this species (see Chapter 8, Chalk Grassland).
Action: HMWT, CMS, owners.

20.6.3 Species management and protection

CB5. Investigate the need for re-introductions, by 2002. If proven, prepare a plan for strategic re-introductions of Chalkhill Blue, based on accepted scientific criteria, into networks of suitable existing and restored habitat.
Action: BC, HMWT.

20.6.4 Advisory

CB6. Ensure all landowners and managers of potential re-colonisation and re-introduction sites are offered advice on habitat management, by 2005.
Action: HMWT, CMS, BC, FWAG.

CB7. If colonies establish on new sites, ensure landowners and managers are offered advice on habitat management, within one year.
Action: HMWT, CMS, BC.

20.6.5 Research and monitoring

CB8. Monitor existing populations annually, either as part of a transect walk or through counts of peak numbers.
Action: BC, HMWT, Therfield Conservators.

CB9. Search former known sites and sites adjacent to existing colonies for Chalkhill Blue, annually.
Action: BC.

CB10. Encourage research projects to understand the relationship between the caterpillars and ants and the growth requirements of the caterpillar foodplant, Horseshoe Vetch.
Action: BC.

CB11. Identify potentially suitable unoccupied habitats, including former known sites within 10 km of existing populations, by 2002.
Action: BC, HBRC, HMWT.

CB12. From the above information, identify Key Sites, within former range, by 2002, for concentrating habitat management and restoration advice and effort, in preparation for natural colonisation or planned (re-)introductions.
Action: BC, HBRC, HMWT.

20.6.6 Communication and publicity

CB14. Encourage butterfly recording and monitoring through the Millennium Atlas project.
Action: BC.

21 Grizzled Skipper species action plan

21.1 Introduction

The Grizzled Skipper *Pyrgus malvae* usually occurs in small, self-contained colonies, the largest containing no more than 150 individuals. Individuals may not move more than a few hundred metres, thereby limiting scope for colonisation of new sites. The species generally only has one generation per year in Britain. After overwintering in the pupal stage, Grizzled Skippers emerge between mid-April and early May, depending on spring weather conditions. The flight period is generally early May to mid-June, though can be mid-April to the end of May in a warm, sunny spring.

Eggs are laid singly on various members of the Rose family, including Wild Strawberry *Fragaria vesca*, Tormentil *Potentilla erecta*, Creeping Cinquefoil *Potentilla reptans*, Agrimony *Agrimonia eupatoria*, and brambles *Rubus fruticosus agg*. After about 10 days, the larvae emerge, and form silken shelters from which they feed, and later entire leaves may be spun together. Pupation occurs after about two months on or near to the ground in a silken cocoon amongst rough vegetation. Little is known about predators or parasites of this species.

This species breeds in two main habitat types; firstly unimproved grasslands, particularly calcareous grasslands, with a rather sparse, though not necessarily short vegetation at the margins of scrub; and secondly, sheltered, but un-shaded woodland rides and clearings. Sunny, sheltered conditions are preferred in both habitats, where the foodplants occur as lush, bushy growths.

21.2 Current status

The Grizzled Skipper occurs throughout Europe as far north as northern England, Wales, and southern Scandinavia. The status of the species throughout the rest of Europe is not known in detail, though it is likely to be fairly common in southern and central Europe (Thomas & Lewington, 1991).

The Grizzled Skipper was formerly widespread with scattered colonies as far north as Yorkshire. However, this century in England and Wales the species has undergone a contraction in range, particularly in eastern counties, including Hertfordshire, though the precise extent of this can not be accurately quantified. It is now rare outside central southern England, but is still half-expected to be found in any suitable habitat from the Cotswolds and Chilterns southwards.

In Hertfordshire at the beginning of this century, the Grizzled Skipper was regarded as locally common. However, a marked decline began in the 1950s and 1960s, with the period from 1970-1986 showing a 43% decline in range compared with pre-1970 (Sawford, 1987). By the mid 1980s small numbers were only found in a handful of discrete areas at Aldbury Nowers, Ashridge, Therfield Heath, in the Mimram valley, Bramfield and Broxbourne Woods. However, in the past decade a further rapid decline has occurred with the species only being recorded in the last five years as scattered individuals from Aldbury Nowers, a recently discovered large colony of at least 30 individuals at Waterford Heath, near Hertford and a small colony at Frogmore Pit, Aston near Stevenage.

21.3 Current factors causing loss or decline

21.3.1 Loss of habitat

This century over 90% of unimproved grasslands have been lost, mainly due to ploughing for arable production or reseeding with simple agricultural grass mixes.

21.3.2 Change in woodland management

Changes in woodland management, particularly neglect of rides and clearings, has resulted in shading out of the sheltered, open habitats, favoured in woodlands. In addition, modern intensive high forest systems, which reduce both the area and frequency of creation of open space within the woodland, result in an increased isolation of suitable open habitats.

21.3.3 Fragmentation and isolation of remaining habitat

Many remaining suitable habitats and colonies are isolated from each other, which because of this species poor dispersal powers, increases the chances of localised extinctions and decreases the chances of re-colonisation.

21.4 Current action

The species is not specifically protected or listed in any conservation legislation or conventions. Nationally, this species is not highlighted for specific conservation action in *Biodiversity: The UK Steering Group Report* (HMSO, 1995).

However, locally in Hertfordshire, because of its rapid and severe decline, conservation action for this species should be afforded a high priority.

The ecology of this species is fairly well understood and practical management requirements for both grassland and woodland ride sites are known. Appropriate management is moderate grazing of unimproved grasslands and maintenance of a continuous supply of open, sheltered, sunny woodland clearings.

21.5 Grizzled Skipper Action Plan

Objectives, actions and targets

Objective 1: To maintain and enhance the current populations of Grizzled Skipper to halt their rapid decline

Target: Implement appropriate habitat management at key existing sites (Aldbury Nowers, Waterford Heath, Frogmore Pit, Tring Park and Broxbourne Woods) by 2007

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GS/A/1.1	Ensure all sites containing Grizzled Skipper are recognised and protected in Local Plans at next review		As reviewed	HBRC	LA's
GS/A/1.2	Ensure Grizzled Skipper sites are protected through the development control process			HBRC	LA's, HMWT
GS/A/1.3	Target existing site landowners to see if Grizzled Skipper are catered for in current management plans	Jan 2004	Jan 2005	BC	WT, HCC, EN, HMWT, FWAG, CMS
GS/A/1.4	Offer site owners help and advice on appropriate habitat management for Grizzled Skipper conservation, including writing of plan and continued survey work	Jan 2004	Jan 2005	BC	CMS, HMWT, FWAG
GS/A/1.5	Ensure site management plans include positive management for Grizzled Skipper	Jan 2004	Jan 2005	BC	HMWT, WT, Gwk, HCC
GS/A/1.6	Implement management prescriptions for Grizzled Skipper on the existing key sites	Jan 2005	Ongoing	Site managers, BC	
GS/A/1.7	Monitor all populations using standard comparable methods and/or through counts of peak numbers		Ongoing	BC	

Objective 2: Restore suitable breeding habitat within the range of existing populations to allow for natural re-colonisation

Target: Identify suitable sites and implement appropriate habitat management by 2007

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GS/A/2.1	Prioritise potential re-colonisation sites using the Hertfordshire Grizzled Skipper Survey reports as baseline data, searching for potential sites in a 10-20 km radius from existing sites. Check search area	Jan 2005	Jan 2006	BC, HBRC	
GS/A/2.2	Identify and contact site owners regarding appropriate habitat management	Jan 2005	Jan 2006	BC	CMS, HMWT, FWAG
GS/A/2.3	Where appropriate, ensure site management plans include positive management for Grizzled Skipper	Jan 2006	Jan 2007	BC	Land managers
GS/A/2.4	Monitor sites	Jan 2005	Ongoing	BC	
GS/A/2.5	Implement appropriate habitat management	Jan 2007	Ongoing	BC	Land managers

Objective 3: To raise awareness of the needs of the Grizzled Skipper to key target audiences such as land managers and general public

Target: Run one public event annually and publish one article annually

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GS/A/3.1	Write articles about appropriate habitat management for Grizzled Skipper for relevant specialist publications	Jan 2004	Ongoing	BC	HMWT
GS/A/3.2	Publicise and run field trips for local people to specific sites to learn about Grizzled Skippers		Annually	BC	
GS/A/3.3	Continue to produce Grizzled Skipper annual reports		Annually	BC	

Relevant Action Plans:

Hertfordshire Plans
Woodland; Grassland and Heathland

National Plans
Lowland calcareous grassland; Lowland meadows; Broadleaved, mixed and yew woodland Habitat Description; Boundary and linear features Habitat Description

Abbreviations (Partners)

BC – Butterfly Conservation, Hertfordshire & Middlesex Branch
Gwk – Groundwork Hertfordshire
HBRC – Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HMWT – Herts & Middlesex Wildlife Trust
LA's – Local Authorities
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)
WT – Woodland Trust

Contact:
The Lead for this plan is Butterfly Conservation, Hertfordshire & Middlesex Branch
Jez Perkins
Email: sorrynotin@hotmail.com

22 Stag Beetle species action plan

22.1 Introduction

The largest native British beetle (a large male can reach 70 mm in length) the Stag Beetle *Lucanus cervus* gets its name from the enlarged jaws of the male, which resemble the antlers of a stag. It uses these ‘antlers’ to display to the female which has much smaller jaws and to fight other males.

The Stag Beetle can be found around the edges of broadleaved woodland, parks, other pasture woodland and gardens. Adults fly well and are active mainly in the evening between May and August when they feed on fruit and tree sap.

The majority of the life cycle is spent in the larva stage which lasts about three and a half years from egg to pupa. Pupation occurs in the winter and the adults emerge the following June. After mating the female lays her eggs in suitable decaying wood of deciduous trees such as stumps and roots. Opinions differ as to the preferred host wood species but the stag beetle does not appear to be particularly selective and has been recorded utilising a number of species in Hertfordshire including: English Elm *Ulmus procera*, Alder *Alnus glutinosa*, and Plane *Platanus* x *hispanica*. Old tree stumps in hedgerows are thought to be particularly important (T. James, pers. comm.).

22.2 Current status

This large and conspicuous beetle is rare and protected in some European countries, but is still widespread in southern England, especially the Thames valley, north Essex, south Hampshire and West Sussex. It also occurs in the Severn valley and coastal areas of the south-west. Outside these areas the records are sparse and often old, indicating some contraction of the beetle's range.

The Stag Beetle is listed on Annexe 11 of the European Community Habitats Directive.

The species has never been common in the county. Its stronghold in Hertfordshire is an area in the Lea Valley centred around the western edge of Cheshunt. All recent records for this area are restricted to a six square kilometre block. This population is part of a larger population in SW Essex, perhaps extending into London. However, there are also records further north at Ware and as far north as Langley, near Hitchin.

22.3 Current factors causing loss or decline

22.3.1 Loss of habitat

The reason for the contraction in the range of this species is not fully understood. The decline in dead wood habitat would seem obvious (although the number of dead elms and elm stumps has increased dramatically in the last twenty years and many still remain).

22.3.2 Climate

Distribution appears to be determined by climate the beetle being limited to the south Recent warm summers may explain some increase in records outside of its stronghold. However, it is presumed to be the winter temperatures particularly the depth of frost, which has most effect on the ability of the species to survive in an area. If this is the case then any increase in average temperatures as a result of global warming should have beneficial effects for the survival of this species.

22.3.3 Collection

Collection for sale may be a contributory factor as it is in Europe.

22.3.4 Accidental trampling/collision

Significant numbers are killed by being trodden on footpaths and run over of collided with on roads, especially where these pass close to breeding sites.

22.3.5 Magpie predation

Numerous observations have come to light of Magpies feeding on the adult beetles as a result of a public appeal for Stag Beetle records by Colchester Natural History Museum. However, it may be that much of this observed activity is simply scavenging off trampled/car impact victims. Magpies have greatly increased in numbers in suburban areas over the last 10 years and it is here that the Stag Beetle has its population strongholds.

22.4 Current action

The JNCC has been encouraging people to record sightings through articles in Wildlife Trust newsletters and similar publications.

Three sites have been proposed as Special Areas of Conservation for this species under the European Community Habitats Directive.

22.5 Stag Beetle action plan objectives

Maintain strong populations at all existing key sites throughout the current range.

22.6 Proposed actions

22.6.1 Policy and legislation

SB1. Include Stag Beetle conservation measures in relevant policies.
Action: Broxbourne BC, LA's.

22.6.2 Site safeguard and management

SB2. Inform the Borough of Broxbourne of the importance of the Cheshunt area for this species by 1997.
Action: HMWT.

SB3. Seek to protect and ensure favourable management in parks and other greenspace in Cheshunt by 1999 (notably Cedars Park, Whithern Park, Grundy Park, New River corridor and Albury Walk), on land under local authority control.
Action: Broxbourne BC, HMWT.

SB4. Seek to maintain and enhance conditions through positive management, including the retention of dead wood, on all sites where the beetle is known to occur, by 2002, and on appropriate sites within the known range by 2005.
Action: HMWT, HBRC.

22.6.3 Species management and protection

No action proposed.

22.6.4 Advisory

SB5. Ensure landowners and managers are aware of the presence and importance of conserving this species, and of appropriate methods of management for its conservation, by 2002.
Action: HMWT, PTES, CMS, FWAG.

SB6. Ensure that the public and relevant organisations are aware of the ecological implications of collecting this species, by 2002.
Action: PTES, HMWT.

22.6.5 Research and monitoring

SB7. Undertake surveys during 1997-1999, including public participation surveys and linked to national surveys, to establish more precisely the current distribution and identify key sites for conservation action.
Action: HMWT, PTES.

SB8. Key sites to be monitored to establish long-term trends. Establish monitoring at three sites by 2000.
Action: HMWT, HNHS, local schools.

SB9. Carry out further research to establish habitat requirements by 2002. The fact that the larvae have been found in garden compost heaps suggests that there may be some way in which the species could be gardened for, i.e. the development of design recommendations for creation of suitable artificial breeding sites.
Action: EN.

22.6.6 Communication and publicity

SB10. Develop and implement a high profile campaign during 1998-2000 for raising public awareness (especially at the local community level) of the conservation needs of the Stag Beetle, in particular its reliance on dead wood. Campaign to include press releases, events and magazine articles.
Action: HMWT.

23 White-clawed Crayfish species action plan

23.1 Introduction

The native crayfish *Austropotamobius pallipes* occupies a wide range of habitats including streams, rivers, lakes, reservoirs and water-filled quarries. It prefers calcium-rich rivers and streams with a good water quality and not too much sediment. Shelter such as that provided by rocks/stones, water plants and tree roots, or a bank into which it can burrow, are important for its survival. The species feeds on a wide variety of vegetable and animal matter and in turn is eaten by many fish, birds, rats, Mink, and Otter. The young also fall victim to predatory insect larvae such as those of dragonflies and beetles.

As a species, which prefers calcium rich watercourses, it has traditionally occupied most of the watercourses of the county. However, it has declined rapidly, largely due to the importation of Crayfish Plague with non-native crayfish species. The species is also sensitive to biocides and other pollutants, particularly those lowering the oxygen content of the water, and these may have contributed to the decline.

The White-clawed Crayfish is a species, which is familiar to many members of the public, as it is comparatively easily found and identified, robust, and has a fair level of 'wildlife star quality' especially for a freshwater invertebrate. This makes the species an appropriate focus for raising public awareness and involvement through surveys and interpretation, which will greatly benefit the cause of conserving the county's rivers together with the species itself.

As the first county in the UK to record an outbreak of the Crayfish Plague and an area where complexes of once wildlife rich chalk rivers (a priority habitat in the European Union Habitats Directive) are extensive but degraded, Hertfordshire has a significant role to play in the fate of the White-clawed Crayfish.

