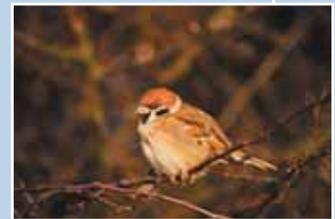


March 2005

Bringing the Big Outdoors Closer to People

A Biodiversity Audit and Objective Setting Exercise for the Green Arc



A Final Report to
English Nature by
Land Use Consultants



**BRINGING THE BIG OUTDOORS
CLOSER TO PEOPLE:**

**A BIODIVERSITY AUDIT AND
OBJECTIVE SETTING EXERCISE
FOR THE GREEN ARC AREA**

**Final Report prepared
for English Nature
by
Land Use Consultants**

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43 Chalton Street
London NW1 1JD
Tel: 020 7383 5784
Fax: 020 7383 4798
luc@london.landuse.co.uk

CONTENTS

1. Introduction	1
Introduction.....	1
Background.....	1
The Green Arc	1
The Green Arc Biodiversity Audit.....	2
Project Drivers	3
<i>Statutory and non-statutory nature conservation sites</i>	3
<i>Sympathetic landowners and land managers</i>	5
<i>Changes to agri-environment schemes and funding</i>	6
<i>Green Infrastructure and Greenway Linkages</i>	8
<i>Human induced pressures and the Sustainable Communities Plan</i>	9
Methodology	11
Stage 1. Target Identification	11
Stage 2. Target Analysis	11
Stage 3. Report Production	11
Public Service Agreement Targets	11
2. Habitat and Species Aims and Targets	13
Prioritising Habitats and Species.....	13
3. Green Arc Habitat Actions	15
Woodland	15
Heath and Acid Grasslands.....	20
Aquatic Environments	23
Wetlands.....	27
Farmland.....	32
Urban	35
4. Green Arc Species Actions.....	39
Water vole.....	39
Bats.....	41
Dormouse.....	44
Tree Sparrow.....	46
Grey Partridge	48
Skylark	50
Song Thrush	52
Great crested newt	54
Adder	56
Stag beetle.....	58
White-clawed crayfish.....	60
Hornet robber fly.....	62
Desmoulin's whorl snail.....	63

Black Poplar.....	64
Creeping marshwort.....	66
5. Site Specific Actions.....	69
Introduction.....	69
The Mardyke Action Area	71
Context.....	71
Actions.....	72
<i>Habitat Enhancement Areas</i>	72
<i>Habitat Linkages</i>	74
The Epping/ Harlow/ Cheshunt Action Area.....	75
Context.....	75
Actions.....	76
<i>Habitat Enhancement Areas</i>	76
<i>Habitat Linkages</i>	77
The Hoddesdon to Hatfield Action Area	79
Context.....	79
Actions.....	80
<i>Habitat Enhancement Areas</i>	80
<i>Habitat Linkages</i>	81
The SawbridgeWorth / Hatfield Forest Action Area	83
Context.....	83
Actions.....	84
<i>Habitat Enhancement Areas</i>	84
<i>Habitat Linkages</i>	85
6. Conclusions and Recommendations.....	87
Conclusions.....	87
Threats and Opportunities	87
The Green Arc Project.....	89
Recommendations	90

TABLES

Table 3.1 Examples of key aquatic sites in the Green Arc	25
Table 3.2 Examples of key wetland sites found in the Green Arc.....	30

FIGURES

Figure 1.1 Extent of the Green Arc Area.....	2
Figure 1.2 Statutory and non-statutory nature conservation sites and waterways in the Green Arc	4
Figure 1.3 Sympathetic landowners and environmental initiatives working in the Green Arc	5
Figure 1.4 Farmland types throughout the Green Arc.....	6

Figure 1.5 Location of the Growth Areas and other development pressures in the Green Arc 10

Figure 5.1 The extent of each of the four action areas within the Green Arc.....69

Figure 5.2 Nature Conservation designations in the Mardyke Action Area71

Figure 5.3 Nature Designations in the Epping /Harlow/Cheshunt Action Area.....75

Figure 5.4 Nature Designations in the Hoddesdon to Hatfield Action Area79

Figure 5.5 Nature Designations in the Sawbridge / Hatfield Forest Action Area83

APPENDICES

Appendix 1 Green Arc Steering Group 93

Appendix 2 Green Arc Biodiversity Overview 97

Appendix 3 Consultees 115

Appendix 4 Consultation Brief 119

Appendix 5 Glossary 127

Appendix 6 Bibliography 131

I. INTRODUCTION

INTRODUCTION

- I.1. In October 2004 Land Use Consultants (LUC) were commissioned by English Nature to produce a prioritised set of biodiversity targets for the Green Arc. The following report describes the principal drivers relating to the Green Arc and its biodiversity, the key habitats and species that require protection and management and four site-specific areas within the Green Arc where improvements could be made. The document is specifically for the Green Arc Project but could also be used to guide wider planning decisions in the study area.
- I.2. The rest of this section looks at the background to the Green Arc and the objectives and drivers of this project. Sections 2, 3 and 4 provide detailed aims and targets for each of the Green Arc habitats and species. Section 5 describes the site-specific areas within the Green Arc, and Section 6 looks at the conclusions of this study.

BACKGROUND

The Green Arc

- I.3. In July 2003 LUC were commissioned to undertake a study providing an overview of the policies, issues and opportunities relating to open space and the countryside around London, focusing particularly on the role of agriculture and public accessibility issues. Part of this project was to assess the feasibility of the 'Green Arc'- a strategic initiative aimed at significantly improving the environment and accessibility of the Green Belt open space and countryside around northeast London and the southern parts of Essex and Hertfordshire. The study was published in March 2004 and set the boundaries of the Green Arc¹.
- I.4. At present the Green Arc covers approximately 120 km² and includes parts of western Essex, eastern Hertfordshire and four northeastern London Boroughs as well as a large area of the Metropolitan Green Belt (See **Figure I.1** overleaf). The area also includes a substantial part of the Sustainable Communities² M11 corridor growth area, as well as Stansted Airport, which is proposed for expansion. The area itself is predominantly open and made up of a mixture of farmland, woodland and areas of informal and formal recreation. The southern part of the Green Arc contains significant amounts of urban development and there are ribbons and pockets of development throughout the area.
- I.5. The Green Arc is currently managed by a steering group made up of a number of local and national government organisations as well as other environmental groups and initiatives found in the area. A list of these organisations can be found in

¹ Bringing the Big Outdoors closer to people: the Green Arc Approach (2004) Green Arc Steering Group. Found on the World Wide Web: <http://www.green-space.org.uk/Network/greenarc.htm>

² Sustainable Communities- Building for the Future (2002) ODPM. Found on the World Wide Web: http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=3657&l=1

Appendix I. In 2004 the steering group set out an agreed vision for the Green Arc. It was:

Bringing the Big Outdoors closer to people- *through the creation and protection of an extensive, attractive and valued recreational landscape of well-connected and accessible countryside around London, for people and wildlife.*

- I.6. This vision was supplemented by a number of strategic objectives that address the full range of opportunities and aspirations of the Green Belt and the Green Arc. It is hoped that the Green Arc concept will build on the success of existing initiatives, to bring about significant improvements to the area, producing a 'world class environment' for a 'world class city'.

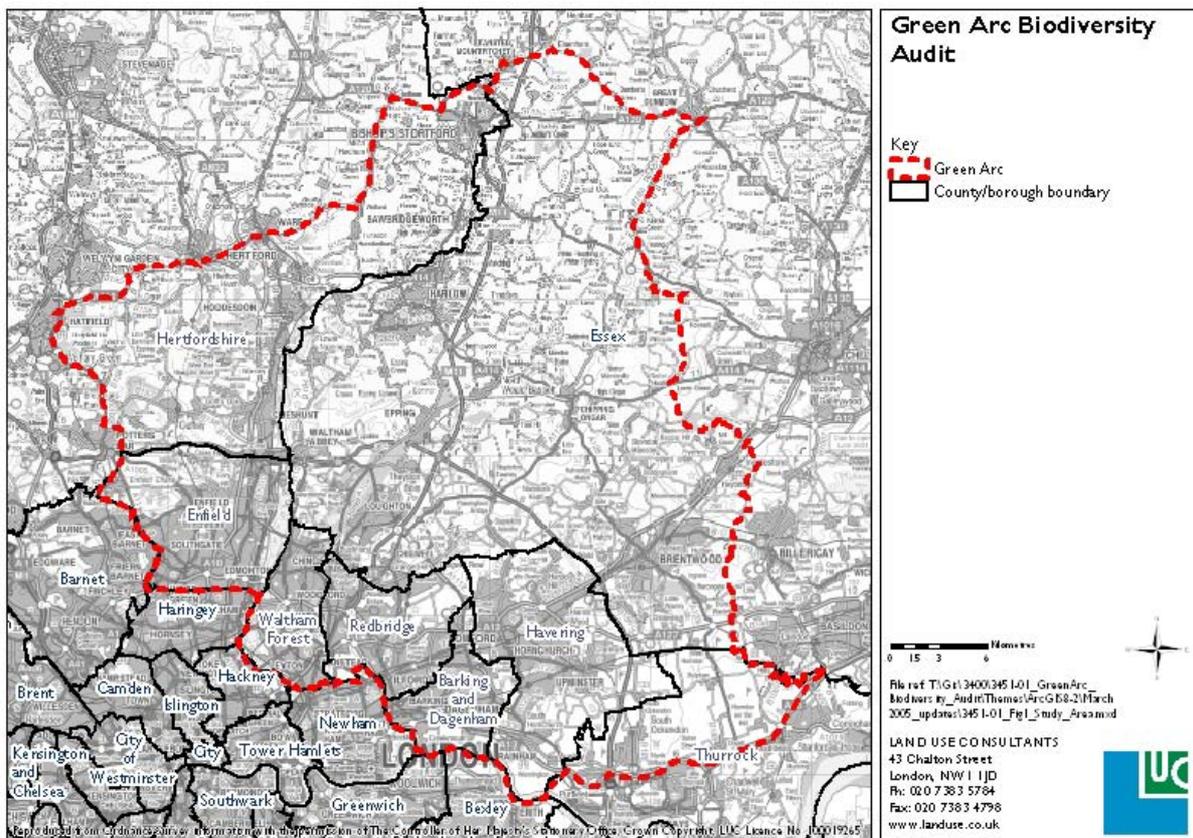


Figure I.1 Extent of the Green Arc Area

The Green Arc Biodiversity Audit

- I.7. From spring 2005 a project team will take over the management of the Green Arc. One of their first functions will be to produce a Project Plan to realise the Green Arc's vision and meet its strategic objectives. Two of the strategic objectives are concerned with biodiversity and the wider countryside. These are:

- To conserve and enhance the biodiversity value of the Green Arc
- To improve the linkages between existing and potential accessible open land for people and wildlife

I.8. As a key member of the Green Arc steering group, English Nature is keen that these strategic objectives are met and that the integrated project plan is developed with clear and well informed biodiversity objectives

I.9. The **main objective** of this study was:

To produce a prioritised set of biodiversity targets for the Green Arc Area, with associated area- or site specific targets, which can be incorporated into the Green Arc Project Plan.

I.10. English Nature also requested that this objective be completed with a number of strategic drivers in mind, as these parameters will provide a number of opportunities for biodiversity conservation that could be delivered through the Green Arc project.

Project Drivers

I.11. The five project drivers are:

- The distribution of existing statutory and non-statutory nature conservation site
- The distribution of land-holdings of sympathetic landowners and land managers
- The proximity of land to areas earmarked for development as a consequence of the Sustainable Communities Plan
- The opportunities afforded by proposed changes to agri-environment funding
- The opportunities to link habitats and/or features to promote and create a functional green infrastructure

I.12. These are discussed in more detail below.

Statutory and non-statutory nature conservation sites

I.13. The distribution of statutory and non-statutory nature conservation sites is shown in **Figure 1.2** overleaf. It shows that the Green Arc area is rich in nature conservation interest and that it contains a number of locally, nationally and internationally protected sites. Examples of these include:

- Two Special Areas of Conservation (SAC)³ at Epping Forest and Hoddesdon Woods
- Parts of the Lee Valley and the Thames Estuary designated Special Protection Areas (SPAs)⁴
- Two National Nature Reserves (NNRs)⁵ at Broxbourne Woods and Hatfield Forest

³ SACs are designated under and protected by the Conservation (Natural Habitats, &c.) Regulations 1994, SI 2716. Transposed from the Conservation of natural habitats and of wild fauna and flora Directive 92/43/EEC.

⁴ SPAs are designated and protected by the Wildlife and Countryside Act 1981 from articles transposed from the Wild Birds Directive 79/409/EEC, these protections were amended by the Conservation (Natural Habitats, &c.) Regulations 1994, SI 2716.

- Numerous Sites of Special Scientific Interest (SSSI) including the Rainham Marshes and Ingrebourne Valley
- Various Metropolitan, Hertfordshire and Essex County Nature Reserves, Local Nature Reserves (LNRs) and Sites of Importance for Nature Conservation (SINCs)
- Many fragments of semi-ancient woodland

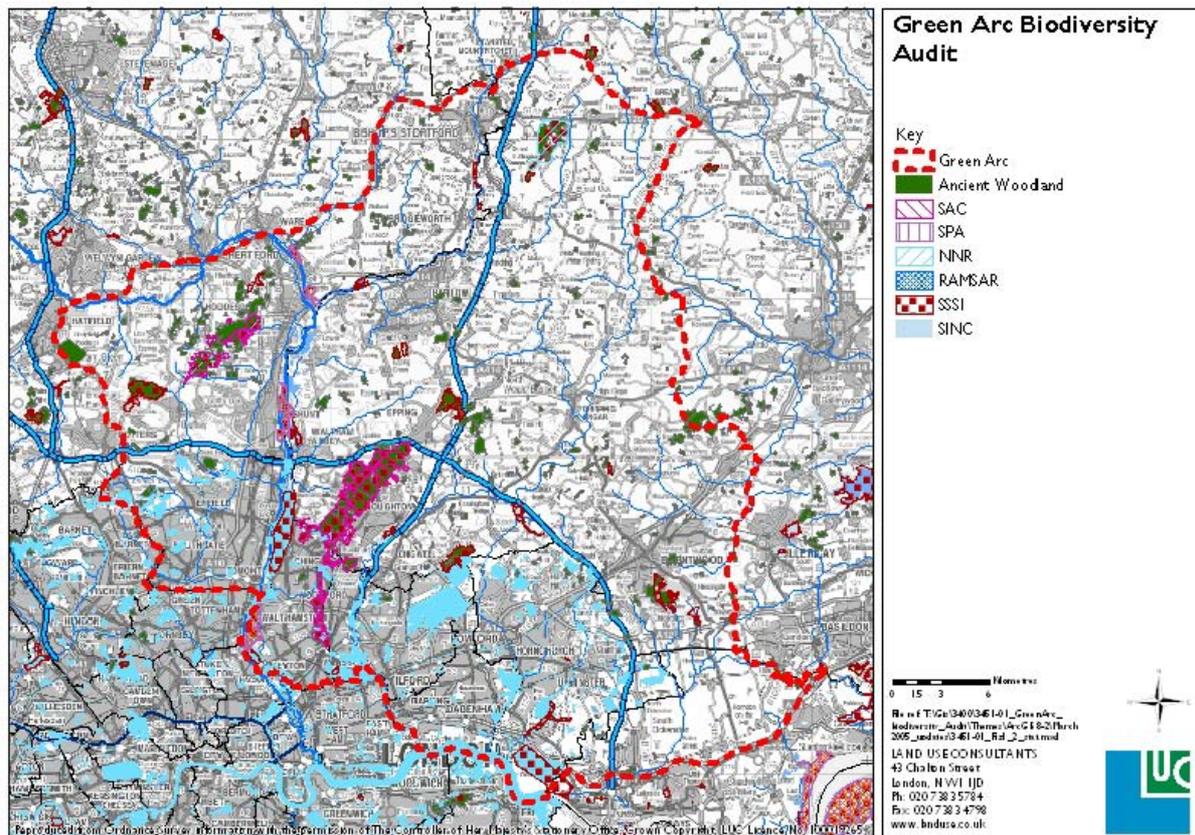


Figure I.2 Statutory and non-statutory nature conservation sites and waterways in the Green Arc

I.14. These sites, especially the nationally and internationally protected sites, are considered to be flagship areas for biodiversity within the Green Arc. They often contain the rarest and most fragile habitats and ecological communities and can act as an oasis for declining species. However these sites can also be under considerable threat from direct (e.g. habitat loss, fragmentation) and indirect (disturbance, diffuse pollution) developmental and agricultural impacts. In many cases when these areas have been left unmanaged or have accumulated a number of adverse impacts on their intrinsic ecology they slip into an unfavourable ecological status which can be hard to redress.

⁵ Both NNRs and SSSIs are protected by the Wildlife and Countryside Act 1981

Sympathetic landowners and land managers

I.15. In addition to the various statutory and non-statutory nature conservation sites the Green Arc also contains a number of sympathetic landowners and land managers. From a biodiversity point of view these organisations and individuals are invaluable for maintaining the Green Arc's biodiversity resource and provide a model of best practice for other landowners and land managers. Of particular note are the following organisations:

- Corporation of London
- Lea Valley Regional Park Authority
- Forest Enterprise
- Several Nature Conservation NGO's (e.g. RSPB)
- Local Councils with responsibility for open spaces (e.g. country parks)

I.16. The land that these organisations manage contains a number of statutory and non-statutory designations including the SACs at Epping Forest (Corporation of London) and the SSSIs of Rainham Marshes (RSPB). In many instances these sites are the some of the best managed for biodiversity, with some sites even having their own Biodiversity Action Plans (e.g. Lee Valley Regional Park).