23.2 Current status

The only freshwater crayfish native to the UK this species is widespread but scarce and declining in clean calcareous streams, rivers and lakes in England and Wales. Since the 1970s many local populations have been lost.

This species was formerly widespread in France, Spain and Italy but populations are now confined to a diminishing number of areas. It is classed as globally threatened by International Union for Conservation of Nature and Natural Resources/World Conservation Monitoring Centre and listed in Appendix III of the Bern Convention and annexes II and V of the EC Habitats Directive. Annex II lists species of community interest whose conservation requires the designation of Special Areas of Conservation. It is protected under Schedule 5 of the Wildlife and Countryside Act 1981 (WCA) in respect of taking from the wild and sale.

In Hertfordshire records suggest that the native crayfish was common throughout most waters. Today it seems that confirmed populations are restricted to parts of the Colne catchment, the Mimram and the Ver near Radlett.

23.3 Current factors causing loss or decline

23.3.1 Crayfish Plague

This is a fungal disease caused by *Aphanomyces astaci*. The spores are particularly virulent and were first brought into the country by the introduced North American Signal Crayfish *Pacifastacus leniusculus*, which carries them but appears to be immune to the plague. The fungal spores can also be transmitted in water, mud, dirty fishing nets, fish scales, and through infected individuals or carcasses moved by mammals

or birds. However, if crayfish have been absent from a stretch of river, the disease is likely to die out as crayfish are the only host.

The first recorded outbreak of the Crayfish Plague in Britain occurred in the River Lea at Ware in 1981. It quickly spread to the tributaries of the Lea including the Ash, Rib, Beane, Stort and Mimram. Crayfish Plague has caused widespread extinctions from rivers and other watercourses including still waters throughout the County and the rest of the UK.

23.3.2 Direct competition for food and habitat

Competition from non-native crayfish is a major threat. There are three species of non-native crayfish breeding in the wild in the UK. In Hertfordshire the major threat comes from the North American Signal Crayfish, an aggressive and dominant species which carries Crayfish Plague without suffering ill effects and prefers the same habitat as that of the native White-clawed Crayfish. The other species present in Hertfordshire is the Narrow-clawed (Turkish) Crayfish *Astacus leptodactylus* which is rare in the county.

23.3.3 Water quantity and quality

Low flows caused by over-abstraction and drought result in poorer quality water and the build up of suspended solids and silts. This alters the riverbed, making it unsuitable for the crayfish and also reduces the amount of oxygen in the water, decreasing overall habitat quality.

23.3.4 Deliberate release of non-native crayfish

There is a potential black-market in the release of non-native crayfish into still waters and some rivers and the later harvesting of the resulting population. There is some evidence of this sort of activity having occurred in Hertfordshire. This threat could include release of all four introduced species, including the North American Signal Crayfish, Turkish Crayfish, Noble Crayfish *Astacus astacus* and Red Swamp Crayfish *Procambarus clarkii*.

23.3.5 Other dangers

The use of Crayfish as livebait by anglers or for consumption by the local community, though not being major causes of decline can be significant threats at particular locations, especially where a colony of native crayfish is vulnerable.

23.4 Current action

The Environment Agency (EA) has commissioned Nottingham University to research the effects of non-native crayfish on freshwater ecosystems and to formulate a strategy into the future conservation management of the native species.

The three species of non-native crayfish established in the wild are listed in Schedule 9 of the WCA which makes it an offence to release or allow them to escape into the wild. The Red Swamp Crayfish will also be added to the schedule if it is found to breed.

The Ministry of Agriculture Fisheries and Food (MAFF) have introduced the 'Import of Live Fish Through Prohibition of Keeping of Live Fish (Crayfish) Order 1996', which allows the establishment of no-go zones, but also removes the prohibition on keeping Signal Crayfish within certain areas designated by postcode, in an attempt to protect native crayfish and habitats in England and Wales.

The EA Thames Region is running a project, undertaken by the Institute of Freshwater Ecology, examining the effect of fishing crayfish from waterbodies on the crayfish population and the ecology of the waterbody.

The EA have published a leaflet describing the identification of the different crayfish species.

English Nature is running a project to determine the extent of trapping of wild living North American Crayfish.

23.5 White-clawed Crayfish action plan objectives

To ascertain the distribution of the White-clawed Crayfish in Hertfordshire.

To halt the decline of the White-clawed Crayfish in the county within 10 years.

To restore the White-clawed Crayfish to all suitable open water habitats within 50 years.

To enhance river habitat quality through a programme of river enhancement schemes with at least three schemes completed annually for the next 10 years (to overlap with Water Vole and Otter Action Plans, Chapters 11 and 14).

23.6 Proposed actions

23.6.1 Policy and legislation

WC1. Strengthen regulations regarding the farming, sale and introduction of non-native crayfish, by 2000.
Action: EA.

WC2. Create 'no-go' areas for the keeping of non-native crayfish (as outlined in the National Species Action Plan for the White-clawed Crayfish) in the Hertfordshire river catchments, by 2000.
Action: EA.

WC3. Investigate the use of control measures such as byelaws or regulations to restrict the spread of crayfish plague by movement of angling equipment between waters, particularly at key sites, by 2002.
Action: EA.

23.6.2 Site safeguard and management

WC4. Identify and protect White-clawed Crayfish Wildlife Sites in LEAPs and Local Plans at the next review.
Action: EA, LA's, HMWT, HBRC.

WC5. Implement at least one enhancement scheme specific to White-clawed Crayfish each year for the next 10 years to restore suitable habitat for native crayfish, targeted initially to currently occupied rivers.
Action: EA.

WC6. Encourage sympathetic land management, such as the establishment of 10 m riparian buffer zones along all rivers to reduce the levels of sediment and pollutants entering watercourses. Aim for 100km over the next five years.
Action: EA, TWU, TVW, HMWT, CMS, FWAG, CLA, NFU.

23.6.3 Species management and protection

WC7. Investigate the feasibility of implementing eradication programmes for non-native crayfish, by 2000, targeting areas where they threaten White-clawed Crayfish populations (sterilisation and release of males and removal of females should be investigated as a possible method).
Action: EA.

WC8. Investigate the feasibility of re-introducing native crayfish to selected sites by 2002, where the habitat is suitable and non-native crayfish are absent. If feasible, undertake a programme of re-introductions according to accepted scientific principles, from 2003.
Action: EA, UH.

23.6.4 Advisory

WC9. Provide advice for those involved in the conservation of this species and management of non-native populations e.g. angling organisations and landowners. The Environment Agency has produced a leaflet.
Action: EA, HMWT.

WC10. Provide advice to angling clubs occupying or close to White-clawed Crayfish Wildlife Sites on measures to help conserve the species.
Action: HMWT, EA, angling groups.

23.6.5 Research and monitoring

WC11. Carry out a detailed survey of Hertfordshire waterways by 2000 designed to show the areas occupied by native crayfish to produce an inventory of Key Sites. Records should be sent to HBRC, and then

onto the Environment Agency/University of Nottingham national monitoring scheme.
Action: HBRC, HMWT, EA.

WC12. Monitor the populations at Wildlife Sites, at least every 3 years. Prepare and implement monitoring strategy by 2001.
Action: *EA*, HMWT, HBRC.

23.6.6 Communication and publicity

WC13. Raise public awareness of the status, threats and needs of the native crayfish in Hertfordshire, through promotion of The Environment Agency leaflet, from 1998.
Action: EA, HMWT.

WC14. Raise public awareness of the status, threats and needs of the native crayfish in Hertfordshire, through production of a revised leaflet incorporating a survey form, by 1998.
Action: HBRC, EA, HMWT.

24 Great Pignut species action plan

24.1 Introduction

Great Pignut *Bunium bulbocastanum* is an erect perennial herb with stems up to about 50 cm. These are solid and arise from a spherical tuber. Leaves are 2-3 pinnate, deeply cut with linear lobes. They become mostly withered by the time the flowers emerge. The flowers are typical umbells of the Umbellifer family, but with several bracts and bractioles. Flowering occurs in June and July. The fruits are 3-4.5 mm long and slightly laterally compressed. They are less than twice as long as wide, hairless with low rounded ridges. It is a species, which requires winter frosts for effective germination. Seed can lie dormant for some time in adverse conditions.

The species occurs on chalk grassland and chalky banks such as road verges. It also formerly occurred occasionally as an arable weed.

24.2 Current status

This species has a very localised national distribution being found in Hertfordshire, Buckinghamshire, Bedfordshire and Cambridgeshire. It is also localised in its occurrence in each of these counties.

In Hertfordshire, Dony *et al.* (1967) recorded the species from 12 tetrads within the current administrative county boundary. Today it is recorded from eight tetrads and nine sites within the administrative county boundary. It is now largely confined to chalk grassland road verges, though in the past was found in rough chalk pastures and arable field margins on the chalk. The largest extant population is at Whiteley Hill, where there may be more than 1000 in a good year.

24.3 Current factors causing loss or decline

24.3.1 Habitat deterioration

A decline in habitat quality has been responsible for the loss of the species from many sites. Over the past 15-20 years road verges, which were previously cut across their full width, have been cut only 1 m back from the road. This has allowed many road verges to become dominated by coarser grasses and even scrub, to the detriment of this species. Some sites have been directly destroyed.

An additional problem associated with road verge management has been the timing of cutting. Most rural verges where the species occurs are cut only once a year, usually during May and June. Cutting during June may prevent flowering and could over time result in a decline in this species.

24.3.2 Nutrient enrichment

The increase in road traffic has resulted in many road verges becoming polluted as a result of car exhaust fumes. As a result nutrient enrichment occurs, favouring the growth of coarser species, and even changing soil conditions to favour more neutral rather than calcareous grassland species. Increased spraying of salt along country roads has also had a negative impact on road verge grasslands and perhaps this species. This problem is further compounded by run-off from neighbouring arable fields.

24.4 Current action

One road verge where Great Pignut still occurs is designated and managed as a Heritage Road Verge.

24.5 Great Pignut Action Plan

Objectives, actions and targets

Objective 1: To ascertain the current status of Great Pignut

Target: Produce an updated distribution map by 2004, establish a 5 year re-survey programme by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GP/A/1.1	Collate all historical and current records and map onto GIS		2004	HBRC	HNHS
GP/A/1.2	Re-survey all sites where records are greater then 10 years old to re-establish population size		2005	HNHS/BSBI, Flora Group	HBRC, CMS
GP/A/1.3	Produce a historical/current distribution map to inform road verge management		2005	HBRC	
GP/A/1.4	Conduct a re-survey programme	2008	2008	NHNS/BSBI, Flora Group	HBRC, CMS

Objective 2: To protect maintain and enhance the current populations of Great Pignut

Target: Appropriate management regimes on all former sites by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
GP/A/2.1	Identify and designate key sites as County Wildlife sites/Heritage Road Verges		Annually	WSP	
GP/A/2.2	Ensure existing sites are managed appropriately		Ongoing	CMS	HCC Highways
GP/A/2.3	Extend appropriate management for all former road verge sites		2008	CMS	HCC Highways

Relevant Action Plans:

Hertfordshire Plans
Farmland; Grassland and Heathland

National Plans
Cereal field margins; Lowland calcareous grassland

Abbreviations (Partners)

CMS - Countryside Management Service
HBRC - Hertfordshire Biological Records Centre
HCC – Hertfordshire County Council
HNHS/BSBI – Hertfordshire Natural History Society/Botanical Society of the British Isles
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:

The Lead for this plan is Countryside Management Service
Tony Bradford
CMS North Eastern Area
Email: tony.bradford@hertscc.gov.uk

25 Cornflower species action plan

25.1 Introduction

The Cornflower *Centaurea cyanus* is an annual plant of arable fields, on dry, friable soils, both calcareous and acidic. The seeds, which are believed to remain viable for several years, generally germinate during the following spring with a second flush in late summer. It flowers between May and August.

25.2 Current status

Cornflower once occurred throughout the UK and was a troublesome weed of arable land. Between 1930 and 1960 it was recorded from 264 10 km grid squares but by 1985 had declined to fewer than 50. Today, self-sustaining populations are thought to be confined to single sites in Suffolk, the Isle of Wight and Lincolnshire. Isolated plants still occur over a large area of south and east England but many are due to introductions from wild flower seed mixtures. In Europe as a whole, Cornflower is not threatened and is still widely distributed but has declined in most of the north-west. In the UK it is now classified as *Endangered*.

In Hertfordshire it was apparently frequent as a cornfield weed especially on the chalk (Dony *et al.*, 1967). In the 1950s it still occurred regularly in a few fields to the east of Baldock. In recent years an irregular population has been recorded from a small area of arable fields in the London Colney area. This population is suspected to be native. Other scattered records are all thought to result from introduced seed, although some may result from chance germination of buried seed.

25.3 Current factors causing loss or decline

25.3.1 Agricultural changes

The following agricultural changes were largely responsible for the decline in the Cornflower and are now providing constraints on its recovery.

- Increased use of herbicides and fertilisers.
- The development of highly competitive crop varieties.
- The destruction of field edge refugia.
- The demise of traditional crop rotations.

25.4 Current action

Nationally, research is underway to determine the ideal conservation management. In addition, Cornflower is being re-introduced to a number of locations.

Cornflower is being considered in the Farmland Action Plan (Chapter 9, Section 9.7).

26 River Water-dropwort species action plan

26.1 Introduction

The River Water-dropwort *Oenanthe fluviatilis* is a submerged aquatic plant of lowland rivers with a moderate flow. It prefers base-rich waters of less than 0.5 m depth with a clay substrate. An inconspicuous plant, it has bright green submerged leaves with narrow leaflets, typically adapted to its flowing water habitat. It frequently lacks flowers. It was in Hertfordshire that the River Water-dropwort was first recognised as a distinct species.

26.2 Current status

This species has a localised distribution in Europe, known from Denmark and Germany. In the UK it is a nationally uncommon plant, recorded in less than 100 10 km grid squares, mostly in southern and eastern England.

In Hertfordshire it was historically recorded in the lower stretches of the Lee and its main tributaries, centred around Hertford, and in the Colne (Dony *et al.*, 1967). Currently it is known from the lower Ash, the Beane and the Small River Lee near Cheshunt. However, its premiere site is the New River, where it is frequent to abundant from Great Amwell down to the county boundary at Waltham Cross. This is potentially one of its most important locations in the UK.

26.3 Current factors causing loss or decline

26.3.1 River management

Unsympathetic river management which drastically alters the in-channel structure is likely to be the main cause of decline. In the past, river maintenance for flood alleviation was achieved principally by widening, deepening and straightening. A population in the Small River Lee was almost destroyed by such unsympathetic management in the 1970s.

The cutting of aquatic weeds may also cause problems. Angling clubs may all but eliminate submerged weeds through uninformed management. The abundant aquatic weeds in the New river are regularly cut by machine, the effect on the River Water-dropwort is unknown.

26.3.2 Water quality

River Water-dropwort favours clear, unpolluted rivers. Poor water quality may have contributed to its decline, particularly in the main rivers. Low flows in some rivers may have accentuated the water quality problems.

26.4 Current action

No current action to specifically maintain or enhance populations of this species is known. However, through its programme of Catchment Management Plans (CMP)/Local Environmental Agency Plans (LEAP), the Environment Agency is addressing general problems caused by past poor management and poor water quality.

26.5 River Water-dropwort Action Plan

Objectives, actions and targets

Objective 1: To ascertain the current distribution in the County

Target: a) Complete countywide survey and map results on to GIS by 2004
b) Conduct a re-survey programme by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
RW/A/1.1	Collate existing records and map on to GIS		Dec 2003	HBRC	Botanical consultant, EA, HNHS
RW/A/1.2	Survey/re-survey all known and recent past sites and establish population size		Dec 2003	HBRC	Botanical consultant
RW/A/1.3	Produce a distribution report including habitat quality and species requirements		April 2004	HBRC	Botanical consultant
RW/A/1.4	Map new details onto GIS		Dec 2003	HBRC	Botanical consultant
RW/A/1.5	Re-survey and monitor species distribution	2008	2008	HBRC	

Objective 2: To protect, maintain and enhance the current populations of River Water-dropwort

Target: Advisory information disseminated by 2005, appropriate river management in place by 2007

Action code	Action	Target start date	Target end date	Lead partner	Other partners
RW/A/2.1	Assess key stretches of river supporting River Water-dropwort as Wildlife Sites	Oct 2005		HBRC	WSP
RW/A/2.2	Disseminate report to relevant organisations as advisory information on river management for the species		May 2004	HBRC	EA, TW, HNHS, CMS
RW/A/2.3	Enable a meeting with relevant landowners to guide appropriate management (consider ELS/HLS)		April 2006	CMS	Landowners, HBRC
RW/A/2.4	Ensure appropriate river management policy and activities are included in relevant plans		As reviewed	EA	TW, HMWT
RW/A/2.5	Implement appropriate river management at key sites	Jan 2006	Ongoing	EA	Landowners, TW, CMS

Relevant Action Plans:

Hertfordshire Plans
Wetlands

National Plans
Rivers and streams Habitat Statement

Abbreviations (Partners)

CMS – Countryside Management Service
EA – Environment Agency
HBRC – Hertfordshire Biological Records Centre
HMWT – Herts & Middlesex Wildlife Trust
HNHS – Hertfordshire Natural History Society
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)
TW – Thames Water

Contact:
The Initial Contact for this plan is Hertfordshire Biological Records Centre
Anita Parry
Email: anita.parry@hertscc.gov.uk

27 Pasqueflower species action plan

27.1 Introduction

Pasqueflower *Pulsatilla vulgaris* is an erect perennial herb with stems between 10-30 cm. Basal leaves form a rosette and are long stalked, feathery and twice-pinnate. Stem leaves are also hairy, but are sessile and deeply divided into long linear segments. The flowers consist of six petaloid sepals which are large (5-8 cm across), solitary and bell shaped. They are deep purple on the inside and paler violet and silky on the outside, with many golden anthers, making it one of the most attractive native flowers. The species flowers for a short period only in April and May. It occurs only on dry unimproved calcareous grasslands, usually on south or south-west facing slopes, where it favours a short sward.

27.2 Current status

This species is very local in central and eastern England, found from Gloucestershire to Essex and north Lincolnshire.

In Hertfordshire, it is now confined to one site, Therfield Heath, which is one of the largest colonies in the country. However, it was never abundant and has only been recorded from four other sites in the past. These include Aldbury Nowers, where it became extinct in the 1970s, the slope below Tingley Wood and Ravensburgh Castle (Dony *et al.*, 1967).

27.3 Current factors causing loss or decline

27.3.1 Habitat deterioration

A decline in habitat quality was responsible for the loss of this species from most of its Hertfordshire locations. With the decline of sheep farming in the chalkland areas followed by the crash in rabbit numbers in the 1950s, due to myxomatosis, remaining chalk grassland sites became ranker and scrub invaded. Under these conditions the low growing Pasqueflower becomes out-competed by taller growing grasses and herbs. A lack of open ground in such conditions may also prevent germination of Pasqueflower seedlings.

27.3.2 Fragmentation and isolation of remaining habitat

The loss of chalk grassland this century to arable cultivation, has resulted in the fragmentation and isolation of remaining sites. Under such conditions, when a species is lost from one site it is less likely to re-colonise.

27.4 Current action

The remaining colony on Church Hill, Therfield Heath has been intensively managed for over 15 years, with scrub removed and the grassland initially cut and raked. Since the mid 1980s Church Hill has been regularly grazed to maintain the desired short sward and the numbers of Pasqueflowers are reported to have increased.

The requirements of Pasqueflower have been researched by English Nature and this information is available to aid management and re-introduction programmes.

27.5 Pasqueflower Action Plan

Objectives, actions and targets

Objective 1: To protect and safeguard from loss, as a result of development, Hertfordshire's grasslands where Pasqueflowers exists or could potentially exist

Target: To ensure grassland sites where Pasqueflowers are present or could potentially exist are identified and these are protected through objective one of the Herts Grassland and Heathland Action Plan

Action code	Action	Target start date	Target end date	Lead partner	Other partners
P/A/1.1	Update details of the sites where Pasqueflowers exist and sites where it can potentially exist in the future	2006	2007	HBRC	HMWT, TH
P/A/1.2	Liaise with the Herts Grassland and Heathland Action Plan to ensure protection policies are within LDF's and local plans for grasslands where Pasqueflowers exist			HMWT	HBRC, TH

Objective 2: To promote the positive management of grasslands where Pasqueflowers exist

Target: To ensure that sites where the Pasqueflowers exist are in positive conservation management by 2007

Action code	Action	Target start date	Target end date	Lead partner	Other partners
P/A/2.1	Support grazing management on Therfield Heath SSSI ensuring that Church Hill (where the Pasqueflowers exist) is included within the heaths grazing regime	2006	Ongoing	EN	HMWT, TH
P/A/2.2	Support and encourage grazing on sites where there is potential for Pasqueflowers to exist	2006	Ongoing	GWG	HMWT, CMS, landowners
P/A/2.3	Ensure that all sites and potential sites for the Pasqueflower have up to date conservation management plans	2006	2007	GWG	EN, HMWT, CMS, landowners, TH
P/A/2.4	Continue annual monitoring of Pasqueflower at Therfield Heath and monitor newly established populations	2004	Ongoing	TH	HMWT

Objective 3: To promote awareness of the conservation needs of the Pasqueflower

Target: One article to be published annually in relevant magazines

Action code	Action	Target start date	Target end date	Lead partner	Other partners
P/A/3.1	Publicise the conservation needs of the Pasqueflower through at least one article per year	2006	Ongoing	TH	HMWT, EN

Relevant Action Plans:

Hertfordshire Plans
Grassland and Heathland; Chalkhill Blue; Grizzled Skipper; Great Pignut

National Plans
Lowland calcareous grassland

Abbreviations (Partners)

CMS – Countryside Management Service
EN – English Nature
GWG – Grassland Working Group
HBRC – Hertfordshire Biological Records Centre
HMWT – Herts & Middlesex Wildlife Trust
TH – Therfield Conservators
WSP – Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

Contact:
The Lead for this plan is Herts & Middlesex Wildlife Trust
Pauline Holmes
Senior Conservation Officer
Email: pauline.holmes@hmwt.org

28 Generic actions

28.1 Introduction

Many actions within this Biodiversity Action Plan occur across two or more of the individual habitat or species action plans. These have been brought together in this chapter, rather than be repeated. These actions form a key component of the whole BAP, particularly in the areas of lobbying, research and monitoring and communication and publicity.

28.2 Proposed actions

28.2.1 Policy and legislation

G1. Biodiversity Action Plans to be prepared for each district/borough by 2001.
Action: LA's.

G2. Establish a working group to investigate the resource implications of this BAP, by 1998.
Action: HEF, HCF.

G3. Lobby for improved incentives and advice through Countryside Stewardship or successor schemes for management, restoration and creation of habitats.
Action: RSPB, CLA, NFU, HMWT, WCCF.

G4. Lobby for a Chilterns ESA scheme to be introduced by 2002 to include options providing attractive financial incentives and advice for management of Wildlife Sites and to support low input farming systems.
Action: CC, HCC, HMWT, RSPB.

G5. Local Authorities to support the Wildlife Sites Project from 1998.
Action: LA's, HMWT.

G6. Ensure that all Wildlife Sites are identified in Local Plans at the next review and protected through appropriate development control policies.
Action: LA's, HBRC.

G7. Establish a national system of approved locally native seed supplies for use in grassland creation schemes, by 2000.
Action: MAFF, seed merchants, seed users.

28.2.2 Site safeguard and management

G8. Identify sites meeting Wildlife Site status by 1998.
Action: HMWT, HBRC.

G9. Seek to notify landowners of Wildlife Sites of their importance by 2001.
Action: HMWT.

G10. Develop a system for linking owners of Wildlife Sites with potential contractors and graziers, perhaps linked to the ENPACT database.
Action: EN, HMWT, CMS.

28.2.3 Species management and protection

G11. Prepare list of additional species requiring action plans, by 2000.
Action: HBRC, HMWT, HNHS, RSPB, BC, PL.

28.2.4 Advisory

G12. Establish demonstration farms in key areas to raise awareness and provide training and advice. Draw up initial objectives and target areas by 1999. Key issues include low input mixed farming, unimproved grasslands, hedgerows etc. Establish two farms by 2007.
Action: HCC, LEAF, FWAG, HMWT.

28.2.5 Research and monitoring

Research

G13. Complete Hertfordshire Habitat Survey by 1997.
Action: HMWT, HBRC, EN.

G14. Prepare and publish a Red Data Book for Hertfordshire, including rare/notable species for wetland habitats by 2000**.**
Action: HNHS, HBRC.

G15. Complete Flora Project by 2002.
Action: HNHS, HBRC.

G16. Within the Watling Chase Community Forest area, undertake a strategic study identifying suitable areas for the creation of woodland (Chapter 4), heathland (Chapter 6) and neutral grassland (Chapter 7) habitats, by 1998.
Action: WCCF, UH, HBRC, WHC, Hertsmere BC, SADC, HMWT.

G17. Within the Chilterns AONB undertake a strategic study identifying suitable areas for the creation of woodland (Chapter 4), heathland (Chapter 6), neutral grassland (Chapter 7) and new chalk grassland (Chapter 8) habitats, by 2000.
Action: CC.

G18. Develop a methodology to identify Key Biodiversity Areas and use this to refine the identification of HBAs in Hertfordshire by 2000.
Action: HBRC.

Monitoring

G19. Establish programmes to monitor and annually review the progress towards achieving targets set in all action plans by 1998.
Action: HEF, HCF.

G20. Devise and implement a strategy for recording/monitoring notable species, including Red Data Book species and key indicators of local habitat quality, by 2000.
Action: HBRC, HNHS.

G21. Encourage recording of plant and animal species through a programme of field events, training courses and seminars.
Action: HNHS, HBRC, HMWT, HBC, BC, RSPB.

G22. All biological data gathered in Hertfordshire to be passed to HBRC for entry into the county database.
Action: HNHS, HMWT, BC, CMS, LA's and others as appropriate.

G23. Devise and implement systems to record the extent of each habitat type being restored and re-created annually by 1998.
Action: HBRC, HMWT.

G24. Monitor the targets set for restoration and re-creation of habitats at least every five years from 1997.
Action: HBRC, HMWT.

28.2.6 Communication and publicity

G25. Site managers to provide interpretative materials for key woodland, neutral grassland, chalk grassland, heathland, wetland and urban habitats, including nature reserves, publicly accessible sites, demonstration, restoration and re-creation sites. (There is a real need to highlight the benefits of sympathetic management in all interpretative material). Target: at least five examples of each habitat type within five years.
Action: HCF, LA's, HMWT, CMS, WCCF, WT, RSPB.

G26. Seek to establish projects to help involve local communities in the Biodiversity Action Plan.
Action: LA's, Gwk, CMS, CDA, HMWT.

G27. Promote the Biodiversity Action Plan and individual plans.
Action: All.

29 The way forward and implementation

29.1 Introduction

Any vision for the conservation of habitats and species in Hertfordshire must be shared by all those involved in wildlife and countryside issues if it is to have any chance of coming to fruition. Extensive consultation and discussion has taken place with a wide variety of potential partner organisations. The culmination of this consultation is the production of this document: *A 50 Year Vision for the Wildlife and Natural Habitats of Hertfordshire*. However, this represents only the beginning; the much harder task of achieving the *Vision* now lies ahead.

The most important parts of the *Vision* are the targets and actions within each habitat and species action plan. Success will be measured by how many of these are achieved. The responsibility for implementing individual actions under each habitat and species plan will fall to the organisations listed against each action. A lead organisation is also identified for each action. When taking forward the action plans it will also be important to ensure links, consistency and co-ordination with other biodiversity initiatives, primarily biodiversity action plans in adjacent counties, as well as regional and national plans. The lead organisation will therefore be responsible for:

- bringing together and co-ordinating the partners listed under the action;
- ensuring links with similar actions in relevant county BAPs;
- monitoring progress under the action; and
- reporting on this progress to the Biodiversity Partnership Group.

There are also important aspects which cut across all the habitat and species action plans. These include:

- setting priorities;
- building support and partnerships;
- obtaining funding; and
- monitoring and review of the vision as a whole.

The general nature of these aspects means that their co-ordination across the plan should be efficient and effective. The Biodiversity Partnership Group should take a leading role in co-ordinating these aspects.

29.2 Setting priorities

Priorities for implementing the proposals within the individual action plans will be determined by:

- the availability of financial resources;
- the greatest need for action;
- the likelihood of success given known constraints and opportunities;
- the willingness of key organisations to form partnerships; and
- the ability to capture the interest of landowners, local people, communities, businesses and other organisations.

The Biodiversity Partnership Group should take the lead in the prioritisation exercise. As a first phase of priority setting, it will also be important to identify what programmes of practical activity are currently underway or are planned. These may well be easier to deliver in the shorter term that other actions. In the light of assessing the above factors, it may be necessary to review the timing of certain actions. Current funding opportunities should also be reviewed. Currently projects include:

- Heath and Acid Grassland (action already being undertaken by a variety of organisations):

- Wildwood Project;
- Veteran Tree survey;
- Wildlife Sites project;
- Stag Beetle (nationally co-ordinated survey underway in 1998 and local funding available);
- Stone Curlew (applications for pilot arable stewardship scheme accepted from spring 1998);
- Bittern (reedbed restoration currently underway in the Lee Valley); and
- Great Crested Newt (volunteer survey organised for spring 1998).

29.3 Building support and partnerships

29.3.1 Conservation organisations

Support from statutory nature conservation organisations and non-government conservation organisations will be vital. In particular, liaison between statutory agencies, local authorities and conservation bodies is a key requirement to implementing the *Vision*. Specialist groups such as bat groups, bird groups and conservation volunteers can play a key role in survey work and delivering some action proposals. For some action plans liaison will also be required with equivalent bodies in neighbouring counties.

Lead partners for a particular action plan have a responsibility to engage the interest of people in both public and private organisations and to encourage them to participate in biodiversity proposals.

29.3.2 Landowners

Landowners are in a key position to be able to make a large and lasting impact on biodiversity. A majority of the county is under private ownership and thus much of the land over which biodiversity issues apply is under the jurisdiction of this important group. Every encouragement should be given to landowners to manage, restore and create habitats on their land. This must be backed up with financial incentives and rewards if significant progress is to be made.

The continuing availability of advice to all landowners, for matters relating to enhancing biodiversity, conservation management and grant schemes is of prime importance.

29.3.3 Community involvement

Support from local communities will be extremely important for achieving the general goal of maintaining and enhancing biodiversity in Hertfordshire. The important role of local communities in bringing about the fundamental changes necessary to achieve a healthy diverse environment is stressed in Agenda 21.

Local communities can benefit environmental projects in many ways. Local knowledge and expertise, involvement in practical work and increased communication are just some of the possible benefits. Community groups split into three types: those with a direct practical involvement in nature conservation; those with a wider interest in the environment; and those without an environmental link. All need to be linked to the implementation of the *Vision*.

Encouraging ‘ownership’ of local projects by a community group is often a good way to engage their interest and trust. However, maintaining effective support and links within communities is a time consuming and challenging task. The role of organisations such as the Countryside Management Service, Groundwork Hertfordshire and other environmental initiatives will be crucial in this. The Wildlife Trust’s ‘Welcome to Wildlife’ project is also crucial, targeting community groups which have not traditionally had an environmental basis, or those groups with a wider environmental interest but no involvement in nature conservation.