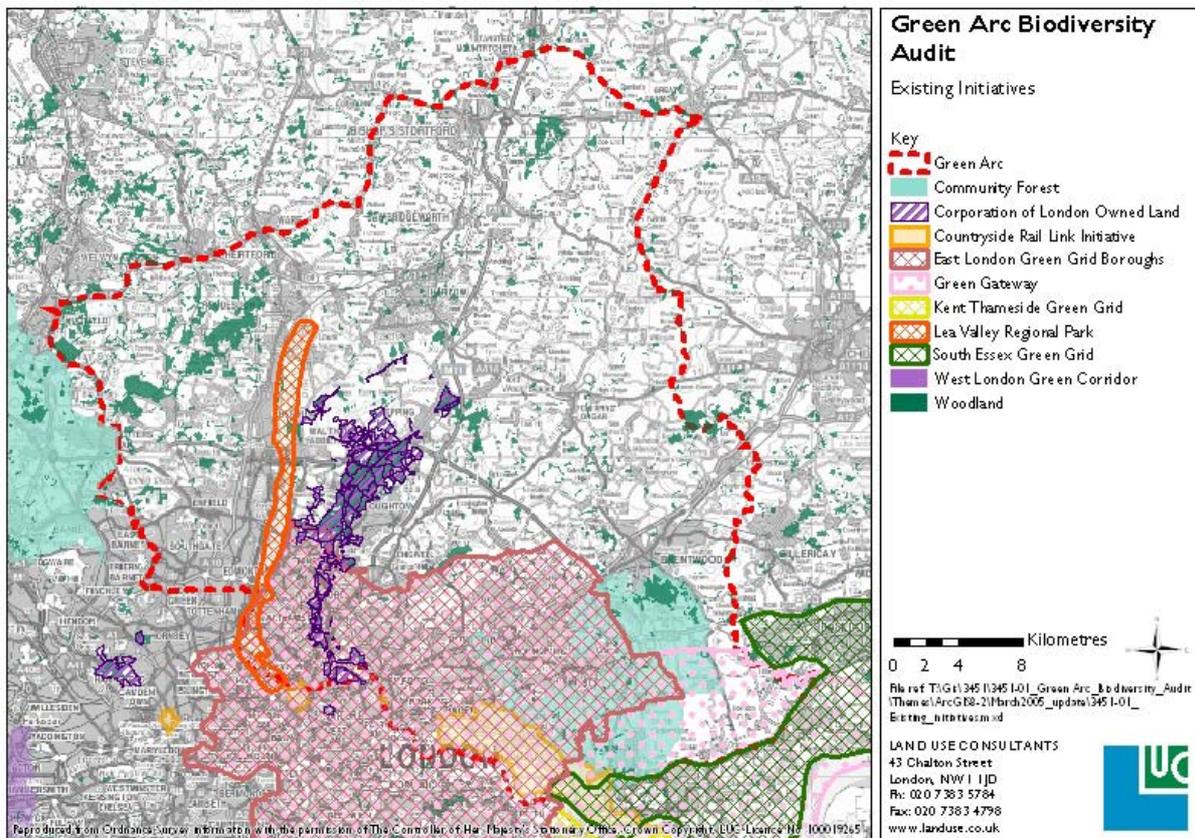


Figure I.3 Sympathetic landowners and environmental initiatives working in the Green Arc

I.17. **Figure I.3** above shows the ownership of the Lee Valley Regional Park and the Corporation of London. Working with these organisations will allow the Green Arc project team to meet more of the biodiversity objectives listed in this document. **Figure I.3** also shows the extent of three other environmental initiatives working within the Green Arc. These initiatives are already helping to improve the ecological resource found in the Green Arc and may help deliver the biodiversity objectives of this report.

Changes to agri-environment schemes and funding

I.18. Over the past few years, environmental organisations have come to realise that the UK’s biodiversity resource cannot be maintained through a site-based approach alone, especially in the lowlands where there are fewer protected sites with greater developmental and agricultural pressures adversely impacting upon them. Maintaining a site based approach would lead to islands of biodiversity in a sea of monoculture and development. Biodiversity conservation is now embracing the idea that the best sites still have to be preserved and enhanced, but the overall condition of the wider countryside for biodiversity is important too. This thinking has led to a number of government initiatives to improve the environmental quality of the wider countryside. Much of the wider countryside is farmland, illustrated in **Figure I.4** below, and so many of the initiatives related to farmland and farmers.

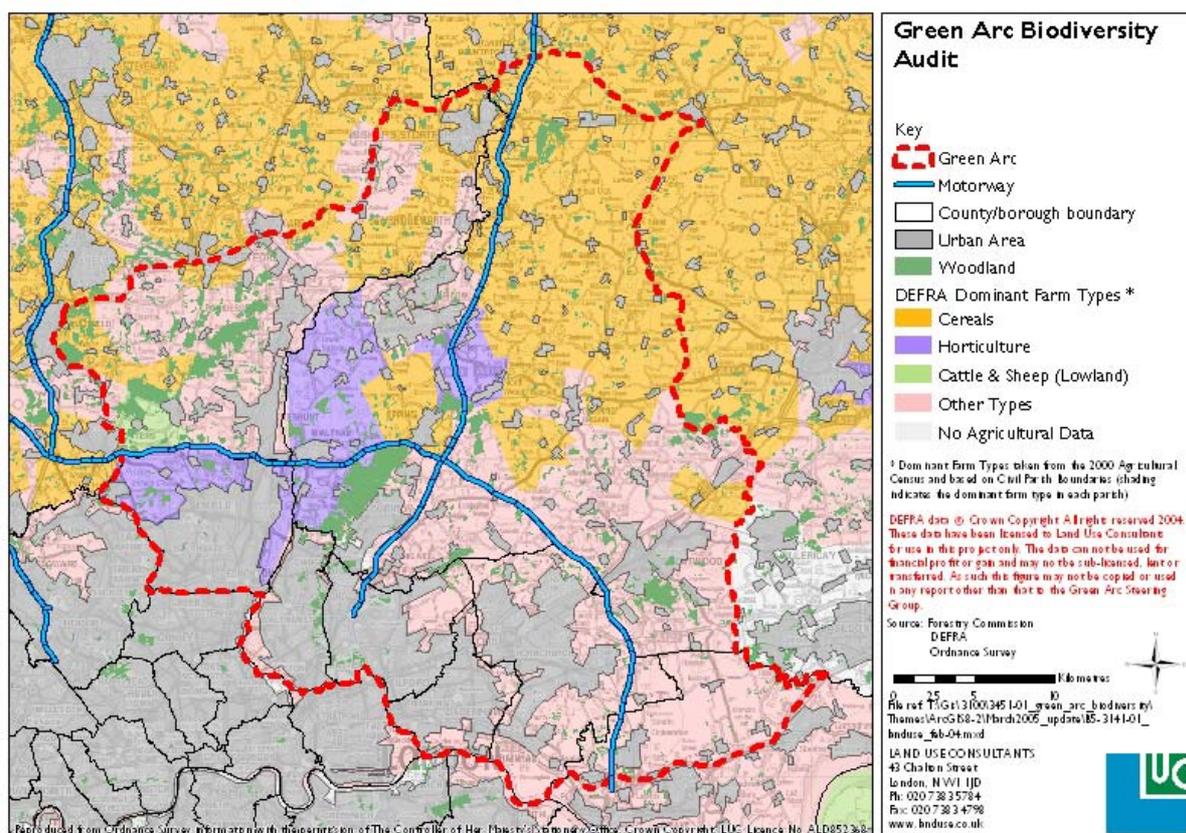


Figure I.4 Farmland types throughout the Green Arc

- I.19. The main initiative that has been operating since 1991 is the Countryside Stewardship Scheme (CSS). It was the Government's principal scheme for conserving and improving the countryside. Farmers were paid grants to follow more traditional farming methods that enhance the landscape, encourage wildlife and protect historical features. These grants could vary between £4 and £525 per hectare, depending on the land type and management option entered into. The scheme was run in parallel with the more prestigious Environmental Sensitive Area (ESA) initiative. Whilst the Green Arc does not contain any ESAs, a large part of it is a CSS Target Area.
- I.20. The CSS and ESA are to be phased out from the start of 2005 and replaced with a new countryside initiative known as Environmental Stewardship Scheme (ESS). The aim of ESS is essentially the same as the CSS. As before the ESS will provide grants to farmers to tackle countrywide environmental problems. However instead of being discretionary the entry-level scheme offers flat rate funding of £30 per hectare will be open to all farms and land providing that the scheme's requirements are met. The ESS also offers extra funding for organic stewardship and provides a 'Higher Level Stewardship' scheme that is available countrywide but considers the wider objectives of resource protection, flood protection and genetic conservation, which in turn requires different funding mechanisms.
- I.21. These changes offer a number of opportunities for the Green Arc, not least the prospect of having all the Green Arc's open land in some sort of favourable management by the end of 2005. The application procedure involves two other points of potential interest to the Green Arc project team. Firstly farmers will be required to prepare a simple Farm Environmental Record which will show the location of environmental features on a map. This simple process will be very useful for identifying and monitoring the progress of the Green Arc's objectives. Secondly farmers and land-managers have to choose from 50 plus management options to reach their individual points targets in order to receive funding. By influencing which options are chosen across the Green Arc a number of the aims and targets of the biodiversity audit could be reached very quickly.
- I.22. Another agri-environment scheme that is being reviewed is the Woodland Grant Scheme (WGS) run by the Forestry Commission and the Farm Woodland Premium Scheme (FWPS) run jointly between the Forestry Commission and DEFRA. In the past these schemes have provided incentives for the creation and sustainable management of woodlands and forests for landowners, land managers and farmers. The WGS applied to all land whereas the FWPS applied only to agricultural land to compensate for lost agricultural income. Both the WGS and FWPS came to an end in 2004.
- I.23. To simplify Woodland Grants the Government is in the process of setting up a single grant scheme called the English Woodland Grant Scheme (EWGS). The EWGS combines the WGS and the FWPS into a single structure that is regionally focused allowing grants to be allocated that help meet the strategic objectives of the Regional Forestry Frameworks and other strategic initiatives. The new schemes main objectives are:
- To sustain and increase the public benefits of existing woodland in England

- To invest in the creation of new woodlands of a size, type, and location that most effectively delivers public benefits
- I.24. It is proposed that the EWGS will have six components- each addressing specific support needs:
- **Woodland Management Planning-** This grant will encourage effective woodland management planning that recognises the different values of the woodlands and encourages sustainable management.
 - **Woodland Assessment-** This grant will support the provision of key information to inform plan preparation and woodland grant and licence applications.
 - **Woodland Management-** This grant will encourage the sustainable management of woodlands – such as grants to support good quality access, repairing boundaries to control grazing, protecting archaeological and historic features within woodlands and controlling non-native species.
 - **Woodland Regeneration-** This grant supports changes to woodland structure following felling activity.
 - **Woodland Improvement-** This grant will support improvements within woodlands in terms of access, education, health, heritage and biodiversity.
 - **Woodland Creation-** This grant will support the creation of new woodlands of the right size, type and location to best deliver public benefits in the region.
- I.25. There will also be extra support for woodlands that are created with public amenity and access in mind.
- I.26. These six initiatives will also be tied in with the new arrangements for the ESS. Therefore some aspects of woodland creation and management will be supported under the ESS, where it is helpful to the overall environmental management of the farm to deal with all the work under one scheme.
- I.27. The new scheme provides a number of opportunities for the Green Arc. Its new strategic focus is aimed at the same level, or just above, as the Green Arc. If the Green Arc Project Plan can influence regional strategic thinking then the EWGS could be used to implement a number projects, beneficial to the biodiversity of the Green Arc. The EWGS is also tied in with the new ESS. This means that farmers and landowners that want to plant woodland can gain points towards their ESS. This in turn will help them access two funding streams, both aimed at improving the environment. The EWGS also provides a number of different funding initiatives allowing landowners and land managers to plant, manage, assess, regenerate and improve woodlands throughout the Green Arc.

Green Infrastructure and Greenway Linkages

- I.28. Initiatives like the ESS, favourable management techniques and the development of organic farms can increase biodiversity and help improve the Green Arc's functional

Green Infrastructure. Green Infrastructure is defined as ‘the sub-regional network of protected sites, nature reserves, greenspaces and greenway linkages’⁶. Figure 2 shows the location of the Green Arc’s protected sites. In addition to these areas the Green Arc contains a number of country parks and other open spaces that can all play a role in maintaining an area’s open space. However, of particular importance to the overall green infrastructure of the Green Arc are its existing greenway linkages. Greenway linkages are linear wildlife corridors which can provide ecological connections between greenspaces and larger areas of habitat. By doing this they help reduce the deleterious effects of habitat fragmentation and can aid species movement through the countryside and urban areas. The most visible examples of these links are hedgerows, river corridors and shelterbelts, however new guidance and improved planning techniques are starting to promote greenway linkages through new developments and into urban environments.

- I.29. The changes to the agri-environment schemes mentioned above means that more of these greenway linkages have the potential to be improved throughout the Green Arc, reducing habitat fragmentation and aiding species movement. These improvements will, over time, allow declining and rare species to re-colonise former areas, which in turn will improve overall habitat integrity in the Green Arc.

Human induced pressures and the Sustainable Communities Plan

- I.30. Whilst there are many positives for the Green Arc and its biodiversity objectives, the area’s wildlife are facing a number of pressures. Intensive agriculture can cause a number of direct and indirect impacts to the Green Arc’s biodiversity. The introduction of the ESS may remedy some of these adverse effects.
- I.31. The Green Arc is also under a large amount of developmental pressure. In 2003 the government set out its long-term programme of action for delivering sustainable communities in both urban and rural areas. This included proposals to meet the predicted shortfall of homes in the South East and London. The government is planning to pick up the majority of this shortfall through four ‘growth areas’. The Green Arc’s boundary crosses into two of these growth areas; the Thames Gateway and the London-Stansted-Cambridge-Peterborough (LSCP) sub-region, which extends broadly along the M11 corridor (See **Figure 1.5** overleaf). The Thames Gateway and the LSCP sub-region have the potential to deliver 120,000 and 500,000 new dwellings respectively. Added to this is the amount of associated development and infrastructure that these dwellings will require, e.g. access roads, water abstraction and treatment, sewage works, electricity cables etc. This could amount to the loss of large areas of viable habitat and the further fragmentation of the Green Arc. However much of the development is planned on brownfield sites within or on the periphery of cities and towns. Whilst brownfield sites contain valuable ecology too, their resource is often less diverse than the ‘pristine’ habitats found on green field sites.

⁶ TCPA (2004) *Biodiversity by Design- A Guide for Sustainable Communities*. TCPA

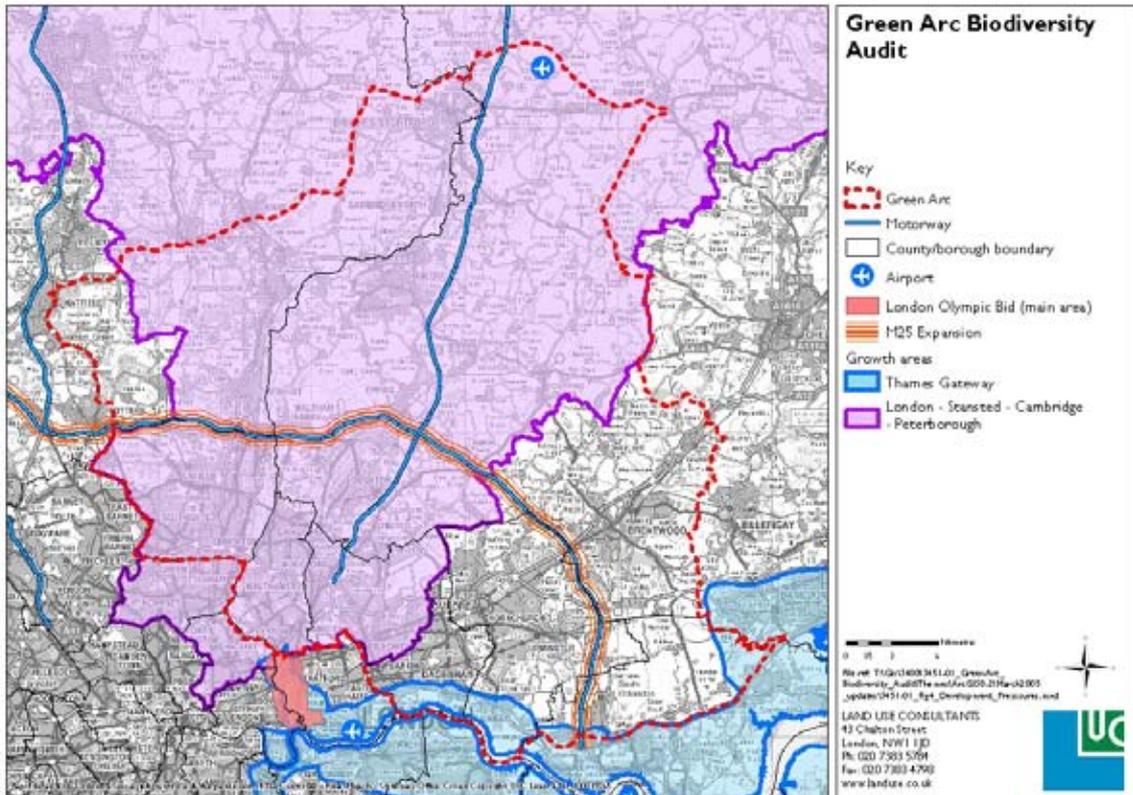


Figure 1.5 Location of the Growth Areas and other development pressures in the Green Arc

- I.32. It is clear that this level of development within and in close proximity to the Green Arc puts biodiversity under a lot of pressure. Whilst this development will cause impacts there may also be some opportunities for conserving, maintaining and enhancing the Green Arc's biodiversity resource. The Green Arc report states that *'a significant amount of funding is being made available for the creation of greenspace alongside the new housing developments'*⁷ This funding could be used to promote the use of best practice green infrastructure techniques within the new developments themselves, thus creating a wildlife resource as well as new developments on formerly brownfield land. Outside the developments themselves, funding for habitat restoration projects, favourable land management schemes, educational programmes and re-colonisation initiatives could also be funded by planning obligations that often accompany large developments.
- I.33. The project drivers described above illustrate the number of opportunities and threats faced by species and habitats within the Green Arc. In order to make the most of these opportunities it is important that the Green Arc project team focuses on the species and habitats that are of utmost importance for the study area.