The provision of skills, expertise, training support and information to community and volunteer groups will help mobilise volunteer support. This volunteer support may also help advise and assist landowners in implementing many of the actions in the plan.

29.3.4 Industry and business involvement

It is widely agreed that concern for the environment must not be the responsibility of conservationists alone. The report for the UK Biodiveristy Steering Group (HMSO, 1995) states the importance of developing partnerships and involving those beyond the normal range of conservation organisations. Private sector industry and businesses are examples of possible partners. Many businesses now take their responsibilities for the environment seriously, both through auditing the impacts of their business on the environment and by supporting those directly involved in environmental projects.

Green Business Groups have been established in the county to promote environmental issues and share best practice.

Businesses within the county or with local bases should be encouraged to be supportive of the *Vision*. Involvement may be through the raising of funds, provision of skills, services and staff, assisting biodiversity projects on land in their ownership and perhaps by taking on the role of sponsor for a particular habitat or species.

29.3.5 Objectives for developing partnerships

The value of forming partnerships to take forward biodiversity is clear. The following objectives summarise the key links required:

- To seek partnerships with local communities and maximise opportunities for local community involvement in biodiversity issues by raising awareness through interpretative, educational and cultural initiatives;
- To seek partnerships with business and commerce in order to promote and support biodiversity initiatives;
- To seek partnerships with statutory and voluntary conservation organisations and local authorities; and
- To encourage landowners to participate in biodiversity projects.

29.4 Obtaining funding

Many of the project proposals in the *Vision* will not be achieved without significant financial support. Some actions, such as the provision of advice to landowners, may not involve significant costs above those already set aside by different organisations for this purpose. Proposals which require additional survey work, significant amounts of management work or the creation of new habitats may cost tens of thousands of pounds. Therefore funding must be sought either directly from available sources or indirectly from fund raising initiatives.

29.4.1 Directly attributed funding for nature conservation work

Available sources of funding include all the existing nature conservation, land management, forestry and agri-environment grants. In most cases such grants go direct to the landowner to carry out specific work or management. Potential recipients of grants are competing against others for a limited supply of money so the quality of applications must be high. The Wildlife Sites project, CMS or FWAG can assist with Countryside Stewardship or Woodland Grant Scheme applications.

Some groups may have access to funds that are not available to others. For example, the Wildlife Trust may have access to funds secured for work on a particular habitat or species, through the Wildlife Trusts nationally. The local bat group would be eligible to apply for a grant from the Bat Conservation Trust Bat Support Fund. Groundwork Hertfordshire have access to government money for land restoration projects and the Watling Chase Community Forest is a priority for Countryside Commission funding. Therefore partnerships and the involvement of a large number of groups and bodies should be encouraged.

29.4.2 Other potential sources of funding

Other potential sources of funding include the Heritage Lottery Fund, the EU funded Life II scheme and the Landfill Tax scheme via HELP (Hertfordshire

Environmental Landfill Partnership). The Environment Agency is able to undertake enhancement work during its rolling programme of river management.

Business and industry may contribute financially particularly if public relations opportunities exist. Smaller local companies may also be willing to contribute to one-off local projects or become involved in local sites or species initiatives.

There are many grant-giving charities that can make money available for nature conservation projects.

Other smaller sources of funding include the Rural Action grants for community based projects in rural areas, which may include nature conservation projects. In addition, many local authorities give grants for environmental projects, such as the Dacorum Environmental Improvement Fund or the CMS administered grants.

29.4.3 Objective for funding

Develop and implement a co-ordinated strategy for fundraising to support priority projects within the *Vision*, through the Hertfordshire Environmental Forum, by 1999.

29.5 Monitoring and review

The monitoring and review of the *Vision* is a key action. To assess whether targets detailed within the individual habitat and species action plans are met and, if not, to identify solutions to why these targets have not been met, it is essential that adequate resources are allocated to survey and monitoring. Changes in circumstances such as policy or budget allocations will affect whether targets continue to be realistic and practically achievable.

The *Vision* should be viewed as a document which will evolve in the future according to perceived nature conservation needs. The initial “active period” is 10 years, but an annual review of habitat and species plans would be appropriate. This review would take into account new information about a particular resource and determine whether existing proposals need refining (e.g. the timing of individual actions) and also whether new proposals or new action plans (particularly further species action plans) are required. The annual review would also review progress to date and highlight major areas of activity for the coming year.

29.5.1 Objectives for monitoring and review

- To establish, in partnership with others, co-ordinated programmes that will monitor the progress and success of the objectives and actions within action plans, by 1999.
- To produce an annual statement on progress, recording the extent of key habitats and species and the level of community, commercial, nature conservation organisation, local authority, NGOs and landowner participation in biodiversity initiatives.
- To produce a complete review of progress every five years, in 2003 and 2008 and assess future actions to be undertaken.

30 Glossary, abbreviations and acronyms

30.1 Glossary

This glossary defines the main terms used in the Biodiversity Action Plan, explaining specialist technical and policy terms used. A separate listing of abbreviations and acronyms is also included.

Agenda 21
An Action Plan for the 21st century endorsed at the **Earth Summit**. Agenda 21 sets out how we can meet the needs of communities and individual people today, whilst improving the quality of life and safeguarding the environment for future generations.

Agri-environment schemes
Schemes offering payments to farmers to promote farming that is compatible with the requirements of the protection of the environment and sustaining wildlife within the countryside. This includes schemes such as **Countryside Stewardship** and **Environmentally Sensitive Areas**.

Agrochemicals
Chemical substances used in agricultural production including fertilisers, herbicides, fungicides and insecticides.

Alien species see non-native species

Ancient woodland
Long-established woodland that has often consequently developed a rich plant and animal life. Ancient woodland is defined as that known to have existed in a specific location since before 1600.

Anthropogenic
Produced by human activity.

Baseline
A defined condition for a site, **habitat** or **species** against which future changes in the condition of the site, habitat or species can be **monitored**, and the significance of this change in conservation terms assessed.

Baseline survey
A survey of a site and its constituent habitats or species to establish the **baseline** conditions.

Biodiversity
The total variety of life on earth or any given part of it. The variety of genes, species and habitats within an area.

Biodiversity Area
Areas of the counties with distinctive wildlife and landscapes. The division of the counties into Biodiversity Areas will aid the implementation of the **Biodiversity Action Plan**.

Biodiversity Action Plan (BAP)
A framework for achieving the **conservation** of **biodiversity** based on the targeting of resources towards protecting priority habitats and species. BAPs also provide a means for the involvement in conservation of a wide range of organisations including the participation of members of local communities. BAPs can be prepared at a range of levels: country-wide (e.g. the **UK Biodiversity Action Plan**), for counties (e.g. the Hertfordshire BAP) or for recognised areas (e.g. the National Forest BAP).

Biological Records Centre (Hertfordshire Biological Records Centre)
A centre based often at the county level for the collection, management, analysis and dissemination of information on wildlife and habitats within that area. Biological Records Centres will play an important role underpinning the **monitoring** of **local BAPs** and supporting the implementation and promotion of such local conservation initiatives.

Biomass
The total quantity of living organisms in a given area, measured in terms of weight or energy content.

Biosphere
The surface layer of the Earth where living organisms occur, comprising land, water and air.

Birds Directive
The abbreviated term for *Council Directive 79/409/EEC of 2 April 1979 on the Conservation of Wild Birds*. This Directive aims to protect bird species within the European Union through the conservation of populations of threatened birds and the habitats used by these species.

Bryophytes
A major group of plants that includes mosses and liverworts.

Champion (of a species or habitat action plan)
An organisation, be they a business, community group, charity or government body, that undertakes to provide support for the implementation of an individual **Species** or **Habitat Action Plan** within a **Biodiversity Action Plan**.

Common Agricultural Policy
A European Community wide policy which supports agriculture through price support measures and market management and through measures to improve agricultural structures.

Community
An identifiable and distinct grouping of organisms occurring together in a particular area that interacts with each other and with their shared **environment**.

Consensus building
An approach to working on issues which builds common ground between all the parties or stakeholders involved.

Conservation
The management of human use of the environment to sustain the diversity of wildlife occurring.

Conservation objective
A stated aim for the level of protection for a habitat or species that is desirable in view of the aims of nature conservation. Objectives should be specific, measurable and realistic, hence they will often include **targets**.

Convention
An international agreement through which nations agree to work together co-operatively to implement certain defined policies or take other action. International conventions are voluntarily entered into by countries, but once a country has signed a convention it agrees to be bound by its specified terms and conditions.

Convention on Biological Diversity
The Convention was signed by the Prime Minister and 150 other Heads of State or Governments at the **Earth Summit** in Rio de Janeiro in June 1992. Under Article 6A of the Convention signatories must develop national strategies, plans or programmes for the conservation and sustainable use of biodiversity.

Coppicing
The traditional form of management of much of the broadleaved woodland in the UK. It involves cutting down trees and shrubs near ground level, allowing the tree to re-grow from the stump, and re-cutting at intervals of one or more decades to provide a harvest of long straight poles.

Countryside Stewardship
An **agri-environment scheme** through which farmers and landowners can receive payments for management agreements that result in the maintenance and enhancement of certain important landscapes and habitats including grassland, lowland heath, waterside land and hedgerows and field boundaries which need restoring. The scheme is administered by FRCA.

Diversity
An assessment of the richness of different types in a location (which can be a large or small area) including the number of different habitats or numbers of different species.

Earth Summit
United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992.

Ecology
The study of the inter-relationships between living organisms and their environment.

Ecosystem
A **community** of interdependent organisms and the **environment** they inhabit and interact with, such as ponds and pond life.

Endemic species
A species of animal or plant found only in a particular area (usually taken to be a country or region).

Environment
The external surroundings (i.e. physical and chemical conditions) experienced by and influencing species and habitats.

Environmental Assessment or Environmental Impact Assessment
A process of predicting and evaluating an action's impacts on the environment. It aims to minimise environmental degradation by giving decision-makers better information about the consequences which development actions could have on the environment. (See also **Strategic Environmental Assessment**).

Environmentally Sensitive Area
An **agri-environment scheme** run by **MAFF** designed to promote traditional farming practices to protect and enhance the environment. Farmers and other land managers can enter into 10 years agreements to manage their land in designated ways to maintain and restore particular landscapes and habitats.

Eutrophic
[A habitat] having high productivity as a result of high levels of nutrients promoting the growth of certain species.

Eutrophication
The over-enrichment of an aquatic habitat with inorganic nutrients, especially nitrates and phosphates, typically from sewage discharge or **agrochemical** run-off which may result in an imbalance of the normal **flora** and **fauna** associated with the area.

Fauna
All animal life.

Flora
All plant life.

Flush
A patch of wet ground, usually on a hillside, where the water flows diffusely over and through the upper layers of soil and not in a fixed channel.

Gene
The basic unit of inheritance of animals and plants.

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 woodlands or grassland. The priority habitats for conservation in the counties are described and defined fully in the Biodiversity Action Plan.

Habitat Action Plan
A targeted programme of management measures aimed at maintaining/restoring a specific habitat. Habitat Action Plans identify **conservation objectives** and **targets** for the habitat in question and specify actions and responsibilities for achieving the objectives. Habitat Action Plans are developed for national priority habitats in the **UK Steering Group Report** and for counties in **local BAPs**.

Habitat creation
Land management actions based on establishing a **habitat** on a site where it has not occurred before.

Habitat re-creation (or **habitat restoration**)
Land management action based on restoring a **habitat** on a site where it has previously existed, but subsequently been lost.

Habitats Directive
The abbreviated term for *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora*. This Directive promotes the conservation of certain key habitats and species within the European Union by requiring Member States to take measures to maintain or restore natural habitats and populations of wild species.

Habitat Scheme
A scheme proposed by **MAFF** to create a range of wildlife habitats by taking land out of production for 20 years and managing it in an environmentally beneficial way.

Hedgelaying
Planting or replanting a stretch of hedge. Hawthorn is the plant species most commonly laid, although a range of species can be planted (e.g. blackthorn, hazel or willow).

Indicator species
An organism whose characteristics (e.g. presence or absence, population density, dispersion, reproductive success) are used as an index of attributes too difficult, inconvenient, or expensive to measure directly. Such characteristics may be used to indicate the degree of pollution or other environmental conditions at a particular locality.

Intensive agriculture
A term generally used to signify the use of high input, high output crop and livestock husbandry systems in order to produce the optimum possible economic return from the available land. Intensive agriculture involves high usage of fertilisers, **agrochemicals** and mechanisation.

Invertebrates
Animals without a backbone (insects, for example).

Lead Agency
An organisation, be they a business, community group, charity or government body, that undertakes to lead on the implementation of an individual **Species** or **Habitat Action Plan** within a **Biodiversity Action Plan**.

Local Agenda 21
Partnerships of local people, communities and organisations to achieve Agenda 21 at a local level.

Local authority
A local government body, such as a County, District of Borough Council.

Local Biodiversity Action Plan
A **Biodiversity Action Plan** prepared for a local area (usually a single county, grouping of counties, District or Borough). Government guidance recommends that local BAPs correspond to **local authority** boundaries.

Local Environment Agency Plan
A plan of action for the Environment Agency and its partners to tackle environmental issues relating to the water environment, air and waste disposal and more generally to the achievement of **sustainable development**. LEAPs identify and focus action on specific problems within defined river catchments.

Local Nature Reserve (LNR)
An area of land that is of special nature conservation interest locally. LNRs are declared and managed by local authorities under the National Parks and Access to the Countryside Act 1949.

Management
The manipulation of a site to maintain or enhance its habitats and population of a species, through recognised techniques such as **coppicing** or grazing.

Management planning
The process of identifying the **management** requirements of a site and developing the appropriate management measures to satisfy these requirements. The document prepared as part of the management process is known as the management plan.

Microhabitat
A small part of a habitat which has distinct physical conditions, a hollow in a mature tree for example.

Monitoring
A process of repeated observations of one or more elements of the environment, such a population of species or **water quality**. Monitoring should follow a prearranged programme in space and time and use pre-set methods for data collection. Monitoring provides factual information concerning the present state and past trends in environmental parameters. Monitoring key habitats and species will allow the assessment of the success of the **Biodiversity Action Plan** in protecting **biodiversity**.

National Nature Reserve
A reserve declared under law and managed either by one of the statutory nature conservation agencies (English nature in England) or by an approved body.

Nationally rare species
Species of very limited national occurrence and distribution. They are defined as those species known to occur in 15 or fewer of the 10 x 10 km Ordnance Survey grid squares that divide Great Britain.

Nationally scarce species
Species of limited national occurrence and distribution. They are defined as those species known to occur in 16-100 of the 10 x 10 km Ordnance Survey grid squares that divide Great Britain.

Native species
A species that occurs naturally in an area and, therefore, not having been introduced by humans, either accidentally or intentionally.

Natural Areas
A concept, introduced by English Nature, for defining areas based on their characteristic landscape and **fauna** and **flora** and resulting in the definition of 92 **terrestrial** and 24 coastal/maritime Natural Areas in England. These biogeographic zones reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England, and provide a framework for setting **conservation objectives**.

Natural range
The geographical distribution of a species or habitat in recent times but excluding any changes to that range as a result of human activities.

Nature conservation see **conservation**

Niche
The ecological resource occupied by a species in a **community** or **ecosystem**.

Non-native species
A species which has become established in the wild in an area (most usually a country) in which it does not naturally occur. Non-native species are introduced into an area as a result of human activities/ intervention (whether deliberate or accidental). These species often have adverse effects on **native species** and habitats as a result of competition.

Oligotrophic
[A habitat] having low primary productivity as a result of being low in nutrients.

Phase 1 (habitat survey)
A land survey to establish land-uses and, in particular, the location of important wildlife sites and habitats within a given area.

Pollard
A tree which has been cut about two metres from the ground so as to produce a crop of branches suitable for fencing or firewood.

Pollution
The introduction by man, directly or indirectly, of substances into the environment resulting in deleterious effects to wildlife, hazards to human health or hindrance to activities such as fishing and recreation.

Population
All individuals of one species occupying a defined area and usually isolated to some degree from other similar groups of the same species.

Precautionary principle
A principle underlying the concept of **sustainable development** which implies that prudent action be taken to protect the environment even in the absence of scientific certainty. Giving environmental well-being legitimate status in the development process and adopting best-practice techniques for environmental management are fundamental to this principle.

Ramsar Convention
An international **convention** originally agreed in Ramsar in 1975. It aims to stem the progressive encroachment loss of **wetlands** and promoting the wise use of wetland wildlife. It requires the designation of Wetlands of International Importance (also known as Ramsar sites).

Red Data Book species
A species listed in catalogues published by the International Union for the Conservation of Nature (IUCN), national agencies or county-level organisations, listing species which are rare, endangered or vulnerable to extinction globally, nationally or within counties.

Reintroduction
The release and establishment of a species by human agency to an area within its **natural range** but where it had became extinct in historical times.

Ride
An open unmade track through a wood.

Rural Action
A scheme co-funded by English Nature, the Rural Development Commission and the Countryside Commission to help people living in the English countryside to care for their own environment by promoting a wide variety of local projects.

Semi-natural habitats
A **habitat** modified to a limited extent by human activities, but still consisting of species naturally occurring in the area. The majority of important habitats remaining in the UK are considered to be semi-natural as opposed to natural.

Set-aside
Normally arable land removed from agricultural production as a requirement for receiving agricultural support. Although set-aside is a measure purely to control excessive production, set-aside land potentially has significant spin-off benefits for wildlife.

Short list species
The top priority species for conservation in the UK as identified in the **UK Steering Group Report**. This report also identifies a long list of species which are of a lesser, but still national, conservation priority.

Site of Special Scientific Interest (SSSI)
An area of land or water notified by a statutory conservation agency under the Wildlife and Countryside Act 1981 as being of national nature or geological conservation importance.

Special Area of Conservation
A site of European importance for wildlife designated under the **Habitats Directive** by the UK Government where the necessary **management** is applied for the maintenance or restoration of the habitats and/or species for which the site is designated.

Special Protection Area
A site of international importance for birds designated under the **Birds Directive** by the UK Government where appropriate steps are taken to protect the bird species for which the site is designated.

Species Action Plan
A conservation plan for a species based upon knowledge of its ecological and other requirements, which identifies the actions needed to stabilise and improve its status. Species Action Plans are developed for national priority species in the **UK Steering Group Report** and for counties in **local BAPs**.

Strategic Environmental Assessment
The formalised, systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or programme and its alternatives, including the preparation of a report on the evaluation and the use of the findings in publicly-accountable decision-making.

Succession
Sequential development of plant or animal **communities** through time.

Survey
An inventory of the attributes of a site, area or region, usually in terms of habitat and associated species and normally following a standardised procedure.

Sustainability
Maintaining the environment's natural qualities and characteristics and its capacity to fulfil its full range of functions, including maintenance of **biodiversity**.

Sustainable development
The use of resources to meet the needs of the present without compromising the ability of future generations to meet their own needs. The conservation of biodiversity is a key test of sustainable development. If an activity results in a net loss of biodiversity then it is unsustainable.

Target (biodiversity target)
A quantified **conservation objective**. Targets state, for example, projected population numbers for species or areas for habitats. Setting such numerical targets provides a tight focus for what the **Biodiversity Action Plan** is aiming to achieve. Furthermore, it establishes a yardstick against which the achievements of the BAP can be measured.

Terrestrial
Living on, or referring to, land.

UK Biodiversity Action Plan
A strategy produced in 1994 by the UK Government that provides the framework for fulfilling the UK's

responsibilities towards the **Convention on Biological Diversity**.

UK Steering Group Report
The report following from the **UK BAP** in 1995 which establishes specific actions and responsibilities for achieving the UK BAP.

Water quality
The nature of a body of water in terms of its physical characteristics, turbidity for instance, and its chemical characteristics, nutrient status or level of pollutants for example.

Wetland
Any habitat that is characterised by the presence of flowing or standing water at some stage in the year. Wetlands can range from open water bodies such as lakes and ponds, to seasonally wet habitats such as carr woodland or lowland wet grassland.

Wildlife Site
A site not qualifying as of national importance for the wildlife it contains (i.e. a **SSSI**) but regarded to be of local importance for wildlife, its importance being merited in a parish, district, borough or county context

30.2 Abbreviations

This section lists the main abbreviations and acronyms used in the Biodiversity Action Plan.

AONB Area of Outstanding Natural Beauty

BAP Biodiversity Action Plan

BC Butterfly Conservation, Herts & Middlesex Branch

BCT Bat Conservation Trust

BSBI Botanical Society for the British Isles

BTO British Trust for Ornithology

BW British Waterways

CC Chilterns Conference

CCB Chilterns Conservation Board

CDA Community Development Agency

CLA Country Landowners Association

CMS Countryside Management Service

CMP Catchment Management Plan

CMR County Mammal Recorder

CoCo Countryside Commission

CVPSC Colne Valley Park Standing Conference

CWP Chilterns Woodland Project

DBC Dacorum Borough Council

DEFRA Department for Environment, Food and Rural Affairs

DI Deer Initiative

DoE Department of the Environment

EA Environment Agency

EHDC East Herts District Council

EN English Nature

ESA Environmentally Sensitive Area

FA Forestry Authority

FC Forestry Commission

FE Forestry Enterprise

FoTR Friends of Tring Reservoirs

FRCA Farming and Rural Conservation Agency

FWAG Farming and Wildlife Advisory Group

GAP Grazing Animal Project

GCT Game Conservancy Trust

Gwk Groundwork Hertfordshire

HBC Herts Bird Club

HBRC Hertfordshire Biological Records Centre

HCC Hertfordshire County Council

HCF Hertfordshire Countryside Forum

HCLC Herts Conservation Liaison Committee

HCS Hertfordshire Conservation Society

HEF Hertfordshire Environmental Forum

HMBG Herts and Middlesex Bat Group

HMG Hertfordshire Mammal Group

HMWT Herts & Middlesex Wildlife Trust

HNHS Hertfordshire Natural History Society

JNCC Joint Nature Conservation Committee

LA's Local Authorities

LEAF Linking Environment and Farming

LEAP Local Environment Agency Plan

LNR Local Nature Reserve

LTL Learning through Landscapes

LVCG Lee Valley Conservation Group

LVRPA Lee Valley Regional Park Authority

MAFF Ministry of Agriculture, Fisheries and Food

NBN National Biodiversity Network

NFU National Farmers Union

NGO Non-governmental organisation

NHDC North Hertfordshire District Council

NNR National Nature Reserve

NSWA National Small Woods Association

NT National Trust

PCs Parish Councils

PL Plantlife

PTES Peoples' Trust for Endangered Species

RDB Red Data Book

RFS Royal Forestry Society

RMRG Rye Meads Ringing Group

RSPB Royal Society for the Protection of Birds

RVWP Roadside Verges Working Party

SAC Special Area of Conservation

SADC St Albans District Council

SASAG St Albans Sand & Gravel

SPA Special Protection Area

SSSI Site of Special Scientific Interest

TGA Timber Growers Association

TH Therfield conservators

TRDC Three Rivers District Council

TVW Three Valleys Water

TW Thames Water

UH University of Hertfordshire

WC Watford Council

WCCF Watling Chase Community Forest

WHC Welwyn Hatfield Council

WSP Wildlife Sites Partnership (HMWT, HBRC, CMS, FWAG, EA, EN, DEFRA, Chilterns AONB)

WT Woodland Trust

31 Bibliography

Andrews, J. and Rebane, M. (1994). *Farming & Wildlife – A Practical Handbook for the Management, Restoration and Creation of Wildlife Habitats on Farmland*. RSPB.

Barr, C.J., Bunce, R.G.H., Clarke, R.T., Furse, M.T., Gillespie, M.K., Groom, G.B., Hallam, C.J., Hornung, M., Howard, D.C. and Ness, M.J. (1993). *Countryside Survey 1990*, Main Report, DOE London.

Biodiversity: The UK Steering Group Report (1995). HMSO London.

Briggs, P. (1995). Bats in Barns. *Herts Nat History Soc Trans* Vol 32, part 3, pp237-244.

Cox, J. (1995). *Woodland Islands: A review of the issues arising out of the isolation of ancient semi-natural woodlands within the urban matrix, with special reference to Milton Keynes*. Hampshire and Isle of Wight Wildlife Trust Ltd.

Crofts, A. and Jefferson, R.G. (eds) (1994). *The Lowland Grassland Management Handbook*. English Nature and the Wildlife Trusts.

Cuming, S. (1996). *A Habitat Survey for Letchworth Garden City.* Herts & Middlesex Wildlife Trust.

Dony, J.G., Jury, S.L. and Perring, F.H. (1986). *English Names of Wild Flowers,* second edition. The Botanical Society of the British Isles.

Gilbert, O.L. (1991). *The Ecology of Urban Habitats*. Chapman & Hall.

Goldsmith, J. (1988). Norfolk underground bat hibernation sites. *Bat News* 14, pp 2-3.

Halliwell, E.C. and Macdonald, D.W. (1995). American mink (*Mustela vison*) in the upper Thames Catchment: Relationship with Selected Prey Species and Den Availability. *Biological Conservation*, vol. 76 (1), pp. 51-56.

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.

Hertfordshire County Council (1987). *The Hertfordshire Pond Report*.

Hertfordshire Environmental Forum (1992). *Report on the State of Hertfordshire's Environment*.

Hertfordshire Habitat Survey 1994-1998.

Hutson, A.M. (1993). *Action Plan for the Conservation of Bats in the United Kingdom*. The Bat Conservation Trust.

James T. J. (1992). Plant and Animal Communities at Ashwell, Herts, 1800-1991. *Herts Nat History Soc Trans* Vol 31, part 3, 1992.

Jefferies, D.J. Morris, P.A. and Mulleneux, J.E. (1989). An enquiry into the changing status of the Water Vole (*Arvicola terrestris*) in Britain. *Mammal Review,* Vol. 19, No.3, pp. 111-131.

McCaskie, J. and Lee, R. Restoring London's Lakes. *Enact* Vol.4 No.3. English Nature.

Molloy, L. (1996), *Water Vole status and habitat preference in Hertfordshire*. University College London, M.Sc Dissertation.

Newton R. (1987). Notes on Stag Beetles in the lower Lea Valley, East Herts, Hertfordshire. *Herts Nat History Soc Trans* Vol 29, part 8.

Newton R. (1991). Further Notes on Stag Beetles in the lower Lea Valley of East Herts, *Herts Nat History Soc Trans* Vol 31, part 1.

North Hertfordshire District Council (1995). *River Hiz Development Guidelines*.

Peterken, G.F. (1996). Natural Woodland. *Ecology and Conservation in Northern Temperate Regions*. Cambridge University Press.

Rodwell, J.S. (ed) (1991-1993). *British Plant Communities Volumes 1-5*. Cambridge University Press.

RSPB *et al*. (1996). *Birds of conservation concern in the United Kingdom, Channel Islands and Isle of Man*. Royal Society for the Protection of Birds, Sandy.

Sawford, B. (1987). *The Butterflies of Hertfordshire*. Castlemead Publications, Ware, Hertfordshire.

Sawford, B. (1990). *Wildlife Habitats of Hertfordshire Past Present Future*(?). Castlemead.

Simmons S.A. and Barker A. (1989). Urban Wetlands for Nature Conservation and Stormwater Control. *Urban Wildlife Now*, Number 4. NCC.

Smith, K.W. Dee, C.W. Fearnside, J.D. Fletcher, E.W. and Smith, R.D. (1993). *The Breeding Birds of Hertfordshire*. Hertforshire Natural History Society.

Speakman, J.R. (1991). The impact of predation by birds on bat populations in the British Isles. *Mammal Review* 21 pp123-142.

Species Conservation Handbook (1996). English Nature.

Strachan, R. and Jefferies, D.J. (1993). *The Water Vole (*Arvicola terrestris*) in Britain 1989-1990: Its Distribution and Changing Status*. Vincent Wildlife Trust.

Summers-Smith, J.D. (1989). A History of the status of the Tree Sparrow in the British Isles. *Bird Study* 36: 23-31.

Swan, M.J.S. and Oldham, R.S. (1993). Herp Sites Volume 1: National Amphibian Survey Final report. *English Nature Research Report* No. 38, Peterborough.

The 1996 Colchester Search for Stag Beetles, Colchester Natural History Museum.

Thomas, J. and Lewington, R. (1991). *The Butterflies of Britain and Ireland*. Dorling Kindersley in association with The National Trust.

Transactions of the Hertfordshire Natural History Society (various).

Woodroffe, G.L. (1998). *Ecology of riverside mammals in the North Yorkshire Moors National Park*. Mphil Thesis, University of York.

Wynne, G, Avery, M, Campbell, L, Gubbay, S, Hawkswell, S, Juniper, T, King, M, Newberry, P, Smart, J, Steel, C, Stones, T, Stubbs, A, Taylor, J, Tydeman, C and Wynde, R. (1995). *Biodiversity Challenge* (second edition). RSPB, Sandy.