⁷ Quote taken from, 'Bringing the Big Outdoors closer to people. Improving the countryside around London: the Green Arc Approach' Land Use Consultants, 2004. Found on the World Wide Web at: www.green-space.org.uk/Downloads/greenarc.pdf

METHODOLOGY

- I.34. To meet the objective of this study a simple and thorough methodology was employed. This involved three stages, which are described below.

Stage 1. Target Identification

- I.35. In order to produce targets and objectives that could be implemented by the Green Arc Project Plan, LUC carried out an audit of all existing national and county Biodiversity Action Plans (BAPs) and Natural Area Profiles which fall within the Green Arc area, to identify all relevant Habitat Action Plans (HAPs) and Species Action Plans (SAPs). The biodiversity targets found in these plans and profiles will be at roughly the same strategic scale as the Green Arc, and as a consequence will be more easily integrated into the Project Plan. Once the HAPs, SAPs and Natural Area targets were identified they were reviewed and collated so that the most appropriate HAPs, SAPs and targets could produce a biodiversity overview for the Green Arc showing the species and habitats thought to be most at risk.

Stage 2. Target Analysis

- I.36. Once the targets were identified and collated they needed to be prioritised to ensure that the most important habitats and species for the Green Arc receive appropriate funding, management and conservation action. Any conflicts that may have existed between the various targets also needed to be highlighted and where possible remedied.
- I.37. Guidance⁸ suggests taking an objective approach to prioritising the biodiversity targets that was based around various ecological criteria (e.g. rarity, decline, threat etc) and local expert judgement. To meet this requirement a consultation document was drawn up and sent out to a number of BAP and wildlife experts working in the Green Arc. The consultee list can be seen in Appendix 3 and a copy of the Consultation Brief is available in Appendix 4. The brief contained a number of questions regarding prioritising the targets and identifying conflicts as well as questions on the format of the final document.

Stage 3. Report Production

- I.38. The consultation responses and the our own analysis provided enough information to produce a prioritised set of BAP targets for the Green Arc, and identify a number of associated site or area specific targets and actions.

Public Service Agreement Targets

- I.39. Throughout the whole of this process it will also be important to identify opportunities where the Green Arc can help meet DEFRA's Public Service Agreement (PSA) targets⁹. DEFRA's PSA objectives and targets relate to a number of themes including improving the urban and rural environment, sustainable farming, and

⁸ Guidance for Local Biodiversity Action Plans- Evaluating priorities and setting targets for habitats and species. Guidance Note 4 (1997) UK Local Issues Advisory Group

⁹ The Government's 2002 Spending Review Public Service Agreement White Paper can be found on the World Wide Web at: http://www.hm-treasury.gov.uk/Spending_Review/spend_sr02/spend_sr02_index.cfm

achieving positive trends in the 15 Quality of Life headline indicators. However of particular importance to this project and the Green Arc concept is DEFRA's third Performance Target:

Performance Target 3

Care for our natural heritage, make the countryside attractive and enjoyable for all, and preserve biological diversity by:

- *Reversing the long-term decline in the number of farmland birds by 2020, as measured annually against underlying trends*
- *Bringing into favourable condition by 2010 95% of all nationally important wildlife sites*
- *Opening up public access to mountain, moor, heath and down and registered common land by the end of 2005*

I.40. Meeting these targets will affect the Green Arc's biodiversity in a number of ways. The first two points will improve biodiversity in the Green Arc, whereas the final point has the potential to impact it by increasing the amount of human induced disturbance.

2. HABITAT AND SPECIES AIMS AND TARGETS

PRIORITISING HABITATS AND SPECIES

- 2.1. The biodiversity audit process laid out in Section 1 identified 24 species and 16 habitats¹⁰. Associated with each of these species and habitats were a number of aims, objectives and targets, which varied depending on where they came from. For consistency LUC standardised each of the actions and produced the biodiversity matrix found in Appendix 2. This matrix included the majority of national and county BAP habitats and species found in the Green Arc and listed alongside each one a number of aims and targets.
- 2.2. The 24 species and 16 habitats were then refined further through a consultation exercise. Appendix 3 shows the people and organisations that were consulted. A copy of the consultation brief can be found in Appendix 4. The organisations and individuals that took part in the consultation process are listed below. The first four completed the consultation document whereas the final contributor provided contextual information.
- Anita Parry- Hertfordshire Biological Records Centre
 - Alison Giacomelli- RSPB
 - Claire Cadman- Essex Wildlife Trust
 - Jez Elkin- London Borough of Waltham Forest
 - William Moreno- London Biodiversity Partnership
- 2.3. Discussions with English Nature helped to produce a final list of habitat and species targets for the Green Arc. The habitats deemed most important to the Green Arc and its biodiversity are listed below:
- Woodlands
 - Heath and Acid Grasslands
 - Aquatic Environments
 - Wetlands
 - Farmland
 - Urban

¹⁰ The matrix actually contains 23 individual species and one set of combined actions for Bats.

2.4. The species requiring protection and increased opportunity are:

- Water Vole
- Bats
- Dormice
- Tree Sparrow
- Song Thrush
- Skylark
- Grey Partridge
- Great Crested Newts
- Adders
- Stag Beetles
- White Clawed Crayfish
- Hornet Robber Fly
- Black Poplar
- Creeping Marshwort

2.5. These habitats and species are discussed in greater length over the following pages. Each habitat and species is given a brief overview describing their current condition and the threats that they face. A list of aims and targets also accompanies each habitat and species providing a guide to the actions that the Green Arc Team should support. Actions that are *italicised* are taken directly from the *Natural Area targets*, whereas actions that are in **bold** are **UKBAP targets**. Some of the targets and actions have been slightly modified to allow sufficient time for completion. Section 3 discusses the habitats in more detail and Section 4 discusses the species in more detail.

3. GREEN ARC HABITAT ACTIONS

WOODLAND

Current Status

- 3.1. Woodlands are the natural vegetation cover of most of lowland Britain and as a result are one of the Green Arc's richest wildlife habitats. They often contain the greatest numbers as well as many of our rarest and most threatened species. Once much of the Green Arc would have been covered in woodland, today however this cover is much reduced.
- 3.2. The woodland found in the Green Arc is of varying ecological quality and will have been subject to management at some point. Similarly some of the woodlands will be older than others and others will have had different levels of management and use. Age and management are often used to categorise woodland and can be also used as an indication of habitat quality. Woodland types can be categorised as follows:
 - **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. These woodlands are usually the richest in wildlife and support the greatest diversity of plants and animals. **Ancient Woodland is an irreplaceable natural asset;***
 - **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. (Hertfordshire BAP)*
- 3.3. Many species only exist in Ancient Woodlands. The long continuity of woodland cover has enabled many rare and specialised woodland species with poor powers of dispersal to survive. Good quality ancient woodland will not only contain a diverse mix of wildlife but will also contain a varied structure including a large amount of fallen and standing deadwood. A varied age structure and a large amount of deadwood will ensure the survival a wide variety of specialist species.
- 3.4. Although less diverse, secondary woodlands are none-the-less an important habitat, providing buffering for ancient sites, habitat linkages and an additional habitat to more generalist woodland species. Dead wood retention can provide equally good habitat here too.

- 3.5. All three types of woodland will have had, either now or in the past some sort of management. Types of management include:
- 3.6. **Coppice:** A large percentage of the woods in Essex and in east and north Hertfordshire contain significant levels of coppice. Coppicing produces a young open and shrubby habitat with species accustomed to the early stages of woodland development and woodland edges. There has however been little coppicing in the last 50 years due to the loss of markets for coppice products.
- 3.7. **High Forest:** This management was used to produce timber with mature 'standard' trees harvested over a much longer timescale. This management produces a much more natural mature woodland structure resembling interior forest habitats and having a much greater potential for deadwood, but with less open space and early woodland habitat. This management provides a very different habitat to coppiced woodland and as a result it is inhabited by different species.
- 3.8. **Wood Pasture:** This is combination of woodland and grazing. The trees are often pollarded to produce timber whilst the deer or cattle graze beneath. Veteran pollarded trees provide a useful bryophyte habitat and provide large amounts of dead wood. The resulting habitat is quite open with mature trees, useful for bats and birds, whilst the deadwood provides good invertebrate habitat. The habitat beneath the trees can also be of biodiversity importance especially if it includes unimproved grasslands or heathland. South Hertfordshire and London contain many examples of this habitat, of particular note is the ancient woodland pasture of Epping Forest.
- 3.9. **Minimum Intervention:** Many woods in the Green Arc will not have been managed for 50-100 years. These woods will eventually develop a high forest character, but will often contain larger amounts of deadwood.
- 3.10. In England woodlands are generally better protected by the planning system than most other habitats, particularly ancient woodland. There are statutory controls on felling and forestry operations as well as Tree Preservation Orders that can apply to individual trees, groups of trees or whole woodlands. Many of the woodlands in the Green Arc are also nationally or internationally designated.

Threats

- 3.11. **Lack of function and neglect-** Woodlands have suffered on most estates from the decline in demand for traditional wood products, leading to woods being grubbed out, coniferised or neglected. Neglect has increased, as there is a lack of knowledge on how to manage these sites and of markets for products.
- 3.12. **Agricultural intensification and new development-** Loss of woodland due to agricultural intensification has largely stopped, however new development still poses a significant threat.
- 3.13. **Inappropriate management-** The removal of large old trees, uncontrolled grazing by deer and livestock can damage the age structure and prevent regeneration. This can allow invasive species such as rhododendron or sycamore to become established. In the past the introduction of coniferous trees has been a serious problem.

- 3.14. **Pest damage-** Increasing deer numbers, primarily fallow and muntjac, are having a serious impact especially where coppicing or planting is being carried out. Grey squirrels can be a significant problem affecting a range of species. High rabbit or hare numbers can also destroy new trees and coppice.
- 3.15. **Encroaching Plants-** A number of non-native and invasive species can cause a variety of problems for Woodlands. Sycamore (*Acer pseudoplatanus*) can grow quickly and densely and can be damaging to species rich woodlands. Rhododendron (*Rhododendron maximum*), Cherry Laurel (*Prunus caroliniana*), Portuguese Laurel (*Prunus lusitana*), Holly (*Ilex aquifolium*) and Bracken (*Pteridium aquilinum*) can all cause problems by shading out ground flora and limiting tree regeneration. Other foreign species, such as Spanish Bluebell (*Hyacinthoides hispanica*), can hybridise with native variants, whilst other non-natives, such as Turkey Oak (*Quercus ceris*) take up room in forests but do not provide the same amount of habitat as the native species. Turkey Oaks also provide a host for the Knopper gall, which sterilises the acorns of native oaks.
- 3.16. **Recreation use/pressures-** Public access can put pressure on woodland wildlife. Well-used woodlands may require safety works such as the removal of dead, standing trees. Walkers can cause significant damage over time through prolonged trampling of well-used paths. Horse riding can be a localised problem in some woods. Illegal uses, such as motorbike riding, can exacerbate the problems. Outdoor pursuits like paint balling can also cause damage to sensitive sites.
- 3.17. **Amenity factors restricting management-** Many woods, particularly urban and urban fringe sites have significant amenity value. There is frequently public concern at attempts to manage the sites especially if operations such as coppicing are proposed.
- 3.18. **Fly-tipping-** Many woods suffer from fly-tipping, especially in urban fringe areas. Garden waste can change soil fertility and introduce exotic species to sites.
- 3.19. **Loss of dead wood-** The tidying of many woods, often associated with enhancing amenity and ensuring safety, has led to the loss valuable habitat for a wide range of invertebrates, for example the stag beetle, and fungi.
- 3.20. **Isolation from other habitats-** Woods separated from other habitats by arable fields or housing for example will be prone to the loss of those species that cannot spread easily.
- 3.21. **Climate change-** Whilst it is not certain what effects climate change will have on habitats such as woodland it is likely that it will alter the viability of some species which may result in changes to the character of woods.' (Essex BAP and London BAP)

Current Action

- 3.22. There are a number of actions taking place in the Green Arc that affect woodland. Hertfordshire County Council has produced a County Woodland Strategy. This document covers all aspects of woodland from creating new stands to timber production, recreation and landscape. It also groups together woodland complexes over 100Ha and assigns them various woodland management zones. The zones allow

different areas of the forest to be used for different uses. Any actions affecting Hertfordshire's woodland should be cross-referenced with Hertfordshire's Woodland Strategic Action Plan.

- 3.23. Essex County Council is part of the Anglian Woodland Project. This scheme provides advice to woodland managers about the markets available for sustainable woodland projects. Several other bodies in Essex and in London also provide expert woodland management advice.
- 3.24. A number of other woodland initiatives also exist between London and Essex. Most of these have appeared as a response to the Thames Gateway and other major developments in the area. These include:
- The Green Grid Network- strategically linking and improving green spaces in the Thames Gateway
 - The Green Gateway- Promoting woodland creation and tree growth throughout the Thames Gateway
 - Thames Chase Community Forest- aims to increase tree cover throughout the Thames Chase area for biodiversity and recreation. The initiative increased woodland cover from 8% to 13% from 1990 to 2003.
- 3.25. The Woodland Grant Scheme run by the Forestry Commission also offers opportunities and funding for woodland creation and management. However this scheme is changing. The new English Woodland Grant Scheme will be available in 2005 and currently under consultation.

Aims

1. To halt the further loss of ancient woodland and ensure that no more areas are lost in the future
2. To ensure all ancient woodland, Local Authority woodland and woodland complexes over 100 ha are appropriately managed to protect their size, integrity and biodiversity
3. Increase woodland cover especially in areas of woodland deficiency and to act as a buffer for ancient woodland
4. Manage the woodland reserve for a variety of objectives, including conservation, recreation and limited timber production
5. At appropriate sites increase production, use and markets for sustainable timber and woodland products

Targets

1. To have 50% of the woodland area and 100% of the ancient woodland area managed sensitively in line with the UK Forestry Standard by 2008

2. To ensure that all local authority woodlands are in agreed management schemes by 2007
3. Establish at least 15 Ha of new woodland a year particularly around ancient woodlands and woodlands that are accessible from urban areas
4. *To have 50% ancient woodland, wet woodland, and lowland beech and yew woodland in a favourable condition by 2010, with 100% in a favourable condition by 2015.*
(Favourable condition will depend on the management objectives of each of the individual woods, i.e. favourable condition in a coppice woodland will be different to favourable condition in a high forest woodland, however most woodlands should have identified their respective management objectives by 2010)
5. Formulate a woodland strategy for the Green Arc area which incorporates other woodland strategies (Thames Chase, London's Tree and Woodland Framework, Hertfordshire Woodland Strategy, Epping Forest etc.) and can look at opportunities for new planting, improved management, best practice and economic benefit. Complete this by mid-2007.
6. Help develop markets for a range of woodland products, by bringing at least two London, two Hertfordshire and three Essex local councils under FSC certification by 2010. All local authorities should follow by 2015.

HEATH AND ACID GRASSLANDS

Current Status

- 3.26. Lowland heathlands and acid grasslands are largely semi-natural habitats maintained through human interference. They often occur together on similar acidic soils with slight changes in nutrients or humidity giving rise to slightly different habitat types and mixtures. These habitat mixtures are often referred to as habitat mosaics. Depending on the location and size of the heathland/grassland mosaic a number of communities can be recognised, including acid grassland, dry heath, lichen heath, wet heath, mire, bracken and scrub. These communities contain a specialised group of plants and animals that are often not found anywhere else making lowland heathland one of the most biodiverse habitats in the country.
- 3.27. Historically large parts of the GA would have been turned over to acid grassland and heath for grazing livestock. Today only a fraction of that remains with the largest remaining areas found in Epping Forest, Northaw Great Wood and the surrounding commons, as well as around Hertford Heath. There are also other smaller areas of heath and acid grassland found all over the GA such as Mill Green Heath and Hatfield Heath in Essex and Wanstead Flats in Redbridge. Much of the early loss of heathland was down to agricultural intensification and lack of management. However this has recently stopped and most of the remaining heathlands are now managed for conservation, although some still suffer from encroaching scrub and poor management.
- 3.28. Both Lowland Dry Acid Grassland and Lowland Heathland are listed as Priority Habitats for conservation in the UK Biodiversity Action Plan. Lowland dry and wet heath communities also are listed on Annex I of the EC Habitats Directive, which requires member states to restore and maintain these habitats at a favourable conservation status.

Threats

- 3.29. **Scrub Encroachment-** 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.
- 3.30. **Mismanagement-** 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.

- 3.31. **Inappropriate Grazing-** The third major threat, which applies particularly to acid grasslands, is inappropriate 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.
- 3.32. **Site isolation and size-** 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.
- 3.33. **Recreation-** Trampling in particular can inhibit the growth of scarce plants. Other human induced impacts, such as accidental fires, can also cause problems for heathland/grassland ecology. Also large urban populations often resist attempts to positively manage or restore heath and acidic grassland habitats, through scrub and tree removal or enclosure (even temporary) for grazing.
- 3.34. **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.
- 3.35. **Lack of Identity-** Less of a problem for heathland, but a major consideration for acid grasslands which are often undervalued. This makes them particularly vulnerable to mismanagement, and beyond protected sites, they are frequently seen as expendable by developers and their advisers.