32 Appendices

32.1 Appendix 1 – Unimproved grasslands in Hertfordshire

Major heathland/acid grassland sites

Berkhamsted and Northchurch Commons SSSI*
Bricket Wood Common SSSI*
Burleigh Meadow, Knebworth (SSSI)
Chorleywood Common*
Claypits Meadow
Colney Heath*
Croxley Common Moor SSSI
Gustardwood Common*
Harpenden Common
Hertford Heath SSSI*
Jacotts Hill Golf Course, Watford
Kinsbourne Green
Knebworth Park (NW sector)
Mardley Heath*
Nomansland Common*
Meadow by Norton Green, Knebworth
Panshanger Park*
Patmore Heath SSSI*
Peplins Wood meadow, North Mymms
Ponsfall Farm Pastures, Newgate Street
Symondshyde Great Wood*

* Sites with heath vegetation communities

Other sites with heathland remnants or heathy grassland

Batchworth Heath
Bishops Wood
Broxbourne Woods SSSI
Bramfield Wood
Brickendon Green
Broad Riding Wood
Chipperfield Common
Commonwood Common, Sarratt
Codicote Heath and adjacent pasture
Crouch Green, Knebworth
Croxley Green
High Scrubs Wood
Hedgeswood Common, Great Gaddesden
Leggatts Park
meadow north of Graffridge Wood, Knebworth
Marshalls Heath
Millwards Park
Moor Park (part)
North Pesthouse Wood, Tring Park
Northaw Great Wood SSSI
Oxhey Woods
Radlett Golf Course
Sherrardspark Woods SSSI

Neutral grassland sites (listed in text)

North of Tring
Astrope meadow and pastures, Puttenham
Boarscroft Farm meadows and pastures, Long Marston
Folly Farm meadows, Tring

Chilterns AONB and surrounds
Chorleywood Dell nature reserve
Long Deans nature reserve, Hemel Hempstead
Pepperstock meadow, Flamstead
Shrubhill Common LNR, Hemel Hempstead
Water End meadows

South Hertfordshire
Dalmonds Farm meadows, Brickendon
Hoddesdon Lodge meadow
Northaw Place Fritillary meadow
Wormley West End meadows

Central/East Herts
Braughing Friars meadow
Burns Green meadows, Benington
Colliers End meadows
Hooks Green meadows, Clothall
Langley meadow, Knebworth (SSSI);
Meesdon Green (part)
Munchers Green and Moor Green, Ardeley
Roe Green, Sandon (part)
Meadow north of Standon Lordship
Weston recreation ground

Herts River Valleys
Hunsdon and Eastwick Meads (SSSI)
Archers Green, Tewin
Danesbury pasture, Welwyn
Ickleford Common
Oughton Head Common, Hitchin (part)
Panshanger pasture, Hertingfordbury

Major chalk grassland sites

Chilterns AONB and surrounds (west Herts)
Aldbury chalk bank
Aldbury Nowers
Alpine Meadow
Ashridge estate/road verge
Church End, Sarratt
Gaddesden Hoo chalk bank
Oddy Hill
Roughdown Common
Sheethanger Common
Tring Park

Chilterns AONB and surrounds (north Herts)
Hexton Chalk Pit
Markhams Hill, Gt.Offley
Ravensburgh Castle
Telegraph Hill/Hoo Bit
Tingley Down

East Anglian Heights
Ashwell Quarry/road verge
Coombe Bottom, Kelshall
Newfield Hill, Weston
Therfield Heath
Weston Hills, Baldock
Wing Hall chalk bank

Other sites
Badgers Mead, Albury
Dawley Warren
Oxshott Hill

32.2 Appendix 2 – Habitat restoration potential

Heathland and acid grassland on existing sites

Heathland site	Estimated area 1997 (ha)*	Estimated potential area 2007 (ha)**	Estimated potential total area 2045 (ha)***	Graze
Berkhamsted and Northchurch Commons	3	100	150	Yes (part)
Bricket Wood Common	4.5	8	12	Yes
Gustardwood Common	2	4	10	
Nomansland Common	5.5	10	20	Yes
Colney Heath	6	8	12	Yes
Panshanger Park	4	9	9	Yes
Mardley Heath	<0.5	4	8	Yes
Hertford Heath	1	5	5	Yes
Patmore Heath	6	7	7	Yes
Croxley Common Moor	0.5	2	6	Yes
Chorleywood Common	1	5	10	

*Figures only include open dry heath, wet heath and grass heath communities
**Figures include open dry, wet and grass heath communities and open areas being restored to heath and acid grassland
***Figures include all open heath and acid grassland communities on these sites

Chalk grassland on existing sites

Site	Total site area (ha)	Area CG (ha) 1995	Restoration potential (ha)	Total area CG (ha) 2045
Aldbury chalk bank	0.1	0.1	-	0.1
Aldbury Nowers	18.6	5.5	3.5	9
Alpine Meadow	2.5	0.4	2	2.4
Ashridge estate/road verge	n/a	0.76	-	0.76
Ashwell Quarry/road verge	2.8	1	-	1
Badgers Mead, Albury	n/a	0.26	-	0.26
Church End, Sarratt	6	6	-	6
Coombe Bottom, Kelshall	7.5	7.1	-	7.1
Dawley Warren	1.5	0.5	0.5	1
Gaddesden Hoo chalk bank	n/a	1	-	1
Hexton Chalk Pit	2	2	-	2
Markhams Hill, Gt.Offley	2.75	0.2	2.55	2.75
Newfield Hill, Weston	n/a	0.24	-	0.24
Oddy Hill	2	1	0.5	1.5
Oxshott Hill	1.7	0.2	1.5	1.7
Ravensburgh Castle	n/a	1.8	-	1.8
Roughdown Common	9.62	1.7	-	1.7
Sheethanger Common	23.3	0.42	2	2.5
Telegraph Hill/Hoo Bit	6	2	2	4
Tingley Down	n/a	3.5	-	3.5
Therfield Heath	168.8	25	50	75
Tring Park	n/a	10	5	15
Weston Hills, Baldock	17	0.8	5.8	6.6
Wing Hall chalk bank	4.25	1.07	-	1.07

32.3 Appendix 3 – NVC communities in Hertfordshire

The National Vegetation Classification (NVC), edited by J S Rodwell, comprehensively describes the vegetation communities of the UK in 5 volumes. No major NVC surveys have as yet been undertaken in Hertfordshire, but the following communities would be expected to occur, and are described under each of the major habitats for which action plans have been written.

Woodland

Carr woodland

The following carr woodlands are described more fully under Wetlands.

W1 *Salix cinerea-Galium palustre* woodland

W2 *Salix cinerea-Betula pubescens-Phragmites australis* woodland

W5 *Alnus glutinosa-Carex paniculata* woodland

W6 *Alnus glutinosa-Urtica dioica* woodland.

Woodland

W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland – This community is characteristic of heavier base-rich (calcareous mull) soils in south-east England, including Hertfordshire. It probably forms the climax forest type of these base-

rich soils, which are generally derived from a wide variety of calcareous parent materials, such as sedimentary limestones, shales and clays and superficial deposits like glacial drift. The community is naturally extremely diverse in both the canopy and field layers and this diversity has often been further influenced by past management practices. It can include both ancient woodlands and more recent naturally regenerated woodland.

This community is typically dominated by Ash *Fraxinus excelsior*, Field Maple *Acer campestre* and Hazel *Corylus avellana*, with smaller quantities of Pedunculate Oak *Quercus robur*. The community occurs in this form on the chalky boulder clay of north-east Herts. However, further south in Hertfordshire, this community may be dominated by Hornbeam *Carpinus betulus*, with Ash and Oak standards, though with Field Maple and Hazel less dominant. This dominance by Hornbeam is a result of the species favouring the natural decalcification of the thin glacial soils due to intense management and past silvicultural selection practices, used to grow Hornbeam for charcoal production. In addition to the above species, the understorey will often contain Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, Dogwood *Cornus sanguinea* and Sallow *Salix capraea*. The ground flora is often rich, with Dogs Mercury *Mercurialis perennis*, Bluebell *Hyacinthoides non-scripta*, Wood Avens *Geum urbanum*, Enchanters Nightshade *Circaea lutetiana*, Lords and Ladies *Arum maculatum* and dog violets *Viola spp.* often present. It is also characterised by the presence of orchids, Primrose *Primula vulgaris* and Herb Paris *Paris quadrifolia*.

W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland – This is the typical climax woodland community across the majority of base-poor brown soils throughout the temperate lowlands of southern Britain. It is usually found over clays, sandstones, sands and gravels, but not over limestones or calcareous superficial deposits such as Chalky Boulder Clay, or over free draining acidic deposits. Locally, it is especially predominant on the London Clay of the Thames Basin. Like the W8 community, it is extremely diverse in the canopy, understorey and field layers and the species composition of the canopy and shrub layers has often been influenced by past silvicultural treatments. It too includes both ancient woodland communities and more recent naturally regenerating woodland.

Oaks, Pedunculate Oak in southern and eastern Britain and Sessile Oak *Quercus petraea* in northern and western areas are usually the most abundant tree. In Hertfordshire, on lighter soils Silver Birch *Betula pendula* is the next most common tree. However, in Hertfordshire, on the heavier soils, Hornbeam is the natural co-dominant, forming the typical Oak-Hornbeam woodlands of most of the south and central part of the county. A further interesting variation in parts of southern Hertfordshire, is the replacement of Pedunculate Oak by Sessile Oak as the dominant oak species. This is particularly marked on highly acidic free-draining soils. In south-east Herts, Sessile Oak would have been the dominant tree.

In addition to Hornbeam, other species typical of the understorey are Hazel and Common Hawthorn. The ground flora is generally species poor, with Bluebell dominating in the spring on less acidic soils, though Wood Anemone *Anemone nemorosa* may be locally prominent. Later in the year Bramble *Rubus fruticosus*, Bracken *Pteridium aquilinum* and Honeysuckle *Lonicera periclymenum* usually dominate.

W12 *Fagus sylvatica-Mercurialis perennis* woodland – This is the dominant community on free-draining, base-rich and calcareous soils in south-eastern Britain. It is essentially a community of limestone scarplands, and appears at the present time to represent a stable end point of successions in such areas. The dominance of Beech *Fagus sylvatica* in some areas has been as a result of past selection.

In this community, no other tree species dominate other than in very local areas. Ash is the next most commonest tree followed by Whitebeam *Sorbus aria*. The understorey, though sparse where beech is dominant, most commonly includes a mixture of Hazel, Hawthorn, Field Maple, Elder, Holly *Ilex aquifolium*, Spindle *Euonymus europaeus*, Privet *Ligustrum vulgare*, Dogwood and Wayfaring Tree *Vibernum lantana*. The ground flora usually includes Dogs Mercury, Sanicle *Sanicula europaea*, Lords and Ladies, dog violets and Wood False-brome *Brachypodium sylvaticum*. Other characteristic species include Fly Orchid *Orchis insectifera*, Woodruff *Galium*

odoratum and Yellow Archangel *Lamiastrum galeobdolon*, as well as rarer orchid species.

This community is naturally found, only at the western and north-western edge of the county, where the Chilterns scarp crosses the county boundary. However, beech woodlands do occur in North-east Herts, as a result of past planting. In South-west Herts, a special form of beech woodland occurs, which mixes the W12 and W14 communities, on damper dip-slope soils and is characterised by a richer flora including Coral-root Bittercress *Cardamine bulbifera*.

W14 *Fagus sylvatica-Rubus fruticosus* woodland – This community is confined to base-poor brown earths with moderate to slightly impeded drainage in southern England. It is typical of the plateaus and dip slopes of the southern chalk, which are covered by superficial deposits such as Clay-with-Flints and Plateau Drift. It probably represents the climax forest in such situations, though again has often been influenced by past silvicultural treatments and also grazing. This community can be found in both ancient and relatively young woodlands.

In mature stands, Beech is the major dominant, often forming a closed, even-topped cover of trees. The most characteristic associate of Beech in this community is Pedunculate Oak with other canopy species such as Silver Birch and Ash only ever occasional. Locally on the Chilterns dip slope, Wild Cherry *Prunus avium* can be widespread. The understorey is generally sparse with Holly being the most frequent and distinctive species. Bramble, Bracken and Honeysuckle are the dominant components of the ground flora. In Hertfordshire, this is the dominant community of the Chilterns dip slope in the west of the county, where much of the woodland has been subjected to recent high forest management of beech for the furniture industry.

W15 *Fagus sylvatica-Deschampsia flexuosa* woodland – This community is confined to very base-poor, infertile soils in the southern lowlands of Britain. In Hertfordshire, it only naturally occurs on the dip slope of the Chilterns, where remnants of very acidic sandy deposits are intermixed with the Clay-with-Flints. It is also probably a climax forest type, but again many stands have been altered by silvicultural treatments, and some form part of a wood-pasture system. Beech, while still dominant, is not as dominant as in the previous two communities. Again the next most frequent canopy tree is Pedunculate Oak, with Silver birch occurring in clearings. The understorey is generally sparse and dominated by Holly. Bracken and Wavy Hair-grass *Deschampsia flexuosa* are the most common components of the ground flora.

W16 *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland – This community is confined to very acid and oligotrophic soils in the southern lowlands of Britain, where it forms the climax forest type. In Hertfordshire, it occurs on the most acidic sandy and gravelly soils in the southern half of the county. Some stands are ancient, but it has often developed recently on former heathy commons.

Pedunculate and Sessile Oak and Silver Birch are the dominant trees of this community locally. Rowan *Sorbus aucuparia* and Holly are the two commonest species of the understorey. The field layer is characteristically species poor, with Bracken and Wavy Hair-grass most frequent.

Scrub

W21 *Crataegus monogyna-Hedera helix* scrub – This community is very wide ranging, being the typical sub-climax community of circumneutral to base-rich soils throughout the British lowlands. It develops on bare ground or as part of a succession from grassland to woodland. It includes most of the seral thorn scrub and many hedges found in Britain. Hawthorn, Blackthorn, Bramble and Dog Rose *Rosa canina* agg. are usually present. On calcareous soils a more species rich sub-community can develop, which also includes, Wayfaring Tree, Dogwood, Privet, Buckthorn and Spindle and climbers such as Black Bryony *Tamus communis* and Travellers Joy *Clematis vitalba*. The ground flora is generally species-poor, with Ivy *Hedera helix* usually being most dominant. However, under the *Vibernum lantana* sub-community it is often quite rich, including various Orchids and Yellow-wort *Blackstonia perfoliata*.

W22 *Prunus spinosa-Rubus fruticosus* scrub – This community occurs on mesotrophic mull soils of moderate base-status in lowland Britain. It typically develops from grasslands where grazing has ceased and forms a seral stage to high forest. Blackthorn is

the dominant woody species with brambles dominating the undershrubs. The ground layer is species-poor with Bracken, Common Nettle *Urtica dioica* and Cleavers *Galium aparine* frequent.

W23 *Ulex europaeus-Rubus fruticosus* scrub – This community is characteristic of moderately to strongly acid brown-earth soils which are generally free-draining. Again it forms part of the succession from neglected grasslands or heaths to woodland. Common Gorse *Ulex europaeus* is the dominant species, though it may be accompanied by Broom *Cytisus scoparius*. The other members of the scrub cover are Bramble very frequently and Raspberry *Rubus idaeus*. The herb layer is often non-existent under the dense shade of the scrub.

W24 *Rubus fruticosus-Holcus lanatus* underscrub – This is a very typical community of abandoned and neglected ground in lowland Britain, on a wide variety of circumneutral and less oligotrophic soils, where it represents an early stage in successions to mixed deciduous or oak-birch woodlands. The community is dominated by Bramble, rank grasses such as Yorkshire Fog *Holcus lanatus*, Cocksfoot *Dactylis glomerata* and False Oat-grass *Arrhenatherum elatius* and tall dicotyledons such as Common Nettle, Cleavers. Red Campion *Silene dioica* and Greater Stitchwort *Stellaria holostea* can be frequent.

W25 *Pteridium aquilinum-Rubus fruticosus* underscrub – The typical community of deeper and generally free-draining, circumneutral to moderately acid and fairly fertile soils in the British lowlands. It is commonly found within woodlands or has developed from neglected heaths. Once established the community can be quite permanent unless disturbance allows woody species to begin colonising. The community is dominated by mixtures of Bracken and Bramble, with Bracken generally the more abundant. Of the ground flora, Common Nettle and Yorkshire Fog are the most common, but Bluebell is sometimes frequent in woodland margin localities, where in Hertfordshire it indicates an ancient woodland site.

Wetlands

Fen, marsh and swamp

S4 *Phragmites australis* swamp – Single species swamp of open water transitions dominated by Common Reed – reedbeds.

S5 *Glyceria maxima* swamp – Single species swamp of nutrient enriched water margins, especially on alluvial soils, dominated by Reed Sweet-grass.

S6 *Carex riparia* swamp – A single species Greater Pond Sedge swamp typical of mineral soils alongside sluggish rivers or other open waters.

S7 *Carex acutiformis* swamp – The Lesser Pond Sedge swamp is found in similar situations to the *Carex riparia* but is more consistently associated with calcareous habitats such as fen meadows, peaty ditches and margins of slow chalk streams.

S8 *Scirpus lacustris* swamp – Stands of Bulrush, usually found in deeper water in lakes or slow flowing rivers.

S12 *Typha latifolia* swamp – A single species swamp dominated by Greater Reedmace. Typical of standing or slow moving moderately eutrophic waters with silty substrates.

S13 *Typha angustifolia* swamp. The Lesser Reedmace swamp occupies similar habitats to the greater but is perhaps typical of less enriched conditions.

S14 *Sparganium erectum* swamp – A community of moderately enriched waters with mineral soils. The tolerance of the dominant Branched Bur-reed to moderate currents makes it one of the most frequent vegetation types along lowland rivers and streams.

S22 *Glyceria fluitans* swamp – This community is characteristic of shallow, standing or sluggish, waters with silty substrates. Found by pools and streams, frequently in flood plains.

S23 Other water margin vegetation – A floristically varied vegetation of the un-shaded margins of waters

where there is an accumulation of medium to fine textured mineral sediments.

S25 *Phragmites australis-Eupatorium cannabinum* fen – A moderately species-rich community of tall herbaceous fen vegetation dominated by Common Reed. Found in moderately eutrophic situations where soils are irrigated and frequently water-logged by base-rich waters.

S26 *Phragmites australis-Urtica dioica* fen – Similar to the *Phragmites-Eupatorium* community but a typically less species-rich mix of Common Reed and Stinging Nettle found on enriched water margins and mires.

S28 *Phalaris arundinacea* fen – A species-poor tall vegetation dominated by Reed Canary-grass and most typical of water margins with fluctuating levels and mineral soils.

M22 *Juncus subnodulosus-Cirsium palustre* fen meadow – A species-rich mix of rushes and other marsh plants found on moist base-rich peats and mineral soils and ultimately dependant on grazing or mowing to maintain its integrity.

M27 *Filipendula ulmaria-Angelica sylvestris* mire – A vegetation mix dominated by Meadowsweet, bulky sedges, rushes and other tall marsh plants, typical of ungrazed neutral mineral or organic soils kept damp for much or all of the year.

Wet grasslands

MG9 *Holcus lanatus-Deschampsia cespitosa* grassland – Highly characteristic coarse tussocky grassland of permanently moist and periodically inundated soils occurring at fen margins or around the upper limit of inundation by pools, lakes and reservoirs.

MG10 *Holcus lanatus-Juncus effusus* rush pasture – A species-poor grassland with prominent rush tussocks typical of permanently moist soils around pools and fens.

MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland – A lush grassland community of neutral soils kept moist and sometimes waterlogged by periodic inundation with fresh water. Frequently providing valuable summer grazing.

Carr woodland

W1 *Salix-Galium palustre* woodland – A relatively species-poor Sallow woodland community of waterlogged mineral soils on the margins of standing or slow moving open waters.

W2 *Salix-Betula-Phragmites* woodland – Sallow and Birch woodland developing on fen peats often from valley mire or fen meadows. Rich in ground flora, it is classically found through the East Anglian fens and broads.

W5 *Alnus-Carex paniculata* woodland – Alder woodland associated with the primary colonisation of swamp vegetation where waters are fairly base-rich and only moderately eutrophic, allowing development of fen peat. The ground flora is rich with many associated rarities.

W6 *Alnus-Urtica* woodland – Replaces the *Alnus-Carex* woodland in more markedly nutrient-rich situations. It can develop on fen peat where there has been enrichment through drainage or disturbance but is more typical of rich alluvial sites in river valleys. The flora is much poorer than in the *Alnus-Carex* woodland, here being dominated by nutrient-demanding plants such as Stinging Nettle, Hairy Willowherb and Cleavers.

Heathland/acid grassland

Heath

H1 *Calluna vulgaris-Festuca ovina* dry heath – This is the dry heath community which is found across East Anglia, with the more continental climate.

H2 *Calluna vulgaris-Ulex minor* dry heath – This is the major dry heath community of the Weald and central southern England, where the climate is more oceanic. With Hertfordshire's climate being less continental than East Anglia, this dry heath community may have occurred.

M16 *Erica tetralix-Sphagnum compactum* wet heath – This wet heath community may have occurred along wetter flushes and in wet hollows.

Acid grassland

U1 *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland – This is the major acid grassland community to be found in the county and would have formed extensive areas in a patchwork with the dry heath communities. Heavier grazing would have favoured this community over the dry heath communities.

U20 *Pteridium aquilinum-Galium saxatile* community – This community would also have formed a patchwork with the dry heath and acid grassland communities. It would have favoured slightly richer soils and occurred particularly after burning, and in the absence of grazing or cutting management.

Scrub

The following scrub communities are often associated with heathlands:

W23 *Ulex europaeus-Rubus fruticosus* scrub – This community would have been found on the most enriched and disturbed soils.

W25 *Pteridium aquilinum-Rubus fruticosus* underscrub – This community would have been typical of more nutrient enriched soils and developed particularly after burning, but also in the absence of grazing and cutting management.

Woodland

In the long-term absence of grazing or cutting management, heathlands eventually succeed to woodlands. The following woodland communities could occur as transitory or more permanent features:

W16 *Quercus spp-Betula spp-Deschampsia flexuosa* woodland – This is the major climax woodland community for the majority of heathland soils.

W14 *Fagus sylvatica-Rubus fruticosus* woodland – This community is a potential climax community for the heathland soils in the Chilterns.

W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland – This is the likely climax woodland for the richer heathland soils over much of Hertfordshire.

Neutral grassland

MG1 *Arrhenatherum elatius* grassland – This community is characteristic of ungrazed grasslands, occurring on road verges, railway embankments and churchyards and in neglected pastures and meadows. It is maintained by regular but infrequent cutting. If cuttings are removed the sward may be quite species rich, though this often does not occur. Early cutting and application of herbicides will drastically reduce the variety of herbs. Resumption of grazing will change the sward towards a MG5 community. Absence of cutting will result in often rapid succession to scrub and woodland.

MG4 *Alopecurus pratensis-Sanguisorba officinalis* grassland – This community occurs where traditional hay meadow treatment has been applied to seasonally flooded land with alluvial soils. With such widespread improvement of grasslands and river drainage it is now of very restricted occurrence. Some of the best examples have survived where common rights have maintained traditional management for many generations. This traditional management is based on a mixture of taking an annual hay crop in July and grazing from August until February or March. The grasslands receive no fertiliser except from the manure of grazing animals. Winter flooding, which provides salts, alluvial silt and decaying organic matter is however vital in order to maintain the fertility. Increasing grazing intensity particularly through the spring changes the community leading to a loss of many of the most distinctive species such as Fritillary or Pepper Saxifrage. Cessation of winter grazing results in a change to MG1 or MG9 communities depending on soil moisture.

MG5 *Cynosaurus cristatus-Centaurea nigra* grassland – This community is the typical grassland of grazed hay meadows treated in the traditional fashion throughout the lowlands of Britain. It occurs in

farm fields, churchyards and on road verges. It has become increasingly rare as a result of agricultural improvement which decreases the herb and grass species richness. The traditional management involves grazing, taking a hay cut and application of organic manures. Although many of the most species-rich examples of this community have been treated in the traditional way for a long period, moderately species-rich examples can develop quite quickly on more recent grasslands if other conditions, particularly nutrient levels, are suitable. Increases in grazing intensity or frequent mowing result in a loss of species richness and a move towards the MG6 community, which is the typical semi-improved pasture of lowland Britain. Absence of grazing results in an increase in coarse grasses and the invasion of scrub.

MG9 *Holcus lanatus-Deschampsia cespitosa* grassland – This community occurs on poorly drained, moist soils in pastures and meadows, in woodland rides and clearings, churchyards, on road verges, river levees and at the upper margins of wetlands. It may occur as a mosaic within MG5 and MG1 grasslands or as more extensive stands and often occurs as part of an ecotone from grassland to fen or swamps. A range of intermediate communities between this and other grasslands or fen or swamps may occur and grazing or mowing can further complicate matters.

Chalk grassland

Grassland

CG2 *Festuca ovina-Avenula pratensis* grassland – This community is what many people consider as typical chalk grassland. It generally consists of a very short, tight, springy turf, with an intimate mixture of fine leaved grasses and low growing herbs. The community is dependent on some form of grazing for it's maintenance, and this is most usually sheep and/or rabbit grazing. The community is usually found on the steeper natural slopes or on drift free plateaus. It would have been the major chalk grassland community found in Hertfordshire in the past. The Nature Conservancy Councils (now English Nature) 1987 chalk grassland survey identified sub-communities CG2a, CG2c and CG2d present in Hertfordshire.

CG3 *Bromus erectus* grassland – This community is typical of lightly grazed or ungrazed chalk grasslands, and is more species poor than the above community with many of the smaller herbs much reduced in abundance or absent. It can be regarded as the major natural ungrazed counterpart of the CG2 grasslands described above, over most of the southern part of their range, including Hertfordshire. Sub-communities CG3a and CG3d were recorded in Hertfordshire in the 1987 survey.

CG6 *Avenula pubescens* grassland – This community is likely to develop on moister, more nutrient rich chalk soils, on flat or gently sloping ground. It generally occurs where there is little or no grazing, and is more likely to develop in response to a history of disturbance, such as ploughing, rather than from ungrazed grassland swards. It is likely to be only rarely found in Herts, because suitable soils are easily cultivated, however, it could develop over a long period of time on set-aside land allowed to revert to permanent grassland. Only sub-community CG6a was recorded in the 1987 NCC survey.

CG7 *Festuca ovina-Hieracium pilosella-Thymus praecox/pulegioides* grassland – This community is typical of more continental climatic conditions with heavy rabbit grazing and perhaps some past disturbance such as ploughing. It occurs on thin, stoney, very free draining and nutrient poor calcareous soils. It was unlikely to have formed a major component of chalk grassland in Herts, however, it could have occurred in NE Herts in the past, where the climate is more continental. Communities with some similarities to this community may potentially develop on some of the arable areas of this part of the county, should arable land be allowed to revert to permanent grassland swards. This community was not recorded in the 1987 NCC survey.

Scrub

In the absence of grazing or cutting, chalk grasslands will eventually succeed to the following scrub and woodland communities.

W21 *Crataegus monogyna-Hedera helix* scrub – This scrub community represents the typical chalk scrub which develops on neglected grasslands or on disturbed calcareous soils. It is now very widespread on the fragments of former chalk grassland remaining in Hertfordshire. Species rich calcareous scrub,

particularly where this is a long-standing feature is an important community, though there are few areas of species rich calcareous scrub in Hertfordshire.

W12 *Fagus sylvatica-Mercurialis perennis*

Woodland – This is the climax woodland community of chalk scarp slopes, where the soils are very thin and free draining. It's occurrence in Hertfordshire is limited due to the very limited extent of the Chiltern scarp in the county.

W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland – This community represents the climax woodland community over the majority of base rich chalk soils in Hertfordshire.

A further interesting variation is the occurrence of 'chalk heath' in some localities here more acidic deposits outcrop over the chalk. Heather and gorses can typify such situations, and local variations in topography bringing the chalk closer to the surface can result in intimate mixtures of chalk grassland and dry heath/acid grassland.

32.4 Appendix 4 – Habitat and species evaluation criteria

Habitat evaluation criteria

Habitat extent

UK priority	
Key habitat	Key habitat as identified in UK Steering Group Report
Local decline rate	
Rapidly declining	50-100% decline in habitat extent in BAP area in previous 25 years
Declining	25-49% decline in previous 25 years
Stable	24% increase – 24% decrease in previous 25 years
Increasing	25-49% increase in habitat extent in previous 25 years
Rapidly increasing	50-100% increase in previous 25 years
Proportion of UK habitat in local area	
Significant	Local habitat forms 10-19% of total UK resource
Isolated	Local habitat is isolated from other areas of the same habitat
Local rarity	
Rare	Habitat currently covers less than 0.6% of the total BAP area
Scarce	Habitat currently covers 0.6% – 4.0% of the total BAP area
Common	Habitat currently covers more than 4.0% of the total BAP area
Local threat	
Directly threatened	Habitat directly threatened by lack of or inappropriate management
Indirectly threatened	Habitat indirectly threatened by generic factors (e.g. recreation and pollution)

Habitat quality

Degree of fragmentation/restoration potential	
Continuous (extendible)	Habitat continuous with potential for increase in area
Continuous (fixed area)	Habitat continuous with no potential for increase in area
Fragmented (extendible)	Habitat fragmented with potential for increase in area
Fragmented (fixed area)	Habitat fragmented with no potential for increase in area
Habitat important for key species	
Key species	Habitat important for local BAP priority species
Minimum viable size	
Viable	Habitat above minimum viable size
Potentially viable	Habitat currently below minimum viable size but with potential for increase
Non-viable	Habitat below minimum viable size with no potential for increase
Local distinctiveness	
Distinctive	Habitat which is particularly associated with the local area (this may be a characteristic habitat or one of special historical or cultural importance)

Species evaluation criteria

UK priority	
Short list	Species present on the UK Short list
Middle list	Species present on the UK Middle list
Long list	Species present on the UK Long list
Additional	Species which meet the UK Long list criteria
Local decline rate	
Rapid decline	50-100% decline in numbers/range in BAP area over previous 25 years
Decline	24-49% decline in numbers/range over previous 25 years
Stable	24% increase – 24% decline in numbers/range over previous 25 years
Increase	24-49% increase in numbers/range over previous 25 years
Rapid increase	50-100% increase in numbers/range over previous 25 years
Local rarity	
Rare	Currently occurs in 0.6% or fewer tetrads in the BAP area
Scarce	Currently occurs in 0.6-4.0% of tetrads in the BAP area
Common	Currently occurs in more than 4.0% of tetrads in the BAP area
Extinct	Extinct in the BAP area
Local threat	
Direct	Species with specific habitat requirements which are directly threatened by lack of or inappropriate management
Indirect	Species threatened indirectly by human activities at the local level (e.g. recreation and pollution)
Position in geographic range	
Localised	Local population forms 10-19% of the species UK population
Isolated	Local population is isolated from other populations and is likely to contribute to genetic diversity of the species
Outlying	Species is at the edge of its range in the BAP area
Local distinctiveness	
Flagship	Flagship species – high profile species which can be used to illustrate wider issues in the environment
Keystone	Keystone species – ecologically important species which can be used as direct indicators of habitat quality
Typical	Typical species – those species not necessarily identified as being of conservation concern, but which are particularly associated with, or characteristic of, the locality

33 Black-necked Grebe species action plan

33.1 Introduction

The Black-necked Grebe *Podiceps nigricollis* is the most social of the grebes, with pairs nesting in colonies and small flocks forming outside the breeding season. Its preferred habitats are shallow inland lakes, ponds, lochs and reservoirs which have extensive water plants. Both sexes work together to build a floating nest, consisting of a heap of water plants and dead leaves, usually well hidden in dense reeds or sedges in shallow water. Several nests may be built before one is selected. At suitable sites, colonies of up to 10-12 pairs may form. Eggs are usually laid during late April to July, clutch size 3-4. Most young have fledged by the end of August and can often be seen riding on their parents' backs when small. During the breeding season they mostly feed on insects such as water beetles, dragonfly larvae, caddisflies and mayflies. Small fish are also eaten, particularly during the winter.

In August, they start to leave the breeding areas, birds from central and northern Europe move south-east or south west, and some reach Britain by November. In winter small concentrations occur on the London area reservoirs and in several south coast estuaries and harbours. Return migration starts during March when birds reappear at breeding sites.

33.2 Current status

Black-necked Grebe is a rare breeding species in the UK with approximately 70 pairs breeding nationally per year, almost entirely north of a line from the Wash to the Severn estuary. The British population had never numbered more than 10 pairs before 1970, since then the population has fluctuated, but has sustained a slow but steady increase. The breeding records come from four or five main colonies with occasional pairs elsewhere. The wintering population is about 120 birds nationally.

Black-necked Grebes first bred in England at Tring Reservoirs in Hertfordshire in 1918. They maintained a small irregular breeding population up to 1928 but did not breed again in Hertfordshire until 1990 when a pair raised three young at Hilfield Park Reservoir. Although present in almost every spring subsequently, they did not breed again at this site until 1998 when a single pair raised four young. The species has bred in all years since then and has slowly increased in population but has not enjoyed good breeding success in a number of these years.

In 2003 Hilfield Park Reservoir held six pairs, representing possibly 8% of the national breeding population. Ten young were raised at Hilfield, a rate of 1.7 young per pair, which exceeds the 2002 productivity figures from the largest single site for this species in north-west England.