Current Action

- 3.36. In London all heathland sites that were identified by the London Biodiversity Audit are included in existing Sites of Importance for Nature Conservation (SINC). Similarly most of the acid grassland sites are also protected with SINC, however there may still be some areas within the London Green Arc Boroughs that have yet to be identified and as a result are unprotected. Most London heathland and acid grassland sites in public ownership also have a management plan and some receive grant funding, for fencing and scrub removal, although often more still needs to be done to improve the overall habitat quality.
- 3.37. In Essex several sites have active management and restoration programmes. Two of these sites can be found within the Green Arc. One, Epping Forest, provides a large amount of heathland through a series of woodland glades. The other, on the eastern edge of the Green Arc at Mill Green, is a much smaller site where a number of acid habitat projects are taking place.
- 3.38. The Hertfordshire BAP suggests a number of heathland and acid grassland restoration schemes. Many of these schemes fall outside the Green Arc however one of the major initiatives is being run at the Broxbourne-Northaw-Hatfield complex in the western part of the Green Arc. Here acid grassland/heathland restoration has been targeted on Cowheath Wood, Broad Riding Wood and Old

Northaw and Cuffley Commons. The scheme hopes to add 25Ha of quality heathland within the complex and work with neighbouring landowners and managers to produce another 100 Ha by 2050.

Aims

1. To ensure no further loss of heathland or acid grassland extent or quality within the Green Arc Area and maintain the existing area as a quality minimum
2. To protect all unimproved and semi-improved acid grassland and heathland habitat within the Green Arc Area
3. *To maintain and enhance the wildlife value and biodiversity of existing heathland through appropriate management schemes*
4. To implement appropriate management on all acid grassland sites to benefit the habitat itself and the species that live there
5. To create new areas of heathland and acid grassland habitat reflecting historical distribution and suitable geological conditions
6. Increase people's awareness and appreciation of conservation status and management requirements of heathland and acid grassland

Targets

1. Identify all heathland and acid grassland habitats and habitat mosaics and pinpoint areas of improvement and habitat re-creation by 2007
2. To have appropriate management on all major heathland and acid grassland sites by 2010 starting with the SSSI's and larger sites.
3. To have established a restoration programme on all degraded heathland sites by 2007, bringing at least 50% back to favourable condition by 2011
4. *To ensure favourable condition on all acid grassland sites by 2015*
5. *To increase the acid grassland resource by 15ha in the lowlands and 15ha in the uplands by 2012*
6. Identify key sites for the creation or re-introduction of new heathland by 2007, creating 20Ha of new habitat by 2010
7. To aid and spread the ideas of London's strategic conservation programme for invertebrate fauna into the Green Arc area by 2010.
8. Promote acid grasslands using flagship sites and by employing a strong invertebrate theme, through a series of regular public events, site visits and educational events by 2007

AQUATIC ENVIRONMENTS

Current Status

- 3.39. The Green Arc includes many rivers, streams, canals and areas of open water (including ponds, lakes, reservoirs and gravel pits). The greatest concentrations of aquatic environments are associated with the main river corridors such as the Stort, Lea, Roding, Mar Dyke, and Ingrebourne. There are few stretches of these watercourses, from spring source to floodplain, that have not been physically altered by human activity; for example sections of both the Lea and its tributary the Stort underwent canalisation in the 18th and 19th century to improve navigation for commercial traffic. As a result riparian habitats are often poorly developed or absent, and opportunities for semi-natural aquatic vegetation to develop are scarce, with the river typically divorced from surrounding wetland habitats, and flood events a rare occurrence. However, where natural features remain such as riffles, gravel bars, eroding banks, meanders and ox-bows, wildlife value is often high, and characteristic species present in these situations include:
- **aquatic plants** – arrowhead, yellow water-lily, and water crowfoots;
 - **birds** – kingfisher, heron and coot;
 - **invertebrates** – dragonflies, damselflies, diving beetles, and caddis flies;
 - **mammals** – bats, brown rat and water vole;
 - **fish** - carp, three-spined stickleback and pike;
 - **amphibians** – common frog, common toad, and smooth newt.
- 3.40. Open water encompasses both natural and man-made bodies of water with no discernable flow. Natural areas of open water are very rare outside of the upland region of England, and the majority of open water in the Green Arc is of human origin. These include abandoned gravel pits and reservoirs in the Lea Valley, ornamental pond and lakes in public parks and country estates, together with ponds within commons, forests and farms. Open water habitat within farms and wetlands has declined in the post war period as a result of land drainage and changing farm practises, but to some extent these losses have been compensated for by the habitat provided by garden ponds, reservoirs and abandoned gravel pits.
- 3.41. Bodies of open water that are allowed to develop naturally and remain relatively undisturbed by human activity, such as water-based recreation, can support a diverse mixture of plants and animals that typically include:
- **birds** – larger reservoirs and gravel pits in particular are important for a wide range of species that include pochard, tufted duck, cormorant, mute swan, and great crested grebe;
 - **invertebrates** – dragonflies and damselflies;
 - **aquatic plants** – rigid hornwort, spiked water milfoil and yellow water-lily.

- **amphibians** – smooth newt, palmate newt, great crested newt, common frog, and common toad.
- 3.42. The UK Biodiversity Action Plan includes the following priority habitats related to rivers and streams, and open water: aquifer fed naturally fluctuating water bodies, eutrophic standing waters, mesotrophic lakes, and chalk rivers. Of these only eutrophic waters are likely to occur in the study area, for example some of the biologically rich gravel pits in the Lea Valley.

Threats

- 3.43. **Water quality** – The majority of rivers, streams and open water in the study area are naturally eutrophic (nutrient rich) but the influence of human activities, such as agricultural run-off and sewage discharge, have tended to further enrich watercourses to levels in excess of what would be considered natural. The effect on aquatic wildlife typically involves a reduction in overall diversity as a small number of nutrient tolerant species dominate. Where eutrophication is a continued problem algae can overwhelm the water body, and the resulting water turbidity is detrimental to other aquatic plants and associated animals. If water quality deteriorates further still blooms of toxic blue-green algae can pose a severe threat to the aquatic eco-system.
- 3.44. **Water quantity** – Many of the watercourses in the study area suffer from low summer flows, often as a result of over-abstraction upstream. In the long-term, lowering of water levels can lead to detrimental changes in the composition of aquatic plant and animal communities.
- 3.45. **Recreational activities** – The popularity of water-based leisure pursuits, can lead to conflicts with nature conservation interests. Activities that require careful management to ensure impacts upon aquatic wildlife are minimised include angling, sailing, and pleasure boating.
- 3.46. **Management** – Natural succession is not typically a threat to rivers and streams, but open water can progress to swamp, fen and eventually some form of terrestrial vegetation if periodic clearance is not carried out. The wildlife of small ponds, and the margins of larger water bodies, can also suffer as a result of over-shading bank-side vegetation.
- 3.47. **Development** – The construction of new residential and industrial property, and associated land drainage and flood defence works can result in direct loss of aquatic habitats or indirectly lead to the modification of plant and animal communities.

Current Action

- 3.48. **Table 3.1** below lists the key sites in the Green Arc protected under international and national designations primarily for their aquatic wildlife interest. In addition a number of other sites designated for their importance as terrestrial habitats include areas of river, stream and open water for example Epping Forest, Hatfield Forest and Rainham Marsh.

Table 3.1 Examples of key aquatic sites in the Green Arc

Site	Designation	County/Borough
Amwell Quarry*	RAMSAR SPA SSSI	Hertfordshire
Rye Meads*	RAMSAR SPA SSSI	Hertfordshire
Turnford and Cheshunt Pits*	RAMSAR SPA SSSI	Essex/Hertfordshire
Chingford Reservoirs	SPA SSSI	Enfield
Cornmill Stream and Old River Lea	SSSI	Essex
Walthamstow Reservoirs*	RAMSAR SPA SSSI	Waltham Forest

* These four sites are components of the Lee Valley SPA and RAMSAR site

- 3.49. A number of schemes are being developed to enhance aquatic habitats along the main river corridors in the Green Arc. For example the Environment Agency in the northeast Thames region is working with both the Lea Valley Regional Park Authority and Redbridge Borough Council on projects that seek to restore habitat quality along the River Lea and River Roding respectively. Similarly in Havering the Ingrebourne Valley Enhancement Programme aims to improve the biodiversity of the River through implementing a series of sustainable management objectives.

Aims

1. *Identify, protect and maintain all mesotrophic and eutrophic standing waters within the Green Arc.*
2. *Maintain the characteristic plants and animals of all waterbodies and watercourses in the Green Arc*
3. To identify opportunities for improving the biodiversity of all waterbodies in the Green Arc
4. To stop chemical pollution of the Green Arc's watercourses and *maintain the flow and quality of river water.*
5. To protect waterbodies that act as vital green corridors between different areas of natural habitat.

6. *To agree mineral extraction and after-use strategies which will ensure a balance between nature conservation, mineral winning, recreation and agriculture*

Targets

1. Identify all mesotrophic and eutrophic standing waters in the Green Arc by 2006
2. To implement appropriate management and maintenance on all waterbodies by 2008
3. To develop and implement a successful programme of habitat improvement and creation initiatives across the most degraded waterbodies by 2008.
4. To bring 95% of waterbodies to good ecological and chemical quality by 2015
5. Return at least 50% of unfavourable standing waterbodies to favourable condition (Tier 2 to Tier 1) by 2020

WETLANDS

Current Status

- 3.50. The terminology used to describe wetland habitats in the BAPs that cover the Green Arc area is varied; wetlands as described here include the following habitats: fen, marsh, swamp, reedbed and wet grassland (including grazing marsh). These habitats are typically concentrated around the major rivers primarily the Lea, Stort and Roding. The type of wetland vegetation present is determined by a number of factors, the most important of which include period of inundation, underlying substrate and water chemistry. Together these habitats represent a transitional stage between terrestrial and aquatic vegetation, and often occur in mosaics with a number of other riparian habitats such as wet woodland.
- 3.51. In the past wetland habitat was undoubtedly more extensive along the major rivers in the Green Arc. River engineering for agriculture and flood defence, abstraction of ground water, and agricultural improvement and development of floodplain habitats has greatly reduced its extent. However, remnants do exist largely in country parks, nature reserves and designated sites, and abandoned gravel workings, have provided opportunities for new areas of wetland habitat to develop, for example within the Lea Valley.
- 3.52. Fens typically occur upon peaty substrates that are kept wet by groundwater for most of the year, marsh develops in seasonally flooded areas on mineral substrates often in transitions with wet grassland. Fen and marsh habitats contain a host of characteristic wildlife; in particular they can be rich in plant and specialist invertebrate species. The Lea Valley supports important areas of fen and marsh; key sites include Rye Meads/Silvermead, Fishers Green and Walthamstow Marsh. Along the Stort in Hertfordshire good examples are located at Thorley Flood Pound, Sawbridgeworth Marsh and Hollingshead Meads.
- 3.53. Swamp vegetation tends to be dominated by tall herbs, and typically fringes open water, with water ground level for most of the year. It is a common component of much of watercourses within the study area, which have not been subject to extensive modification.
- 3.54. Reedbed is a generic term for any vegetation dominated by common reed (*Phragmites australis*), but in particular refers to those stands under water for much of the year. The Lea Valley contains the greatest concentration of this habitat in the Green Arc, key sites include Rye Meads, Fishers Green, and Walthamstow Marshes, outside of the Lea Valley sites of importance occur in Hertfordshire at Cheshunt gravel pits, and in Greater London at Rainham Marshes, Goresbrook, Ingrebourne Marshes, and Roding Creek. Reedbeds support a distinctive breeding bird assemblage, and within the Lea Valley the red data book bird the bittern is a regular winter visitor. This strategy does not refer to the bittern (*Botaurus stellaris*), a threatened species, in depth due to the extensive work that has previously been and is still being undertaken by Lea Valley Regional Park. Consultation has suggested that there is less scope for similar works elsewhere in the Green Arc

- 3.55. Wet grassland and grazing marsh are periodically inundated often associated with the floodplains of rivers and the lower reaches of estuaries. Unimproved wet grassland is often rich in plant species and is one of the UK's scarcest grassland types. Grazing marsh is typically less botanically rich, and is often more extensive, the vegetation having been reclaimed from saltmarsh, for agriculture, by the construction of earth defences that restrict tidal immersion. They provide important habitat for breeding waders and wildfowl, and the network of ditches often support specialist invertebrate and plant assemblages; in addition they remain a stronghold for the UK BAP mammal the water vole. Important areas of wet grassland remain at a number of sites, within the Lea Valley, for example Walthamstow Marsh and Sewardstone Marsh, Walthamstow Marsh in particular is home to a number of uncommon plant species that include the red data book species creeping marshwort. In Essex the Roding Valley Meadows complex is an excellent example of a traditionally managed floodplain grassland rich in plant and invertebrate species. Other key wet grassland sites include Bedfords Park, Cranham Marsh and the Ingrebourne Marshes in Havering, and Hundson Mead and Parndon Meads along the Stort in Hertfordshire. In terms of grazing marsh, Rainham Marshes represents the most important site within the study area.
- 3.56. The wetland habitats discussed here, encompass five priority habitats: fens, purple moor grass and rush pastures, reedbeds, coastal and floodplain grazing marsh, and lowland meadows. The distribution of purple moor grass and rush pastures is unclear within the study area; fragments are likely to occur within Epping Forest, and in mosaics with wet grassland vegetation along the major rivers. However, good examples of each of the other habitat types occur in suitable locations. In particular extensive examples of reedbed occur in the Lea Valley, and floodplain grazing marsh at Rainham.

Threats

- 3.57. **Management-** Successional change is inevitable if wetland vegetation is not managed. As organic material accumulates the habitats dry-out, and typically move towards terrestrial scrub and woodland. Therefore, periodic clearance of swamp vegetation, together with grazing or mowing of fen, reedbed, and wet grassland is essential if wetlands are to be conserved in the long-term.
- 3.58. **Water Quality-** Enrichment from flood and groundwater that contain high levels of nutrients, often as a result of human activities such as farming and sewage treatment, typically causes a decline in plant and animal diversity. In addition storm water run-off from urban areas introduces toxins and pollutants into the wetland foodchain, e.g. organochlorines.
- 3.59. **Water quantity-** Over-abstraction in the upper reaches of many of the river catchments has reduced summer flows, and often leads to the drying out of marginal wetland habitats. In addition river engineering has greatly reduced the incidence of floodplains being inundated seasonally. Both tend to alter the nature of wetlands with specialist plant and animal species becoming replaced by more commonplace terrestrial assemblages.

- 3.60. **Development-** Construction of housing and industrial units upon wetlands leads to direct loss of habitat, indirectly the surfacing of land can alter the ability of wetlands to recharge groundwater levels and sever links between rivers and their floodplains.
- 3.61. **Recreational activities-** Water based recreation activities are popular, for example the Lea Valley Regional Park is well used by anglers, sailors and other water-sport enthusiasts, and careful management is required to avoid excessive disruption to wetland wildlife such as breeding birds.
- 3.62. **Problem species-** A number of invasive non-native species can pose a threat to wetland habitats. Examples of problem species and their impact within the Green Arc include Himalayan balsam (*Impatiens glandulifera*), which once established can form continuous stands and displace native plants, and Canada geese (*Branta Canadensis*), large numbers of which can lead to overgrazing of wet grassland and recently cut reedbeds.
- 3.63. **Public perception-** Wetland sites can be perceived as lacking any economic benefit to landowners, and where wildlife is elusive they can be perceived as supporting little biodiversity. In addition sites in the lower reaches of rivers tend to accumulate windblown or tidal rubbish and can appear visually unattractive.

Current Action

- 3.64. Many of the key wetland sites within the Green Arc are designated as SSSIs and receive statutory protection, examples of these are summarised in **Table 3.2** overleaf.
- 3.65. The Lee Valley SPA includes a number of SSSIs that fall within the Lee Valley regional Park. This European designation provides even greater protection for these sites. The Lee Valley also has its own BAP which helps manage and enhance the wetland habitats found in the Regional Park. Seventy Acres Lake has particular protection as it is part of the LIFE nature project to create a strategic network of SPA reedbeds for bitterns. Through this project, reedbeds are being promoted and protected in the Green Arc.

Table 3.2 Examples of key wetland sites found in the Green Arc

SSSI Name	County/Borough	Fen and Marsh	Swamp	Reedbed	Wet grassland and grazing
Inner Thames Marshes	Havering			X	X
Walthamstow Marshes	Waltham Forest	X		X	X
Ingrebourne Marshes	Havering			X	X
Turnford and Cheshunt Pits	Essex/Hertfordshire			X	
Rye Meads	Hertfordshire	X		X	X
Sawbridgeworth Marsh	Essex/Hertfordshire	X		X	X
Hudson Mead	Essex/Hertfordshire				X
Thorley Flood Pound	Essex/Hertfordshire	X		X	X

Aims

1. To identify, maintain and protect any wetland sites within the Green Arc area
2. To ensure that there is appropriate water quality and quantity in wetland areas
3. To restore the integrity and hydrology of river valley corridors
4. *Where possible restore degraded sites and enlarge the best sites*
5. To raise public awareness about the flood prevention benefits of wetlands

Targets

1. To identify and protect all wetland, reedbed, fen and grazing marsh sites in the Green Arc area by 2007
2. Introduce sustainable management on all sites above 0.5ha by 2008
3. To bring 95% wetlands to good ecological and chemical quality by 2015
4. To have restored 150ha of seasonally inundated wet grassland from drier, semi-improved or improved sites where ditches and other features remain by 2010
5. To have begun the re-creation of at least 500ha of wetland habitat by 2012
6. To run an educational event for planners and councillors stressing the benefits provided by wetlands in the Green Arc by 2008
7. Provide cultural and ecological interpretation at all key sites by 2010

FARMLAND

Current Status

- 3.66. Farmland covers much of the English lowland landscape and therefore provides a home to many familiar plants and animals. Post war agricultural improvement has seen production increase and the methods deployed by farmers become progressively more intensive. This has reduced the extent of once commonplace habitats, such as hedgerows, woodlands and hay meadows, together with species, such as farmland birds and arable weeds. This section focuses on those species that are strongly associated with agricultural landscapes, they include:
- Arable weeds – particularly characteristic of arable cultivation on thin chalky or sandy soils;
 - Farmland birds – for example grey partridge, lapwing, turtle dove, skylark, tree sparrow and corn bunting. These species are also important in meeting DEFRA's PSA target and the headline quality of life indicators;
 - Farmland mammals – for example brown hare.
- 3.67. Farmland in the Green Arc comprises largely arable cultivation for cereals, followed by livestock farming, with horse paddocks a common component of many sub-urban and urban fringe farms. The northern areas of Essex and Hertfordshire are still largely agricultural in character, with the majority of farms large units that specialise in either arable or livestock production, traditional mixed farming is rarely practised, typically restricted to the small number of organic farmers operating in the area.
- 3.68. Cereal field margins are a priority habitat in the UK BAP, within the study area the distribution of suitable habitat encompassed under this description is unclear. Cereal production is widespread, but largely intensive, small numbers of individual farms have implemented management to encourage field margin wildlife, for example on land owned by the Corporation of London and the Lea Valley Park, but specific examples of the wildlife they support are limited.

Threats

- 3.69. **Cropping patterns-** Cereals are now frequently sown in autumn rather than spring, this has led to a decline in suitable spring habitat for ground-nesting birds, and a similar reduction in opportunities for over-wintering invertebrates, with winter stubble now rarely available as a food source for farmland birds. Break crops, such as grass leys or root vegetables, are now infrequently sown which tends to lead to increased applications of chemical inputs and, overall, a uniform farmland landscape.
- 3.70. **Fertiliser and pesticide-** Many semi-natural habitats are degraded by increased nutrient inputs from artificial fertilisers, which generally precipitate a reduction in floral and faunal diversity, and dominance by a small number of commonplace species. This includes run-off into aquatic and wetland ecosystems, spray drift into woodlands and hedgerows, and enrichment of unimproved grasslands. The widespread use of pesticides and herbicides to maintain pest and weed free agricultural systems leads to

a direct reduction in farmland flowers and insects, and a knock-on effect upon the animals that rely on these species as a source of food.

- 3.71. **Removal of semi-natural habitats-** The destruction of important farmland habitats such as hay meadows, hedgerows and ponds since the Second World War is well documented; it would appear that the rate of loss has slowed in recent years but the continued ploughing of species-rich grasslands, grubbing out of hedgerows, and removal of woodland remains a threat as farms continue to intensify production techniques. Where semi-natural habitats are not directly threatened, on-going management to maintain their value for wildlife can pose a problem, for example in the absence of grazing or mowing species-rich grasslands tend to lose their inherent botanical interest.
- 3.72. **Urban fringe pressures-** Farms on the fringes of major conurbations, tend to suffer from a range of damaging activities, such as illegal motorcycling, dumping of refuse, and general disturbance of habitats and wildlife.

Current Action

- 3.73. A number of former farms and estates are now owned by conservation organisations and while they, or their tenants, still farm commercially management for wildlife is a key priority. Examples include: Copped Hall, Warlies and Woodredon Estates, owned and managed by the Corporation of London as part of a buffer-land strategy around the northern edge of Epping Forest, tenanted farmland within Essex County Council's Thorndon Country Park, and a number of farms in the Lea Valley Park. Management to enhance opportunities for farmland wildlife that have been carried out on these farms include: the sowing of seed-rich crops for song birds, creation of native species hedgerows, and the establishment of conservation headlands, beetle banks and other arable crop margins that are less intensively managed than the main crop and provide a home for arable weeds and insects.
- 3.74. In the wider agricultural community many private landowners have signed up to agri-environmental schemes run principally by the Department for Food and Rural Affairs (DEFRA), these seek to offer incentives to farmers to manage their land in environmentally beneficial ways. For example the Countryside Stewardship Scheme provides financial support for the management or recreation of habitats for farmland wildlife.

Aims

1. To promote and recommend sustainable agriculture throughout the Green Arc
2. To seek reductions in agricultural chemical use
3. To promote the conservation of notable farmland species
- 4. To halt the net loss of ancient and species rich hedgerows**
5. To implement management that that brings all species rich and ancient hedgerows to a favourable condition

6. **Maintain the overall number of hedgerow trees** in the Green Arc area
7. To identify, maintain and protect lowland hay meadows, lowland wood pasture, cereal field margins, old orchards and Purple Moor Grass (*Molinia*)/rush pasture

Targets

1. To develop a more strategic approach to agri-environment schemes, ensuring that an additional 3000 ha of farmland is entered into such schemes by 2008.
2. To help introduce two flagship organic farms to teach best practice techniques to other land owners and land managers in the Green Arc. These should be operational by 2010
3. *To seek favourable management for 100% of all lowland hay meadows, lowland wood pasture, cereal field margins, old orchards and Molinia/rush pasture by 2010.*
4. Attempt to link separate areas of lowland hay meadows, lowland wood pasture and *Molinia*/rush pasture by increasing their habitat by 30% for each sub-habitat by 2010
5. **To identify, protect and safeguard all ancient and species rich hedgerows by 2008**
6. To achieve the favourable management of 75% of species rich and ancient hedgerows by 2010
7. To carry out a hedgerow audit to note the number of hedgerow trees in the Green Arc whilst also indicating opportunities to manage other hedgerows for biodiversity. Complete this audit by 2012
8. Identify 750 ha of cereal field margins in the Green Arc to be improved by 2007
9. Safeguard these sites and identify areas where new sites could be planted by 2009

URBAN

Current Status

- 3.75. A large part of the Green Arc is made up of urban areas. The expanse of urban development is obvious in the London boroughs but large towns, such as Brentwood, Harlow, Bishop's Stortford and Hertford-Cheshunt in Essex and Hertfordshire, also add to the overall developed nature of the Green Arc. Urban areas are often under valued when people consider nature conservation, however the contribution of these areas for biodiversity should not be ignored. Parks, cemeteries, canals, allotments, gardens and even buildings can offer valuable and unique habitats for a number of species. If planned and managed appropriately these urban habitats will complement the wildlife resource found in the wider countryside and can aid in increasing public appreciation of nature, conservation and environmental policies in general.
- 3.76. For the purposes of this report urban habitats will be divided into the following categories.
- 3.77. **Encapsulated Countryside-** Areas of semi-natural habitat which persist in the urban area from a more rural past. These habitats can include unimproved grassland, heath, hedgerows, ancient woodland etc. Unfortunately the location of these habitats means that they suffer more from urban pressures than their countryside counterparts. *The ecological conditions, constraints on management and cultural significance of these habitats are so altered within an urban context that they require separate consideration (Hertfordshire BAP).* However many areas of encapsulated countryside are now receiving sympathetic conservation management, brought about through better awareness and urban-rural fringe guidance.
- 3.78. **Managed Greenspace-** Areas managed for recreation or amenity such as parks, school grounds, roadside verges, private gardens, allotments, churchyards etc. Such areas are now recognised as being capable of supporting rich wildlife communities provided that they receive more sensitive and informal management in certain areas. The management required will depend on the site in question. Town parks often consist of grassland sward usually dominated by Perennial Ryegrass. This monoculture combined with regular mowing and the tidying of dead wood can hamper the area's true biodiversity potential. In Broxbourne dead timber has been retained in the town parks to provide habitat for Stag Beetles (*Lucanus cervus*). Small measures like these can go a long way.
- 3.79. Private Gardens can also provide a valuable biodiversity resource. The London Ecology unit found that private gardens comprised around 20% of Greater London. This figure is likely to be higher in the outer London boroughs and in Essex and Hertfordshire. Gardens feature a mosaic of small habitats, such as compost heaps, shrubs, ponds etc. that are perfect for a variety of invertebrate and the predators that hunt them, e.g. small birds, bats, hedgehogs, frogs, slow worms etc.
- 3.80. Similarly allotments, churchyards and cemeteries, road verges and street trees all have a role to play in the urban biodiversity resource. Allotments share many of the biodiversity benefits of private gardens, but are often on a larger scale and can provide bigger habitats. Churchyards and cemeteries provide a habitat for many

species and often help add to an area's green network. Often they are intensively managed, but more sensitive management also takes place and some older churchyards contain a varied wildlife resource, particularly for lichens.

- 3.81. **Naturally Regenerating Habitats-** Areas of disturbed or previously disturbed ground on non-natural substrates which develop their own self-seeded plant and animal communities. Habitats include, 'urban' commons, industrial land, railway sidings, buildings, walls etc.
- 3.82. Urban Commons can develop on a variety of former industrial and commercial land. They are typically wasteland that has been colonised by a range of plant communities, both native and exotic. The habitat can range from pioneer species (found on recently abandoned sites) to scrub to secondary woodland (found on abandoned allotments, railway land, and wasteland without hard standing). As the site is colonised plants animals will also utilise the empty space. Depending on the habitat available and the substrate the community is developing on, '*wasteland sites can have an ecology comparable to heathland or coastal dunes, both of which are UK priority habitats.*' (London BAP).
- 3.83. **Urban Wetlands-** Urban rivers and watercourses, ponds, lakes, canals and reservoirs. Urban wetlands often have a different character to their counterparts in the countryside. They can be heavily engineered, polluted, overused, and suffer from eutrophication, however features such as rivers and canals can also provide useful wildlife corridors and ponds and lakes can be refuges to a number of species under threat in the countryside. Garden ponds are a particularly good habitat especially for amphibians, which also like the associated dense vegetation found in suburbia.
- 3.84. Few, if any, urban sites in the Green Arc have statutory biodiversity protection. It is more usual for urban sites such as cemeteries, parkland and some wasteland sites to be given local designations, either as LNR or SINC. Other protection for these sites may come from their historical or amenity value. Parkland and cemeteries can be protected under English Heritages' 'Register of parks and gardens of special historic interest'. Equally, parkland and other amenity spaces are often designated as Metropolitan Open Land, and safeguarded in planning documents. The Green Belt also protects open space from development although certain kinds of development are permissive.
- 3.85. Few gardens have any form of protection. However in gardens as well as parks and other urban areas biodiversity can be safeguarded through the use of Tree Preservation Orders and the individual statutory protection that certain species receive.

Threats

- 3.86. **Lack of Information-** As illustrated above, the urban environment contains a wide variety of unique habitats. However for many urban areas there is a lack of up to date information regarding habitats and species presence, abundance and extent. This lack of information is a major threat because it means that sites and wildlife corridors can be lost without anyone knowing the true value of the site.

- 3.87. To raise public awareness adequate information needs to be displayed when biodiversity management is being carried out. Too often the public perception of natural areas can be a problem for their management and survival.
- 3.88. **Lack of Resources-** Green space in the urban environment is also hindered by a lack of resources. The managers of parks, cemeteries churchyards etc. often do not have the budgets or the time to improve the biodiversity of their local greenspace or the knowledge to carry out the job properly. Wildlife sites can often be too small and numerous to manage effectively.
- 3.89. **Conflicting Management-** Urban greenspace often has a number of other or indented uses. Parkland in particular is often expected to conform to a designed landscape that may be historically sensitive and/or may have to be kept 'tidy'. Cemeteries, churchyards and gardens are also usually kept tidy. A tidy environment rarely leads to a biodiverse environment as dead wood and leaf litter are removed, grasses are regularly mown and water features are sterilised.
- 3.90. **Level of Use-** Increased use of greenspace will have implications for wildlife. As an area is more heavily used impacts such as disturbance, trampling, litter and pollution are more likely to increase, which in turn will reduce the biodiversity of the area.
- 3.91. **Development Pressure-** Two types of development are likely to affect biodiversity in urban areas. These are: infill development, which is most likely to take place in the suburbs; and brownfield development, which is more likely to occur in former industrial areas. Infill development will mainly affect gardens, and allotments and has the effect of reducing the overall size of urban habitats as well as their distribution. Brownfield development is more likely to affect wasteland sites, which should be fully assessed before development is allowed to take place.
- 3.92. **Pesticides-** These can cause major problems throughout the urban food chain. The adverse effect of herbicides and molluscicides not only reduces snails, slugs and weed species but also adversely affects the species that feed on them such as birds. One such casualty of the use of molluscicides may well be the Song Thrush, a species that has been experiencing a recent decline.
- 3.93. **Other Threats-** The urban environment is also under a number of other threats.
- Sports developments can remove areas of natural habitat and replace them with artificial surfaces.
 - Dogs and cats can be a real problem for reptiles and ground nesting bird species. Where they occur in large numbers their excrement can also fertilise nutrient poor soils, changing habitats entirely.
 - A shortage of burial space has led to cemeteries being used more intensively which has started to impact on their ecology.

Current Action

- 3.94. Local authorities throughout the Green Arc already have had to conform to PPG9's commitment to site protection, wildlife management and maintaining a diversity of

linked natural networks. The planning system also facilitates the reduction of biodiversity impacts at a site level and Local Nature Reserves to be designated at a district level. Various councils within the Green Arc also maintain scientific records and are improving wildlife management and open space management.

- 3.95. On a more local level, 'Friends of ...' groups are very useful for protecting, raising awareness and carrying out volunteer management works a number of small sites throughout the Green Arc.

Aims

1. Identify and protect the best urban sites in the Green Arc.
2. To utilise the huge variety of habitats found within the Green Arc's urban areas.
3. To make people aware of the biodiversity found on their own doorstep and on other sites throughout their district or borough
4. To promote green infrastructure, green wedges and green corridors through towns and cities.
5. 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

Targets

1. To identify the most important sites and corridors within the urban and built up centres by 2007.
2. To protect these sites and manage them appropriately by 2009.
3. Produce a database of best practice for parks, amenity grassland, cemeteries, churchyards and other biodiverse areas to allow expertise and best practice to be shared by 2008.
4. Hold wasteland awareness events with developer, planners and the public to highlight the diversity of these derelict sites. Have this up and running by 2009
5. To see that every urban area has Local Nature Reserves at a minimum level of 1 ha per 1000 population by 2010.
6. Compile baseline information on wildlife in gardens by 2007.
7. Publish a 'wildlife gardening guide' and a 'guide to managing your gardens for wildlife' to raise public awareness about the biodiversity potential of their gardens by 2008

4. GREEN ARC SPECIES ACTIONS

WATER VOLE

Current status

- 4.1. Previously abundant and widespread, the water vole (*Arvicola terrestris*) has attracted little or no conservation interest until quite recently. However, its accelerating decline in numbers and the resulting fragmentation of its population is of great concern. The water vole now receives legal protection under the Wild Mammals (protection) Act 1996 and Schedule 5 of the Wildlife and Countryside Act 1981, (Section 9(4) only). It is an offence to intentionally damage, destroy or obstruct access to any structure or place that is used for shelter by water vole, as well as to disturb them while they are using such a place.
- 4.2. The water vole is present in all of the Green Arc regions, and is recognised as being a rapidly declining species, which is directly threatened by a variety of actions and impacts, as outlined below. In Essex, research suggests that water vole have not experienced as rapid a decline as in other parts of the UK, and that populations still exist along most river corridors (Essex BAP). In Hertfordshire the impact on water voles appears to have been much more severe, with the most recent survey suggesting that populations have declined by 72.9% since 1989 (Molloy, 1997). A similar situation exists in Greater London, where a 72% decline since 1997 has been identified (LMG Greater London Water Vole Survey 1997).
- 4.3. The water vole is also included in the Biodiversity Action Plan for the Lee Valley. The park supports a healthy population of water voles which the BAP identifies as a priority for conservation management.

Threats

- **Loss and fragmentation of habitats-** This is identified as the key threat to water vole populations in Hertfordshire, and is also noted as a factor of major concern in London.
- **Disturbance of riparian habitats-** Disturbance of riparian habitats through water abstraction, water level change and development can destroy water voles burrows and general habitat.
- **Predation by mink-** Spread of American mink (*Mustela vison*) along river corridors has severe consequences for water voles, which are preyed upon by the non-native mink populations. In London the distribution of mink is currently confined to the Lee and Colne valleys.
- **Pollution of watercourses and poisoning by rodenticides-** Water voles appear to be moderately tolerant of general water pollution, but the consequences of many pollutants are unknown. Rodenticides used to curb populations of common rat can have indirect impacts on water vole populations through water course pollution (UK BAP).

Current Action

- 4.4. In 1998 English Nature and the Environment Agency commissioned the 'Water Vole Conservation Handbook' (Strachan 1998), which provides practical advice for maintaining water vole habitat.
- 4.5. A number of other studies into water vole and mink population, distribution and their relationship have also taken place. A selection of these includes:
 - An Oxford University and Environment Agency Study into the relationship between Water Voles and Mink
 - An Essex University study into the distribution of Mink in Essex
 - The Hertfordshire Mammal Group carrying out an ongoing investigation into the status, habitat and requirements of the Water Vole
 - The Essex Field Club compiling a County Mammal Atlas
- 4.6. The Wildlife Trusts are also promoting awareness through their Vole Watch scheme.