33.3 Current factors causing loss or decline

33.3.1 Loss of suitable habitat and changes in land use

Historically natural wetlands in Britain have suffered greatly from drainage and conversion to agricultural usage (e.g. the fens). In recent years this has been offset somewhat by the construction of man-made wetlands, often as a bi-product of mineral extraction or the requirement for potable water resources. In Hertfordshire there are no natural water bodies, but considerable numbers of man-made lakes, gravel pits and reservoirs which are mainly grouped in the Lea and Colne valleys with reservoirs also in the north west of the county at Tring.

There has generally been a lack of positive management of wetland sites for wildlife. Most have, at best, multiple usage where wildlife shares the same water body with angling or sailing activities for example. Many man-made wetlands are ephemeral in nature; unless managed, open water and emergent aquatic vegetation dries out through natural succession: banks become overshadowed by willows and the emergent vegetation becomes shaded out. There has also been a loss of man-made wetlands to development pressures, i.e. landfill for agriculture and new housing.

33.3.2 Human disturbance

The increase of recreational activities such as angling and sailing has reduced the number of sites suitable for Black-necked Grebes as they prefer to nest on quiet undisturbed waters.

The local population may also have been subject to targeting by egg thieves. There was a possible incident at Hilfield Park Reservoir in 2003 to which Three Valleys Water, the Police and the RSPB responded extremely well.

33.3.3 Nest flooding

Locally, heavy rain during incubation has caused nests to flood. The HMWT voluntary warden, has produced some analysis of rainfall/breeding success during good and bad years. The floating nests at Hilfield appear to be constructed of a single type of pondweed attached to reed stems. The extremely flat platform nature of construction makes them particularly vulnerable to changes of water level.

Additionally, the open nature of Hilfield Park Reservoir means that any strong north/north-westerly wind has an opportunity to build significant wave heights by the time they reach the south bank. The preferred nest sites appear to be on the outer edge of the reed bed making them extremely vulnerable to flooding from wave action.

33.3.4 Isolation of populations

Restriction to a few isolated sites nationally leaves the population vulnerable to chance events.

33.3.5 Predation

The effects of predation are relatively unknown, but Pike and Mink have been implicated at sites where breeding success is low.

33.4 Current action

33.4.1 Legal status

In the UK the Black-necked Grebe is afforded full protection as a Schedule 1 breeding bird under the Wildlife and Countryside Act 1981(as amended). It is also a Red Data Book species and is on Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats, 1979.

33.4.2 Mechanisms targeting the species

The population and breeding success of known colonies are monitored annually by the RSPB and the Rare Breeding Birds Panel.

There are local monitoring activities carried out in north-west England where the largest concentrations of Black-necked Grebes breed.

33.5 Black-necked Grebe Action Plan

Objectives, actions and targets

Objective 1: To maintain or increase the population of Black-necked Grebes at Hilfield Park Reservoir

Target: To implement habitat enhancement work at Hilfield Park Reservoir by 2008

Action code	Action	Target start date	Target end date	Lead partner	Other partners
BNG/A/1.1	Set up a Working Group to oversee the implementation of the plan	2003	2003	HBC/ HMWT	TVW, Hertsmere BC, RSPB
BNG/A/1.2	Liaise with other monitoring groups in the UK to compare data on habitat, food types, water quality, etc	2003	2004	Working Group	
BNG/A/1.3	Monitor the breeding success and note any significant factors effecting this		Annually	HBC/ HMWT	
BNG/A/1.4	Survey breeding habitat and produce a breeding habitat enhancement plan	2003	2004	HMWT	HBC
BNG/A/1.5	Identify and survey potential food sources for young	2004	2006	HMWT	HBC
BNG/A/1.6	Investigate the viability of artificial mechanisms to protect the nest sites (rafts, booms to lessen wave action, etc)	2004	2005	TVW	HMWT, HBC
BNG/A/1.7	Develop a contingency plan for protecting the site against wilful disturbance	2003	2004	HMWT	TVW, RSPB, Police Wildlife Liaison Officer

Relevant Action Plans:

Local Plans
HMWT Hilfield Reservoir Management Plan

Hertfordshire Plans
Wetlands

National Plans
Eutropic standing waters

Abbreviations (Partners)

HBC – Herts Bird Club
HMWT – Herts & Middlesex Wildlife Trust
RSPB – Royal Society for the Protection of Birds
TVW – Three Valleys Water

Contact

The Lead for this plan is Herts Bird Club
Jack Fearnside
Email: fearnsidej@aol.com

34 Purple Emperor species action plan

34.1 Introduction

The Purple Emperor *Apatura iris* is the jewel of woodland butterflies. One of the United Kingdom's largest butterflies, the smaller male displays a purple iridescent sheen. The female is a larger butterfly and has a plainer brown background colour. Individuals are fast flying and are known to be able to travel over a wide area. They usually emerge from the first week of July, followed by a period of intense male activity mid-month. Activity then subsides and occasional sightings of males and egg laying females will be made until the end of July and occasionally into the first weeks of August. The butterfly feeds mainly on aphid honey-dew and tree sap of broad-leaved trees, especially oak. However, the male needs to take salts as part of the reproduction process and will come down to the ground usually in the early part of the day. In Hertfordshire, the female has also been observed taking moisture from the ground.

Eggs are laid on members of the sallow *Salix* family. Goat Willow *Salix caprea* is the most widely used food plant although Grey Sallow *S. cinerea* is also used. Crack Willow *S. fragilis* is a recorded food plant but this has not been confirmed in Hertfordshire. The female is believed to lay c100 eggs over about 10 days usually between 12 and 2 o'clock. She can use both young and old sallows, along rides or in the canopy. The larva feeds on sallow leaves until hibernation and then continues feeding in the spring until around the middle of June, depending on weather conditions, when pupation occurs. The larvae are open to predation, and parasitic, bacterial and viral attack for the relatively long time of 10 months or more, so numbers of emerging adults are generally low over wide areas of woodland.

The butterfly requires woodland with a diverse age structure, combining mature woodland and younger plantations that are encouraged to be sallow-rich. Ride-side, woodland edge, riverside and road-verge sallows can also provide important habitats. Age diversity within a woodland complex or a group of woods is essential for this butterfly to survive and thrive over the long-term.

34.2 Current status

In Europe the Purple Emperor occurs from north Spain to central Russia, is absent from Italy and the Mediterranean islands, is declining in several western and central European countries, including north France, and is spreading at the northern edge of its range in Scandinavia and Russia.

Once found as far north as Lincolnshire and in parts of Wales, the strongholds of the butterfly are still concentrated on the heavily wooded areas of Surrey, Sussex and Hampshire. At present, the most northerly sites that are known are in Northamptonshire. There are historic records from Cambridgeshire, Essex, Huntingdonshire, Norfolk and Suffolk. In East Anglia, there have also been a few sightings in recent years, which we believe relate to discrete naturally occurring colonies. There have been at least two recent releases in the region.

In Hertfordshire, near the end of the 19th century, reports of sightings were documented in the Hitch Wood area, as well as Knebworth Woods, woods near Walkern (later suggested as St. John's Wood), Oxbury Wood near Meesden and the woods adjacent to the Welwyn Railway tunnels. At this time a pinned specimen was required for a sighting to be accepted; unfortunately many reports were only considered as hearsay. Then followed several decades with no recorded reports, the species was considered extinct and any sightings were dismissed. In the 1980s, the butterfly was again seen in woods between St. Paul's Walden and Preston, and historical anecdotes of

sightings from the Broxbourne Woods Complex were documented. Since the 1990s there have been more reports from this area and this is where many of the colonies have now been found.

34.3 Current factors causing loss or decline

34.3.1 Woodland management systems

Whilst woodland fragmentation over the last 100 years has been given as a major historical factor in the national decline of the species, the 2002 Forestry Commission audit of woodland for both Hertfordshire and East of England shows a long-term increase in woodland cover, and recent decades have also seen a reversal in the long-term reduction of linear habitats linking woodlands. However, there have been dramatic changes in woodland management practices over this time, with a continued reduction in active management, such as coppicing and panel felling, resulting in loss of age diversity. In addition, many woods and heathlands (Breckland) in the Eastern Region were planted with conifers. In recent decades woodland cover has continued to increase, and there has been a significant move from conifer back to broadleaved woodland.

Sallows are light demanding shrubs and trees, and thrive in younger unweeded plantations or where traditional coppicing or clearance has occurred and amongst the immature growth of conifer plantations. As growth matures beyond 20 or 30 years, sallows can no longer compete and begin to die off. In addition, for many years, sallows had been treated as a ‘weed’ and systematically removed during thinning operations and from ride-sides. Presently, there is a trend towards managing woodland as uniform high or continuous canopy (‘continuous cover’) where light conditions tend to be inadequate for sallow regeneration, or for woods to be left as un-managed high forest. In the short term, retaining sallows when thinning woods will be of benefit, but in the long term sallow numbers will decline as surrounding growth matures.

A general assessment of the situation in Hertfordshire is that sallow-rich woodland is now in decline. Lack of continuity of suitable habitat, by not maintaining good numbers of sallows within each woodland complex, will be the main cause of decline or loss of colonies in the future.

34.4 Current action

34.4.1 Legal status

The butterfly is listed on Schedule 5 of the Wildlife and Countryside Act (1981, as amended) but only to prevent trade.

34.4.2 Mechanisms targeting the species

34.4.2.1Action Plans

Butterfly Conservation has produced its own National & Regional (Upper Thames) species action plans for Purple Emperor to focus and co-ordinate the species’ conservation over the next five to ten years.

34.4.2.2 Survey and research

The species lead contacts (Purple Emperor species co-ordinators for Butterfly Conservation Hertfordshire & Middlesex Branch) have conducted an in-depth study of the butterfly in Hertfordshire. Numerous woods have been surveyed for sallow content and likely territorial areas out of season, and during the July flight period, almost daily surveying has been undertaken from 2000-2005, with additional contributions from other interested observers at publicly accessible sites.

34.4.2.3 Awareness-raising

The Hertfordshire Purple Emperor Report was published in June 2003, followed by the Purple Emperor Project Progress Report for 2003 and both have since been sent to all key partners involved with woodland management within the county. The species lead contacts have visited landowners and managers to discuss the needs of the species. Several articles have also been written for newsletters and magazines, including Butterfly, the national magazine of Butterfly Conservation. During the flight period, the Butterfly Conservation, Hertfordshire and Middlesex Branch, website gives full details of all sightings at publicly accessible sites, which has helped heighten public awareness of the species. Field trips are arranged

annually during the flight period, and visits are encouraged from other BC branches and Natural History Groups.

Butterfly Conservation Hertfordshire and Middlesex Branch, supported by a Heritage Lottery Awards for All grant, has recently produced a Woodlands for Butterflies and Moths leaflet (October 2005), which encourages favourable woodland management for Purple Emperor, White Admiral, Silver-washed Fritillary and other woodland butterflies and moths. The branch hopes to distribute this as widely as possible to those involved with woodland management in the area.

34.5 Purple Emperor Action Plan

Objectives, actions and targets

Objective 1: To gain a greater understanding of the Purple Emperor distribution and population dynamics in the County

Target: Conduct a species and habitat-monitoring programme in medium priority areas by 2007 and low priority by 2010
In high priority* areas the programme is ongoing and up-to-date

(* High priority areas are identified as a woodland complex or a site known to hold a population of Purple Emperor)

Action code	Action	Target start date	Target end date	Lead partner	Other partners
PE/A/1.1	Monitor present colonies during the flight period and estimate current sallow density and woodland conditions (high priority areas)	2000	Ongoing	BC	BC volunteers
PE/A/1.2	Survey for new sites in areas near where colonies are known to be present and in historic areas (medium priority areas)	2000	2007	BC	BC volunteers
PE/A/1.3	Survey for new sites in areas where there is no knowledge of the butterfly ever being present, using sallow density as an indicator of suitable habitat (low priority areas)	2000	2010	BC	BC volunteers

Objective 2: To raise awareness of the needs of the Purple Emperor amongst woodland owners, managers and authorities and to endeavour to safeguard its presence in each woodland complex known to have a population of Purple Emperor

Target: To contact all owners in high priority areas by 2005 (ongoing and up-to-date), medium priority areas by 2008 and low priority by 2011 and produce written reports for each landowner/manager in high priority areas on a regular basis. To encourage positive management of at least one part of all larger complexes, so that there is a continuing abundance of sallows

Action code	Action	Target start date	Target end date	Lead partner	Other partners
PE/A/2.1	Write and produce a simple woodland management guide for woodland owners/managers and other bodies involved with influencing woodland management in the county	2004	Completed	BC	

PE/A/2.2	Encourage all owners/managers of sites known to hold a population of Purple Emperor, to consider the species in their woodland plans; provide them with a flight season species report and woodland leaflet (high priority areas)	Ongoing	Ongoing Up-to-date	BC	CMS, EN, FC, HBRC, HMWT, LA's, WT, landowners
PE/A/2.3	Complete a detailed habitat survey of at least one wood within each woodland complex, to be followed by pro-active positive management or: To encourage and achieve favourable management throughout a complex	2000	2010	BC	CMS, EN, FC, HBRC, HMWT, LA's, WT, landowners
PE/A/2.4	Identify important areas of woodland and contact those involved with their management, giving advice on good practice by distributing the woodland leaflet (Medium and low priority areas)	2005	2007	BC	CLA, CMS, EN, FC, HBRC, HMWT, LA's, RFS, WT, landowners
PE/A/2.5	Monitor the development of the woodland grant system by the Forestry Commission with regard to financial incentives for appropriate woodland management	2004	Uncertain Ongoing	BC	FC

Relevant Action Plans:

Hertfordshire Plans
Woodland

Butterfly Conservation Plans
Species Action Plan, Purple Emperor *Apatura iris* (2000)
Regional Action Plan, Thames Region (2000)

National Plans
Broadleaved, mixed and yew woodland Habitat Description

Key References

Asher *et al*, 2001, *The Millenium Atlas of Butterflies in Britain and Ireland*, Oxford University Press.
Barrett, C.G., 1901, Insecta, Lepidoptera, *The Victoria History of the Counties of England: Norfolk*
Butterfly Conservation Hertfordshire & Middlesex Branch, 2005, Woodlands for Butterflies and Moths (leaflet)
Forestry Commission, 2002, *National Inventory of Woodland & Trees: East of England Region*
Forestry Commission, 2002, *National Inventory of Woodland & Trees: Hertfordshire*
Fryer, J.C.F., 1938, Lepidoptera, *The Victoria Histories of England: Cambridgeshire and the Isle of Ely*
Goodyear, L., & Middleton, A., 2003, *The Hertfordshire Purple Emperor*
Goodyear, L., & Middleton, A., 2004, *The Purple Emperor Project Progress Report for 2003*
Goodyear, L., & Middleton, A., 2006, *The Purple Emperor Progress Report for 2004 & 2005*
Morley, C., & Bloomfield, Rev. E.N., 1911, Lepidoptera *The Victoria History of the Counties of England: Suffolk*
Omer-Cooper, J., 1926, Lepidoptera *The Victoria History of the Counties of England: Huntingdon*
Sawford, B., 1987, *The Butterflies of Hertfordshire*, Castlemead Publications.

Abbreviations (Partners)

BC – Butterfly Conservation, Hertfordshire & Middlesex Branch
CLA – Country Landowners and Business Association
CMS – Countryside Management Service
EN – English Nature
FC – Forestry Commission
HBRC – Hertfordshire Biological Records Centre
HMWT – Herts & Middlesex Wildlife Trust
HWF – Herts Woodland Forum
LA's – Local Authorities
RFS – Royal Forestry Society
WT – Woodland Trust

Contact:
The Lead for this plan is Butterfly Conservation, Hertfordshire & Middlesex Branch
Andrew Middleton
Email: acmiddleton@blueyonder.co.uk
Liz Goodyear
Email: elizabethgoodyear@talk21.com