Aims

1. To halt the decline of the Water Vole in the Green Arc area.
2. To conserve the current population and increase their range to their 1970 distribution.

Targets

1. Establish a baseline population for the Green Arc area by 2007.
2. Assess the Water Vole's population trend and identify the key threats to its survival by 2008.
3. Implement measures to remove these threats and manage riverine habitats for water vole, whilst maintaining current populations.
4. Facilitate re-colonisation of past sites and establish populations at suitable new sites. Produce 20% new threat-free, well-managed habitat by 2012

BATS

Current status

- 4.7. Most bat species are recognised as nationally declining, and all are fully protected under the Wildlife and Countryside Act 1981. Due to lack of knowledge regarding species-specific traits, and similarity of habitats between many species, a general approach to plan for their conservation has been adopted by the respective BAPs. The tendency for bats to roost in buildings, and ability to adapt to live in urban environments, mean that their future is reliant upon understanding of their sensitivity to human behaviour. This is particularly relevant in densely populated areas such as the Green Arc. Sympathetic woodland management including provision of standing dead wood habitats will also be key to improving the status of many bat species. There are currently six species of bat known to be breeding in the Green Arc Area: Common Pipistrelle (*Pipistrellus pipistrellus*); Soprano Pipistrelle (*Pipistrellus pygmaeus*); Brown Long-eared (*Plecotus auritus*); Daubenton's (*Mycotis daubentonii*); Natterers (*Myotis nattereri*); and Brandt's (*Myotis brandtii*). Two pipistrelle species are the most common.

Threats

- 4.8. **Loss of summer and winter roosting sites-** This threat is often a result of a lack of public awareness regarding bat signs and sensitivity to disturbance.
- 4.9. **Changes to and loss of foraging habitats-** The threat from lost feeding grounds can be particularly acute in the Green Arc area, where development of wasteland and land use change can result in open spaces required as feeding grounds to be depleted. Modern farming practices have also reduced availability of insect-rich feeding grounds.
- 4.10. **Disturbance and obstruction of commuting routes-** The maintenance of green links and green corridors is a key aspect of avoiding obstruction to bat commuting routes.
- 4.11. **Pesticides-** Although the extent of the impact is unknown, there is some evidence to suggest that increased use of industrial pesticides in agriculture is associated with decreasing size of bat populations.
- 4.12. **Climate change-** The recent changes in climate towards mild winters and wet summers can affect the life cycle of insect species, which has consequential impacts on bat population size.
- 4.13. **Persecution-** As with the loss of roosting sites, this threat is largely the result of lack of awareness about the nature of bats. Many people still see bats as a pest or a health problem, and this threat needs to be addressed through education.

Current Action

- 4.14. Schedule 5 of the Wildlife and Countryside Act, 1981 and on Schedule 2 of Conservation Regulations, 1994, protect all species of bat in the UK. Bats are also protected by the Wild Mammals Protection Act, 1996.

- 4.15. The UK is a signatory to the Agreement on the Conservation of Bats in Europe (1994), set up through the Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1979. This is not strictly a legal instrument, but as signatory, the UK is obliged to abide by such agreements.
- 4.16. The National Bat Colony is monitoring several colonies in Essex.
- 4.17. The Essex Bat Group and the Hertfordshire and Middlesex Bat Group are continuing to provide support to English Nature, in an advisory capacity and in surveying, monitoring and educational 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 Natterers bat. The Hertfordshire Bat Group is providing information to assist this scheme.
- 4.18. Field work is being carried out to record the distribution of the two pipistrelle species in Essex.
- 4.19. The Hertfordshire and Middlesex Bat group are carrying out ongoing investigations into the county status, habitats and requirements of the Natterers bat. Key sites are identified and entered onto a Geographical Information Alert System by the Hertfordshire Environmental Records System. As a result, some sites have been designated important wildlife sites and incorporated into District Local Plans.
- 4.20. Some planning applications are being checked for barn conversions. Planning lists are provided direct to the Bat Group by North Hertfordshire District, East Hertfordshire District and Hertsmere District.
- 4.21. Licensed bat workers are carrying out advisory visits to householders to discuss management for all species of bat. The London Bat Group co-ordinated a network of licensed bat wardens, working liaison with English Nature to safeguard bat roosts, particularly in houses.
- 4.22. The place of bats is promoted by organisations such as the London Bat Group, the Bat Conservation Trust and English Nature have produced various publications, including a series of specifically targeted leaflets aimed at promoting best practice in relation to bats within the building, pest control and aboricultural professions

Aims

1. To maintain the present populations and geographical range of the bat species living in the Green Arc, particularly the two Pipistrelle species and Natterers Bat.
2. To increase the range and populations of the bat species found in the Green Arc.
3. To redress any misconceptions the public may have about bats.

Targets

1. To disseminate best practice advice to all planners and land managers within the Green Arc area

2. To establish what the baseline population for each of the Bat species is in the Green Arc area is by 2007. Collation of current information by 2006, other primary surveys completed by 2007
3. Identify all maternity and hibernation roosts by 2008
4. Identify declining populations and work with local groups to reverse the trend by 2010
5. Establish 50 new roosting opportunities within the Green Arc by 2010

DORMOUSE

Current status

- 4.23. The dormouse (*Muscardinus avellanarius*) is restricted within Britain to England and Wales, with very few populations in the latter, and none in Scotland or Ireland. In England population of dormouse has been dramatically declining, and is now extinct in seven counties, representing half its normal range. Within the Green Arc, populations presently exist in Essex and Hertfordshire, with Essex noting that populations are small and widely dispersed over most of the county. In Hertfordshire it is predicted that populations are currently limited by fragmentation of appropriate habitat across the county. Increases in dormouse populations in the future require a change in woodland management practice towards more traditional regimes, twinned with green links joining up fragmented woodland to allow more viable and robust populations.
- 4.24. 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 (Natural Habitats &c.) Regulations, 1994 (Regulation 38) and Schedule 5 of the Wildlife and Countryside Act 1981.

Threats

- 4.25. **Lack of appropriate habitat-** Ancient semi-natural woodland has been decreasing dramatically across the country. In Hertfordshire it is estimated that 44% of this species-rich habitat has been lost over the past 50 years.
- 4.26. **Fragmentation of appropriate habitat-** As dormice have naturally limited dispersal and reproductive abilities, fragmentation of their habitat severely threatens the viability of populations. Research suggests that a gap in appropriate habitat as small as 100m could be enough to sever a population (Hertfordshire and Middlesex BAP).
- 4.27. **Lack of woodland management and inappropriate woodland management-** Well managed coppice is the most suitable form of habitat for dormice, and areas that are either unmanaged, or managed on a commercial scale are unable to provide the cover and habitat required by the species.
- 4.28. **Climatic factors-** The dormouse copes better with the more predictable weather of continental Europe, and climatic variations in the UK can negatively affect hibernating, breeding and feeding routines.
- 4.29. **Poisoning-** Some poisons left for grey squirrels such as Wayfarin can also threaten dormice.
- 4.30. **Competitors and other animals-** Grazing animals in woodlands such as deer can over-graze and restrict the understorey which dormice depend upon. In addition, introduced species such as the grey squirrel compete with the dormouse in some areas, and can threaten their food supply.

Current Action

- 4.31. Both the Essex Wildlife Trust and the Hertfordshire and Middlesex Wildlife Trust receive English Nature funding from the Species Recovery Programme to erect and check nestboxes. This monitoring is mainly used to check presence and absence, however there are plans to extend the surveys and set up a species recovery strategy in Hertfordshire.
- 4.32. English Nature produced the 'The Dormouse Conservation Handbook' in 1996.
- 4.33. Dormice are often found in smaller habitats that link together other wild places. Whilst many of these sites do not have any form of statutory protection, PPG 9 requires that all planning authorities have regard for linking habitats and wildlife corridors. This statement and the dormouse itself will provide some degree of habitat protection.

Aims

1. Maintain and enhance the current dormouse population.
2. Research the feasibility of increasing dormouse habitat and re-introductions.

Targets

1. Establish the current dormouse population and distribution by the end of 2006
2. Identify suitable areas of habitat that are currently unused by dormice by the end of 2007
3. Undertake a feasibility study looking at connecting viable dormouse habitat, the potential of re-introductions to viable habitat and positive land management techniques for the species. This should be completed by 2008.
4. Re-establish four additional self-sustaining populations by 2010

TREE SPARROW

Current Status

- 4.34. Tree Sparrows (*Passer montanus*) are patchily distributed on farmland across Britain. They are scarcer in the uplands and the far north and west. The main populations are now found across the Midlands, southern and eastern England. The Common Bird Census (CBC) indicates a decline of 95% in numbers in Britain between 1970 and 1998. This is the largest decline of any common species during this period. The Tree Sparrow also decreased in range by 20% over the same period. The most recent population estimate (1988-91) suggests that there are about 110,000 breeding pairs.
- 4.35. This once common farmland bird has suffered a serious decline in breeding numbers over the last 25 years. 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. 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.

Threats

- 4.36. **Agricultural Intensification-** The steady decline of the Tree Sparrow over the last 50 years coincides with agricultural intensification and specialisation. These changes include the increased use of pesticides and herbicides, which has reduced the availability of insects. The change from spring-sown to autumn-sown crops has severely reduced the areas of winter stubble feeding grounds. The more intensive management of grassland and the general reduction in habitat diversity on farmland due to loss of mixed farming and increased specialisation may also have affected Tree Sparrows.
- 4.37. **Loss of Hedgerows-** The removed of tall bushy hedges which are favoured by the Tree Sparrows has contributed to the decline of the Tree Sparrow. The loss of Elm trees in the late 1970s and 1980s, due to Dutch Elm disease reduced the availability of nesting cavities for the bird. Loss of habitat due to urban development in the London Green Arc area may also be linked to the decline of Tree Sparrows.
- 4.38. **Population Fluctuations-** There have previously been several long-term fluctuations in Tree Sparrow populations.
- 4.39. **Continental Factors-** It has been suggested that UK populations reflect those on the continent, being supported by immigration when continental numbers are high (Hertfordshire BAP).

Current Action

- 4.40. The RSPB has published a series of information sheets on the management of farmland birds, including the Tree Sparrow (Hertfordshire BAP). The Tree Sparrow is on the RSPB Red List of 'Birds of Conservation Concern' and also appears on the UK Biodiversity Steering Group (UKBSG) 'Middle List of Globally Threatened/Declining Species'. Little direct conservation work for the Tree Sparrow

has been carried out, although nest boxes have been erected at some sites. Studies of breeding Tree Sparrows are being carried out and discussions have been had with local farmers on improvement to habitats at these sites.

- 4.41. The Tree Sparrow is protected under the Wildlife and Countryside Act (1981). It is illegal to intentionally kill, injure or take any wild bird, intentionally take, damage or destroy the nest of any wild bird while it is in use or being built or intentionally take or destroy the egg of any wild bird. The Tree Sparrow also receives protection under the EC Birds Directive 79/409/EEC.

Aims

1. To halt the decline, maintain and expand the Tree Sparrow population

Targets

1. **Return the Tree Sparrow to its 1996/97 population levels by 2006.**
2. Identify sites which can be managed to increase the numbers and range of Tree Sparrows in the Green Arc area by 2006
3. **Continue Tree Sparrow recovery to 150% of 1996/97 population levels in 2010**
4. To restore 1970 population levels by 2020

GREY PARTRIDGE

Current status

- 4.42. Once very common and widespread, the Grey Partridge (*Perdix perdix*), the only native partridge in the British Isles, has undergone serious declines throughout most of its range. It occurs in arable fields, rough pastures, heaths and moorlands. The national population of the Grey Partridge has declined by over 50% between 1969 and 1990 and it now has an estimated population of 150,000 pairs. This species is protected in the close season under the Game Acts and is listed on Annex III/I of the EC Birds Directive and Appendix III of the Bern Convention (UK BAP, 1995)
- 4.43. The Grey Partridge is only present in the Essex section of the Green Arc area. It is unevenly distributed through all the Essex districts with strongholds along the Thames Estuary, Hamford Water, the Dengie area and inland in the Epping Forest district. The Grey Partridge's population has steadily declined since the 1940s with some stabilisation over the past few years, although population trends are unclear (Dennis, 1996).

Threats

- 4.44. **Loss of nest sites-** Loss of key nest sites such as hedge bottoms as a result of farm intensification is a major threat to the Grey Partridge population.
- 4.45. **Reduced food supplies-** A reduced number of sources for chick food through the use of pesticides and herbicides, as well as the loss of winter stubble which is used as a food source by adults, is a growing problem.
- 4.46. **Vulnerability of nests to predators-** This is a problem in areas of farmland with poor cover.
- 4.47. **Nest destruction-** This is caused by early mowing and other farm operations.

Current Action

- 4.48. The Game Conservancy Trust (TGCT) encourages land managers to create suitable conditions for Grey Partridges, including suitable nest sites and cover, summer and winter feeding areas (e.g. conservation headlands and winter stubbles), and control of predators and shooting.
- 4.49. Some suitable habitat is also provided on some land under CSS and the pilot ASS scheme.
- 4.50. A species action plan has been prepared for this species by the RSPB, the country agencies and the TGCT.
- 4.51. Arable margins are being promoted via the ESA review.

Aims

1. To halt and reverse the decline of the Grey Partridge in the Green Arc area.

2. To, where feasible, expand the species' range and population.

Targets

1. To halt the decline in the Grey Partridge's population by 2007.
2. To identify sites where sensitive management can be introduced to create new habitats by 2010.
3. To have a 30% increase in population by 2012.

SKYLARK

Current status

- 4.52. Once a common and widespread ground dwelling bird, the Skylark (*Alauda arvensis*) is currently undergoing a dramatic population decline. It is now a UK red-listed species (BTO et al 1996) as a consequence of a 54% decline in the breeding population on lowland farmland in the UK between 1961 and 1991, as well as having an unfavourable European conservation status (SPEC 3) (Essex BAP 1999). The Skylark is protected under the 1979 EC Birds Directive and the Wildlife Countryside Act.
- 4.53. The Skylark is only found in the Essex region of the Green Arc. It is common and widespread through Essex although the breeding population has declined significantly in recent years, reflecting the national trend (Dennis, 1996). The causes of the population decline are poorly understood because population trends in habitats other than farmland are largely unknown (UK BAP 1995).
- 4.54. Although Skylarks are predominantly a farmland species they can survive in other habitats too. Rainham Marsh has supported around 100 breeding pairs for the last 5 years, illustrating the importance of a variety of habitats for the species (Essex BAP 1999).

Threats

- 4.55. **Intensification of farming practices-** Agricultural intensification on lowland arable land has reduced the available food sources for the Skylark. At the same time, the use of herbicides and insecticides has led to a reduction in most ephemeral weeds and insect prey and the trend towards autumn-sown crops has resulted in a loss of winter stubble fields (UK BAP 1995).
- 4.56. **Unsuitable nesting habitats-** The change from hay cropping to silage cutting on grasslands is destructive for nesting birds such as the Skylark due to earlier and more frequent cutting. Similarly, autumn-sown crops and intensively managed grassland create unsuitable nesting habitat for Skylarks (Essex BAP 1999).
- 4.57. **Inundation of saltmarsh nesting habitats-** Skylarks are amongst the most widespread species found breeding and wintering on British saltmarsh (Fuller 1982). Inundation by high spring tides during the breeding season often results in almost complete nesting failure on some sites (Essex BAP 1999).

Current Action

- 4.58. Little action has so far taken place to halt the decline in Skylark numbers, due to the fact that it has happened only recently. However a national species action plan has been prepared by RSPB.
- 4.59. Research and survey work is in progress to identify the relative importance of the causes of population decline, especially with regard to habitat change.
- 4.60. Skylark counts are carried out annually in Essex as part of the Common Bird Census and the Breeding Bird Survey (1995 onwards). Specific Skylark counts were also

carried out on selected 1km squares during the 1997 breeding season and the 1997/8 winter, co-ordinated by BTO. These surveys will help to identify the most important areas and habitats within the county for Skylarks.

- 4.61. EWT and RSPB are in the process of monitoring farmland bird species, including the Skylark, in the Maldon district.
- 4.62. Arable margins are being promoted via the ESA review and one of the pilot Arable Stewardship Schemes incorporated part of Essex. This legislation should help the Skylark (Essex BAP 1999).

Aims

1. To maintain and enlarge the Skylark population across the Green Arc area.

Targets

1. For the Skylark population to equal or be higher than the 1995 BBS level by 2008.
2. To reverse the Skylark's decline on lowland farmland and other habitats where its population is dropping by 2012.
3. To work with landowners and managers to maintain the Skylark population in the Green Arc.

SONG THRUSH

Current status

- 4.63. The Song Thrush (*Turdus philomenus*) is common and widespread and found in a variety of habitats including woods, fields and gardens. It is a partial migrant with large numbers of Continental breeders overwintering in the UK.
- 4.64. Following the winter of 1962/3, the population declined but recovered to a stable level within three to four years. The numbers subsequently remained stable until the mid 1970s (from UK BAP 1995). Since then the Song Thrush's population has declined throughout the UK – there has been an estimated decline of 73% in farmland and 49% in woodland since the mid-1970s. The species is protected under the EC Birds Directive, 1979 and the Wildlife and Countryside Act, 1981. (from Essex BAP 1999).
- 4.65. The Song Thrush is found throughout the Green Arc area. It is common and widespread throughout Essex and its local population trend has mirrored the national trend with a steady decline over recent years (Dennis, 1996, Essex BAP 1999).
- 4.66. In Hertfordshire the species is also declining, with confirmed breeding in only 84% of the region between 1988-92, compared with 91% between 1967-72 (Smith et al 1993). This small distributional decline is likely to mask a larger decline in breeding density. If this trend continues, it is likely that the Song Thrush may disappear as a breeding species from some areas of the county (Hertfordshire BAP 1999).

Threats

- 4.67. **Changes in farming-** In particular, the switch from spring to autumn-sown cereals and the increased use of molluscicides has affected farming and the availability of nest sites.
- 4.68. **Meteorological factors-** The severe winter weather and dry soil conditions (especially during drier summers, a possible effect of climate change) may have affected the food availability for the Song Thrush (Essex BAP 1999). The prolonged cold weather could particularly hit juveniles (Hertfordshire BAP).
- 4.69. **Competition with blackbirds-** The competition for food sources with other birds, in particular blackbirds, could be a feasible explanation for the decline in the Song Thrush population.
- 4.70. **Hunting in southern France-** Hunting in southern France may affect the part of the UK Song Thrush population that migrates south.
- 4.71. **Predation-** The Song Thrush's numbers are being affected by predation by corvids and foxes (UK BAP 1995).
- 4.72. **Hedge management-** The increase in mechanical hedge trimming and the change to lower, less bushy hedges may be partly responsible, as may the loss of hedgerow trees which provide suitable song posts.

Current Action

- 4.73. Little action has yet been taken as the decline in Song Thrush numbers has only recently been identified. A national species action plan has been prepared by the RSPB and agreed by the country agencies.
- 4.74. Research and survey work is currently being carried out to identify the causes of population decline. Research so far has identified mortality of juvenile birds as being a key factor in the population decline, and the causes of this mortality are being investigated.
- 4.75. In Essex there is ongoing RSPB research at Ongar.

Aims

1. To halt the decline of the Song Thrush.
2. Re-establish it to its former range and population within the Green Arc.

Targets

1. Continue to aid the RSPB in their Essex research programme.
2. Return the Song Thrush to its 1997 levels by 2007.
3. Return the Song Thrush to its 1968-1972 geographical range and population size by 2015.

GREAT CRESTED NEWT

Current status

- 4.76. The British population of Great Crested Newts (*Triturus cristatus*) is Europe's largest, and the majority of this population are located on pond sites in lowland England. This sensitive amphibian has strict habitat requirements which include the proximity of range of vegetation types, particularly grazed pasture, scrub and woodland. Despite these specific habitat requirements, the great crested newt is not confined to pristine habitats, it can also develop colonies in gardens, derelict industrial sites and town parks. The Great Crested Newt is a priority species in Hertfordshire, London and the UK.
- 4.77. Monitoring conducted in London and Hertfordshire suggests that Great Crested Newt populations may be in severe decline. A recent study from London suggested a decrease in population of 42% over the last 20 years. In Hertfordshire, species distribution across the county is thought to be fairly wide, but numbers are believed to be steadily decreasing.
- 4.78. The Great Crested Newt is listed on Annexes II and IV of the Bern Convention. It is protected under Schedule 2 of the Conservation (Natural Habitats &c) Regulations, 1994, and Schedule 5 of the Wildlife and Countryside Act 1981.

Threats

- 4.79. **Habitat Loss-** Many sites of previous colonies within the Green Arc have been damaged through either development, altered drainage or climatic variations. Across the Green Arc region it is believed that many previously viable colonies will have been affected in this way.
- 4.80. **Inappropriate Management-** Where ponds are surrounded by inappropriately managed land, it will become unable to sustain great crested newt populations. Research suggests that at least half a hectare of appropriately managed land is required in order to support a viable population. This should be taken into consideration alongside the requirements of other native species, when managing these sites for nature conservation.
- 4.81. **Fragmentation and Isolation of Populations-** As great crested newts do not tend to travel more than 300-500 metres away from their breeding pond, isolation of these ponds can have severe consequences for host population. An example of this is Norton Pond (near Letchworth) that supported a healthy population of newts until it became surrounded by development. Recently only one or two individuals have been recorded at the site.
- 4.82. **Pollution-** Newt tadpoles are very sensitive to toxic agro-chemicals and other pollutants, which often run off land into ponds and can inhibit and prevent their healthy growth.
- 4.83. **Predation-** Introduction of fish and ducks into ponds has a negative impact on great crested newts, as both will prey on tadpoles and spawn.

Current Action

- 4.84. The Joint Nature Conservation Committee (JNCC), in collaboration with the statutory nature conservation agencies and voluntary bodies, have published a five year framework (1994-1999) for the conservation of amphibians and reptiles in the UK.
- 4.85. The Countryside Council for Wales, English Nature and Scottish Natural Heritage supports a post within the NGOs to develop further Amphibian and Reptile Groups as well as supporting surveys and conservation initiatives. A group has been set up in Essex, but there has been little or no action so far.
- 4.86. English Nature recently published the results from a symposium on the species, and leaflets have been published by English Nature and British Coal, including one for developers, which are distributed in the county.
- 4.87. Newts have been translocated at several sites in Essex to allow development to continue, but despite the species being protected under the regulations shown above, few prosecutions occur.
- 4.88. 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 Environmental Records Centre. Some of these sites have been incorporated into District Local Plans.

Aims

1. Maintain the current range, population and viability of the Great Crested Newt in the Green Arc area
2. Re-introduce Great Crested Newts to former sites and expand their range

Targets

1. Ascertain the newt's true distribution over the Green Arc area by 2006.
2. Restore populations to two former or unoccupied sites each year over the next ten years, by restoring existing ponds and creating new ones. These gains should be in addition to any loss through development or neglect.

ADDER

Current status

- 4.89. The adder (*Vipera berus*), Britain's only venomous reptile is still fairly widespread in the UK, and across Europe, but numbers are thought to have dropped dramatically in London and Hertfordshire. This is likely to have occurred as a result of destruction of habitat, and although little conclusive monitoring has been undertaken, the adder is perceived to be sufficiently abundant not to warrant prioritisation in the Essex BAP. Adders are associated with a range of habitats including heath, open woodland, hedgerows and riverbanks, but prefer relatively undisturbed tracts of countryside. There are very few sites within the London and Hertfordshire parts of the Green Arc where adders are still present, and at those where they are, numbers are worryingly low. A programme of habitat creation and creation of green links is needed to avoid local extinction of this species.
- 4.90. Adders are protected under the Wildlife and Countryside Act 1981 from being killed, injured or sold.

Threats

- 4.91. **Loss of suitable habitat-** Adders are the most threatened of British reptiles in terms of loss of suitable habitat. The diverse vegetative structure they require for the various aspects of their life cycle is limited by intensive land use, and many previously suitable sites have been lost due to agricultural intensification, recreational use and general development.
- 4.92. **Isolation of populations due to fragmentation of habitat-** Many land uses can provide physical barriers to adders and other reptiles. Adder's populations are fragmented by urban developments, but also by closely mown grass and ploughed fields. These isolated populations then become less resistant to other threats such as predators, disease and inbreeding. This threat is particularly relevant to the Green Arc area, as domestic pets such as cats threaten reptile populations.
- 4.93. **Persecution-** The common misconception of snakes as 'dangerous' and 'poisonous' has and still does result in persecution by man. The adder is a key victim of this and within the Green Arc this threat is likely to be more severe than in other areas, due to its dense urban population.
- 4.94. **Liability-** Fear on the behalf of landowners and managers that adders pose a threat to the public, has historically led to their persecution. This may have caused a severe decline in adder populations, and education should be encouraged to ensure that future populations do not suffer from the same problem.

Current Action

- 4.95. All British reptiles are protected to various degrees by the Wildlife and Countryside Act, 1981. Greater London's reptiles are protected from intentional killing and injury, selling or other forms of trade.

Aims

1. To protect populations of adders and their habitats where they exist within the Green Arc
2. To facilitate the adder's re-population of London and Hertfordshire
3. To promote awareness of reptile conservation within the Green Arc

Targets

1. Identify and safeguard populations of adders within the Green Arc by 2007
2. Produce and disseminate reptile conservation advice notes throughout the Green Arc by 2007
3. Identify sites within the Green Arc London boroughs and Hertfordshire districts where adders could be reintroduced and introduce two self-sustaining populations in each county by 2010.

STAG BEETLE

Current status

- 4.96. Britain's biggest native beetle, the stag beetle (*Lucanus cervus*) sometimes grows up to 8cm in length and relies on the presence of dead and decaying deciduous wood for its life cycle. Now uncommon in many part of Europe, it is still fairly widespread in Britain, particularly in southern England, where it is found in its highest density. Despite this, population size is decreasing even in the South East, and as such it is deemed necessary to take action now to avoid the complete loss of the species.
- 4.97. The stag beetle has been identified as a species requiring an action plan, in all of the Green Arc regions, as well as at the national level. Whilst it is fairly common in south London, the Green Arc area of the city has much smaller populations of the stag beetle. Whilst the species is rare in most of Hertfordshire, viable populations still exist in the Lea Valley area. These are also linked to larger populations over the border in Essex. The linkages between populations in London and the two counties make integrated conservation and management an essential aspect of its future.
- 4.98. The stag beetle is listed on Annex II of the EC Habitats Directive 92/43/EEC.

Threats

- 4.99. **Loss of habitat-** This is currently the only known significant threat to stag beetle populations. Unsuitable management of wooded spaces which includes the removal of dead and decaying wood can deprive the stag beetle of its larvae habitat. This threat may be particularly relevant in areas such as the Green Arc, where historical management of green spaces may have often been more people focussed and less concerned with nature conservation.

Current Action

- 4.100. The stag beetle is listed on Schedule 5 of the Wildlife and Countryside Act, 1981, but only to prevent trade, that is to stop the species from being collected for sale at entomological fairs. It is also listed on Appendix III of the Bern Convention on the Conservation of European Wildlife and Natural habitats, 1979 and Appendix 2 of the Habitats Directive. The latter requires the UK to designate SACs specifically to protect the stag beetle.
- 4.101. The JNCC has been encouraging people to record sightings through articles in Wildlife Trust newsletters and similar publications.
- 4.102. Three sites in Hertfordshire have been proposed as Special Areas of Conservation for this species under the European Community Habitats Directive.
- 4.103. Surveys have been completed in 1996 in north east Essex (report in Essex Naturalist vol 14 1997). Surveys are currently in progress in the Greater London area, including south west Essex.
- 4.104. A national survey was carried out in 1998 by The People's Trust for Endangered Species (PTES). The forms were circulated in Essex.

- 4.105. Research projects into stag beetle ecology are currently being formulated nationally by PTES and the Stag Beetle Focus Group.
- 4.106. Epping Forest has been proposed a Special Area of Conservation (SAC), the stag beetle being a secondary criteria under the Habitats Regulations.
- 4.107. Two stag beetle pyramids and a site for relocation of displaced larvae have been established in Colchester Borough during 1998.

Aims

1. Maintain population size at all of the key sites in the Green Arc
2. Maintain the current geographic range of the Stag Beetles in the Green Arc

Targets

1. Establish the key sites and populations for the Stag Beetle within the Green Arc by 2006
2. Maintain the Green Arc's breeding populations by ensuring a continued supply of deadwood at all urban, sub-urban and rural key sites by the middle of 2006
3. Increase the usable deadwood resource at these sites by 20% over the next 20 years
4. Create three more Stag Beetle sites in the Green Arc and facilitate the introduction of beetles to bolster smaller populations by 2009

WHITE-CLAWED CRAYFISH

Current status

- 4.108. The only crayfish species native to the UK, the white-clawed crayfish (*Austropotamobius pallipes*), was once common across the country, but populations have declined since the 1970s and the species is now confined to far fewer streams and rivers. The species is associated with clean chalk rivers, and historically would have been common across the calcareous areas of the southeast. A combination of water pollution and introduction of non-native species has led to the decline of the species. At present significant populations are thought to only exist in the very north of the Green Arc, with rare sighting in the rest of the area.
- 4.109. The white-clawed crayfish is classed as “Globally Threatened” by IUCN/WCMC. It is listed in Appendix III of the Bern Convention and Annexes II and V of the EC Habitats Directive, 1992. It is also protected under Schedule 5 of the Wildlife and Countryside Act, 1981.

Threats

- 4.110. **Crayfish plague-** Imported into the UK along with the non-native American signal crayfish (*Pasifastacus leninsculus*), this fungus can spread rapidly through water with dramatic implications for the native populations of crayfish. This is the single biggest threat to the future of the native crayfish.
- 4.111. **Competition for habitats and food-** There are currently three non-native species of crayfish in UK waters, the most common of which, the American signal crayfish, is also the largest and that which prefers habitat closest to that of the native species. In many areas including the Green Arc, this has led to the non-native species out-competing, and in some areas, wiping out populations of the native species.
- 4.112. **Pollution-** White-clawed crayfish are very sensitive to water pollution, particularly pesticides and sewage. Low levels of water quality can have a significant impact on local populations of the species, and make it more vulnerable to crayfish disease.
- 4.113. **Modification of waterbodies-** Modification of waterbodies such as dredging of silt and removal of other rubble can also remove crayfish habitat, damaging local populations and making future colonisation unlikely.

Current Action

- 4.114. The Environment Agency 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.
- 4.115. The Environment Agency is also undertaking trappings of rivers in Essex, Norfolk and Suffolk to establish the presence of native and non-native crayfish species. All main river fisheries survey sites will be surveyed for crayfish by 2000. Surveys will be undertaken as part of a 3-year fisheries surveying rolling programme.

- 4.116. 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.
- 4.117. The former Ministry of Agriculture, Fisheries and Food (MAFF) 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 removed the prohibition on keeping Signal Crayfish within certain areas designated by postcode, in an attempt to protect native crayfish and their habitats in England and Wales.
- 4.118. The Environment Agency in the Thames Region is running a project, undertaken by the Institute of Freshwater Ecology, to examine the effect of fishing crayfish from water bodies on both the crayfish population and the ecology of the water body.
- 4.119. The EA have published a leaflet describing the identification of the different crayfish species.

Aims

1. Maintain the present geographical extent of the species.
2. Limit the spread of non-native crayfish species within the Green Arc

Targets

1. Ascertain the distribution and population of the White Clawed Crayfish within the Green Arc by 2006.
2. Safeguard these areas against adverse development, foreign species, pollution and bad river management to halt the decline of the White Clawed Crayfish by 2009
3. Restore White Clawed Crayfish to 25% of suitable open water habitats by 2020

HORNET ROBBER FLY

Current status

- 4.120. The hornet robberfly (*Asilus crabroniformis*), is associated with unimproved grasslands, heath and grazing marshes in southern England and Wales. As a larva, the Hornet Robberfly preys on dung beetle larvae, and as an adult it feeds on a variety of insects. Its plight is directly related to its habitat, and the decreasing quality and quantity of grassland in southern England recently has been mirrored by similar declines in hornet robberflies. Within the Green Arc area the hornet robberfly is known to be present on a few sites in Essex, none of which currently receives statutory protection. The hornet robberfly is a priority species on the UK BAP.

Threats

- 4.121. **Loss and fragmentation of appropriate habitat-** The pressure for development in the south east of England has resulted in much appropriate habitat being lost, and the remaining areas becoming fragmented. This makes hornet robberfly populations increasingly unviable, whilst making them more vulnerable to ecological stresses and disease.
- 4.122. **Use of parasite treatment on grazing stock-** Inappropriate use of parasite treatments on stock can kill off the dung beetle populations on which the hornet robberfly depends for its larvae diet.
- 4.123. **Recent changes to stock management-** Changes to stock management caused by agricultural intensification can have a negative impact on the life cycle of the hornet robberfly.

Current Action

The areas of South Essex in which the Hornet Robberfly are found are the subject of detailed entomological survey to ascertain its true population and abundance.

Aims

1. Identify, maintain and protect viable populations and key sites for the Hornet Robber Fly in the Green Arc

Targets

1. Identify all post-1980s Hornet Robber Fly sites and assess for viable populations, identifying key sites for the Green Arc by 2007.
2. Maintain and protect all key sites through appropriate management to halt and reverse the species' population decline. Have measures in place by 2009.

DESMOULIN'S WHORL SNAIL

Current status

- 4.124. The Desmoulin's Whorl snail (*Vertigo moulinsiana*) is associated with well-established wetlands such as fens and marshes, which occur alongside rivers or lakes on calcareous soils. Within the UK, it occurs within southern England only, and within the Green Arc area it has been recently recorded along the River Stort in Essex only, although not in great density. Its limited numbers reflect the long-term destruction and drainage of the country's natural wetlands and floodplains.
- 4.125. This species is listed on Annex II of the EC Habitats Directive, and is listed as *Rare* in the GB Red List.

Threats

- 4.126. **Destruction of wetlands-** Desmoulin's Whorl snail only tends to occur on well-established wetland habitats, and will not generally colonise man-made sites. For this reason the ongoing destruction of wetlands across the south of England for development or agriculture is thought to be the main factor influencing the deterioration the snail's status in Britain.
- 4.127. **Habitat degradation-** In addition to habitat destruction, changes to wetland sites inhabited by this species, which often occur as a result of changes in hydrology, also have detrimental effects on the snail populations.

Current Action

- 4.128. Sawbridgeworth Marsh in Essex has SSSI status. However, there is no direct current action taking place for this species in Essex.
- 4.129. JNCC and EN have funded a series of surveys at selected UK sites to determine the distribution and habitat requirements of the snail. Four sites in the UK have been proposed as Special Areas of Conservation (SACs) under the EC Habitats Directive.

Aims

1. Maintain, identify and protect populations of the snail within the Green Arc area.

Targets

1. Undertake a survey of Desmoulin's Whorl Snail to establish its distribution within the Green Arc area by 2007
2. Ensure that viable populations are maintained in identified sites and that no further habitat loss or habitat degradation takes place.

BLACK POPLAR

Current status

- 4.130. The Black Poplar (*Populus nigra ssp. betulifolia*) is the only sub species of a number of Black Poplars that is truly native to Britain. It is an impressive tree that was once common in the British countryside, and is associated with rivers and streams. Today's populations of the Black Poplar are extremely limited, and their future is threatened by a number of factors. It is estimated that there are 4,000 – 8,000 individual trees of this species in the UK, most of which are in the south and midlands of England. Many of these are thought to be genetic clones however, which limits the robustness of the population as a whole. The Black Poplar is still fairly widespread in Essex, where there could be more than 200 trees. In the London area of the Green Arc, trees are known to be present in the Waltham Forest, Redbridge and Havering boroughs, but numbers and condition are not currently known.

Threats

- 4.131. **Drainage-** The drainage of lowland areas, especially along river corridors, can limit populations and put stress on existing trees by limiting the amount of water available. New saplings cannot germinate without damp conditions, limiting the amount of regeneration within the species.
- 4.132. **River corridor management-** The development of river bank areas and canalisation of many lowland rivers has also pushed the native Black Poplar out of its prime habitat.
- 4.133. **Tidiness-** Where naturalistic river habitats still exist, the tendency to tidy fallen branches prevents new saplings from regenerating in this way.
- 4.134. **Cross-pollination-** Cross pollination by non-native sub-species of Black Poplar is limiting the native species populations.
- 4.135. **Planting practice-** Where cuttings are taken to create new individuals, many are often taken from a single tree. If this is practised over large areas then the number of genetic clones in the region could make the population vulnerable to stress and disease.

Current Action

- 4.136. The first list of Essex trees was compiled in 1996, using survey data collected by Edgar Milne Redhead. This list has been regularly updated by the National Trust and English Nature as trees are either discredited or confirmed as being native Black Poplars and new records are added.
- 4.137. A clone bank has been set up by Dedham Vale and Stour Valley Project, with assistance from the Environment Agency and Essex Wildlife Trust at Daws Hall field centre and reserve, with an overspill at Loshes Meadow Reserve. It holds cuttings from trees in north Essex and south Suffolk, and currently represents 12 Essex trees.

- 4.138. A training day and identification workshop was held in June 1998 by the Suffolk Black Poplar Working Group in Sussex, where the national status of the species and work currently underway was discussed.
- 4.139. New trees are being planted but the provenance is unknown for many of them and they are not regularly recorded.
- 4.140. Fiona Cooper, a student at Nottingham University, has been funded to research native Black Poplars for her PhD, funded by the Environment Agency. She is looking at leaf morphology and genetic variation in relic populations and is carrying out DNA tests on some trees in Essex.

Aims

1. To maintain and protect Black Poplar stands and individual trees
2. To ascertain, maintain and increase a diverse age structure and genetic diversity for the Black Poplar population in the Green Arc
3. Inform and educate landowners and managers about Black Poplars

Targets

1. To survey all known trees to establish authenticity and sex by the year 2006
2. Double the number of sites that contain Black Poplar by 2012 compared to the number in 2005
3. First planting of new Black Poplar clones by 2010
4. Provide information for landowners and managers by 2007

CREEPING MARSHWORT

Current status

- 4.141. Creeping marshwort (*Apium repens*) is a small member of the carrot family which grows in open, wet, usually base-rich permanent pasture subject to winter flooding. It occurs through central and southern Europe, and North Africa. Superficially it resembles the much more common fool's watercress and questions about the true status of creeping marshwort as a separate species remain.
- 4.142. The plant has been previously recorded from sites in Oxfordshire and Buckinghamshire, Scotland, south east Yorkshire, Norfolk and Suffolk, and the two sites in the Thames Valley, but until recently was believed to remain at only a single site, Port Meadow SSSI in Oxfordshire, therefore the discovery of the plant in 2002 at Walthamstow Marsh, in the Lea Valley Park, makes this one the rarest vascular plants in the Green Arc. The plant is currently found in only a small area on the bank of a ditch in the south marsh.
- 4.143. Creeping marshwort is listed in Annex II and IV of the EC Habitats Directive, Appendix I of the Bern Convention, and is protected under Schedule 4 of the Conservation (Natural Habitats, etc.) Regulations 1994 and Schedule 8 of the WCA 1981.

Threats

- 4.144. **Lack of Management-** Due to the small population size, creeping marshwort is vulnerable to extinction at its current site in the Lea Valley. High water levels in the ditch adjacent to where it grows may drown it, in addition, due to its prostrate habit, it may be overgrown by faster growing, taller plants, if sympathetic grazing or mowing is not carried out annually. The plant would appear to require some disturbance of soils to provide openings, in which its stems can spread, complete closure of the turf is likely to prove fatal to individual plants.
- 4.145. **Agricultural Issues-** Overgrazing, agricultural intensification, ploughing, dumping of waste and spraying with herbicide have posed further threats to its existence at its only other known site, and would appear to have contributed to its demise at the other 10 sites on which it was formerly recorded from.

Current Action

- 4.146. The species is one of a small number of plants that are part of English Nature's Species Recovery Programme; in addition it has its own species action plan in the UK BAP. Locally the Lea Valley Regional Park Authority have initiated a programme of management and monitoring. So far management has included light summer grazing with cattle, and the re-excavation of areas of ditch to provide suitable conditions in which plants can set seed and grow.

Aims

1. Maintain the present population of the species.
2. Create suitable conditions for the species in similar areas of wet grassland habitat elsewhere in the Lea Valley.

Targets

1. Identify other sites that offer potential habitat to support creeping marshwort within the Green Arc, and complete detailed botanical surveys to ascertain their suitability for re-introduction or translocation by 2006.
2. Where possible, extend appropriate management to similar areas of wet grassland in the wider Lea Valley to enable natural re-colonisation from current population by 2010.
3. Carry out regular surveys of the current site, and sites where appropriate management has been extended, to monitor natural re-colonisation, and assess the effectiveness of grazing and water-level management

5. SITE SPECIFIC ACTIONS

INTRODUCTION

- 5.1. To complement the area specific habitat and species actions listed in sections 3 and 4, LUC were asked to look into a number of site-specific actions. It was decided that these actions should focus on a number of areas where real improvements could be made. When choosing these areas it was important to keep in mind the area wide biodiversity actions listed in the two previous sections and the DEFRA PSA target.
- 5.2. Discussions with English Nature led to the creation of four action areas within the Green Arc. These areas were chosen because they incorporated the majority of the SSSIs in the region, contained a number of diverse habitats and allowed scope for some major ecological improvements. The four action areas for the Green Arc are shown in **Figure 5.1** below.

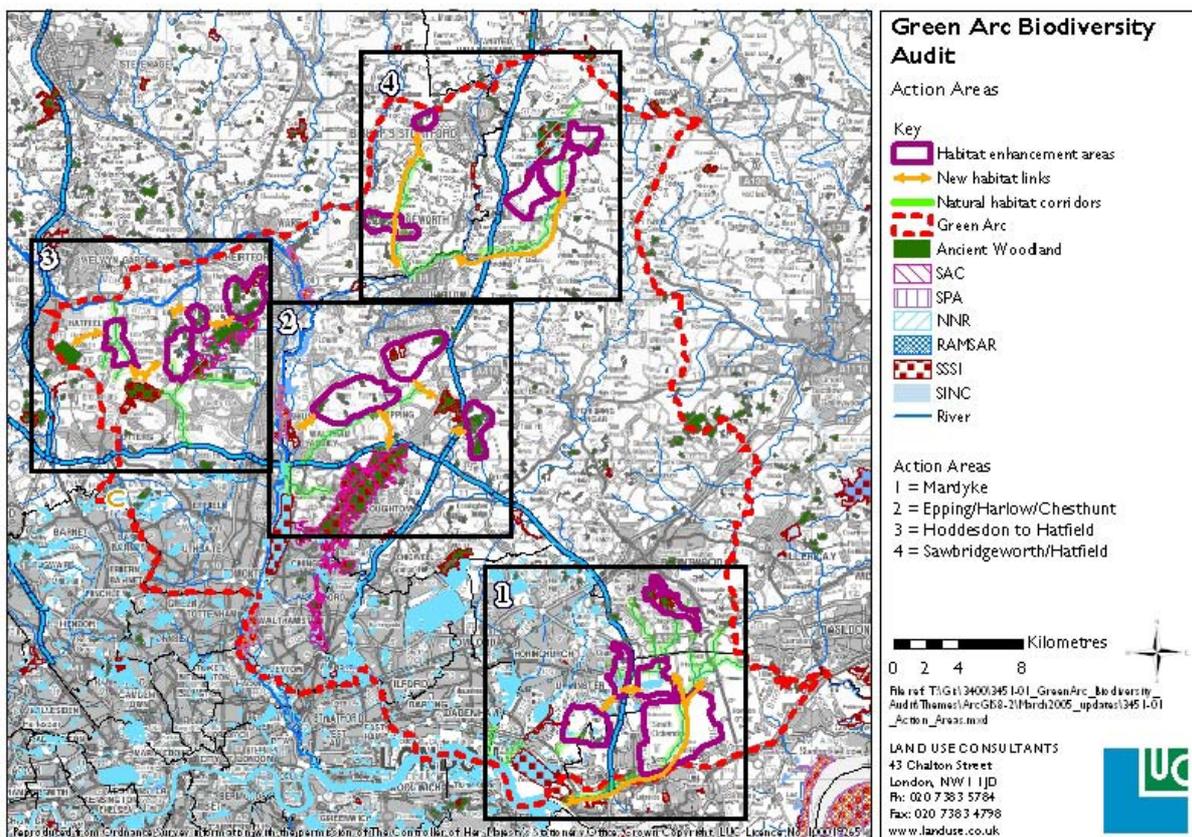


Figure 5.1 The extent of each of the four action areas within the Green Arc

- 5.3. Each action area has identified a number of sites and green links where biodiversity improvements could be made. The sites are known as Habitat Enhancement Areas (HEAs) and the green links are known as 'Links'. Natural wildlife corridors that are key to the functionality of the action area have also been highlighted.

- 5.4. The action areas are described in the rest of this section. Each description gives a brief introduction into the area's biodiversity, land use and threats, a map summarising the whole area and a discussion of the HEAs, the links and some of the natural wildlife corridors.
- 5.5. Many of the action areas describe 'appropriate management' or 'ecological management'. For the purposes of this section 'appropriate/ecological management' mean management that helps increase to an areas biodiversity and facilitates species movement.
- 5.6. Finally it is important to note that ecological improvements should not be limited to the four areas highlighted in this report. Biodiversity should be promoted throughout the Green Arc. These action areas merely highlight actions that could make a real difference to the Green Arc.

THE MARDYKE ACTION AREA

Context

- 5.7. The first Action Area is probably the most unique as it includes a number of habitats that are not found in the rest of the Green Arc. This is mainly due to its location next to the Thames Estuary and the flat land that surrounds it.
- 5.8. The action area contains only four SSSIs but numerous SINCs. The three most notable SSSIs are:
- **Thorndon Park**, in the north, mainly woodland and heath
 - **The Ingrebourne Valley**, southeast of Upminster, consisting of fen, grassland and woodland
 - **The Inner Thames Marshes**, northwest of Purfleet, featuring neutral grassland and littoral sediment
- 5.9. As well as numerous designated sites the action area also contains some small sites of ancient woodland (See **Figure 5.2** below)

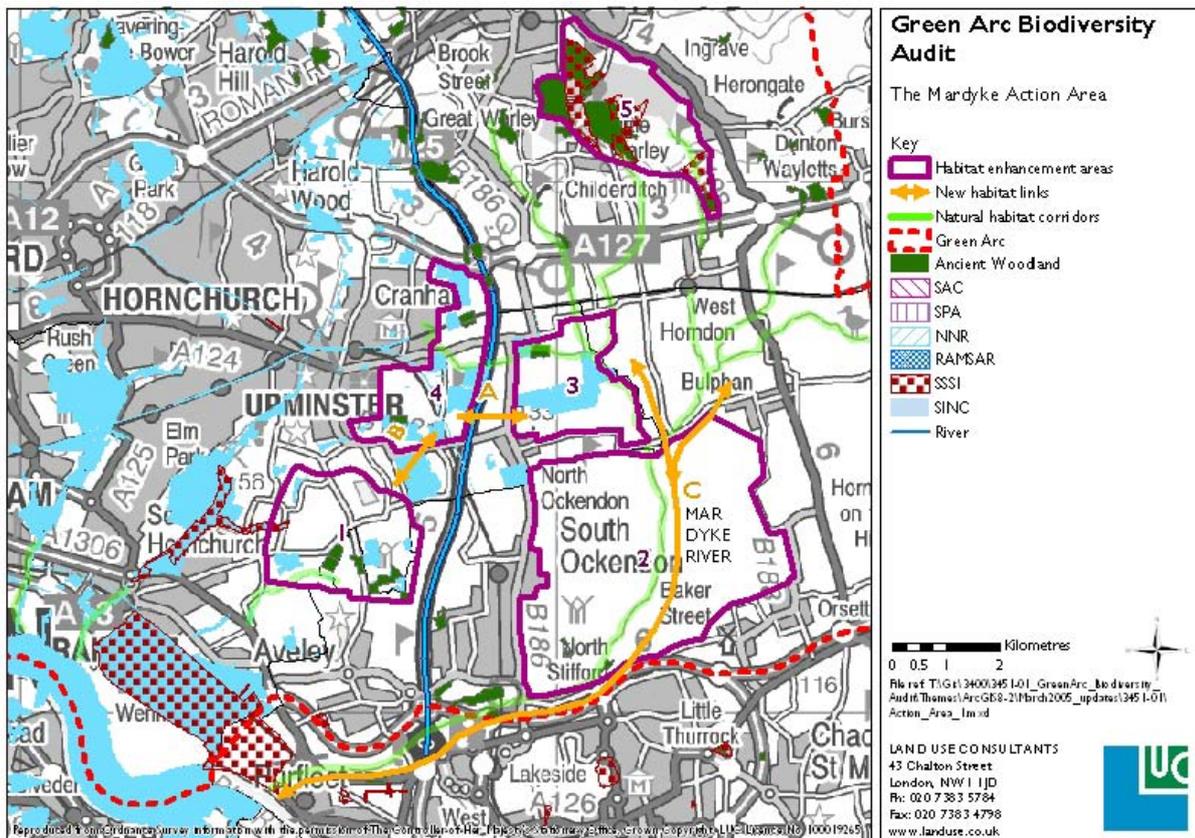


Figure 5.2 Nature Conservation designations in the Mardyke Action Area

- 5.10. Two rivers also play a key role in the ecology of the action area. The Ingrebourne River in the west of the action area provides a wildlife corridor between the Thames, the Ingrebourne Valley SSSI and the various SINC's to the north. Similarly the Mardyke River in the east also acts as a good wildlife corridor between the Thames and the farm and woodland south of Brentwood.
- 5.11. The action area also includes a large amount of urban development. The eastern edge of London, the ribbon development along the Thames and the M25 are the most obvious urban features. The M25 is a particular problem not least because of the many adverse impacts it creates but also for its fragmentation effect. It splits this action area in half severing the open land south of Upminster from the wider Essex countryside.
- 5.12. The remaining open space is mostly given over to agriculture, although the exact nature of this agriculture is not currently known.
- 5.13. A number of environmental initiatives are also taking place in this Action Area. Two of particular note are The Thames Gateway South Essex Green Grid and the Thames Chase Community Forest. The first initiative is a partnership of public and private organisations that has been successful in raising money to fund environmental projects. The second initiative deals with more on the ground projects. Over the last three years it has acquired over 330ha of land and planted around 400,000 trees. It now owns and runs several sites in this action area and these have been an important factor in choosing HEAs and Habitat Links.

Actions

Habitat Enhancement Areas

- 5.14. **Belhus Extension-** This first HEA incorporates four woodland sites from the Thames Chase Community Forest in its southeast corner. Three of these areas are ancient woodland whereas one other is recently planted secondary woodland. The HEA also includes another reasonably sized secondary woodland called Gerpins Wood in its northwest corner, as well as several former gravel and sand pits and an area of disused workings. Another area of Thames Chase Community Forest known as *Rainham to Corbets Tey*, which includes Hornchurch Country Park, abuts the HEA to the north and west.
- 5.15. The aim of this HEA is to improve the habitat and the linkages between Hornchurch Country Park and Belhus Country Park. This will involve planting new woodland between Belhus Country Park, White Post Wood and Warwick Wood. Linking and buffering these ancient woodland sites will help improve their habitats and biodiversity. Additional woodland planting should also take place opposite Warwick Wood on the other side of Warwick Lane to facilitate species movement over the road. This additional planting should stretch as far as the woodland at Gerpins Farm.
- 5.16. Habitat enhancement should take place in all of the other areas. Farmland should be entered into favourable ecological management through the ESS. The disused pits should be turned into lakes and ponds with surrounding areas of neutral semi-

improved or unimproved grassland. These habitat improvements should ensure that a favourable ecological matrix forms between the two Country Parks.

- 5.17. **Ockenden Fens-** The potential for this area is huge. At present it features a number of farms, two golf courses and an outdoor education centre. Ecologically the area contains a few sites of floodplain grazing marsh, but these are limited to the northeast and the very southwest of the HAE. The main ecological feature is the Mar Dyke River that flows through the middle of the area. There are no designated sites for nature conservation but there is one small copse of ancient woodland in the southwest.
- 5.18. The area falls right on the Mar Dyke floodplain and as such has a history of wetland habitats, indicated by the many place names that contain the word 'Fen'. It is these wetland habitats that this HEA seeks to reinstate. Ideally Fen could be reinstated on a large scale on appropriate locations either side of the river. Surrounding fields could re-introduce grazing marsh to provide a complementary habitat. However the most important improvement would be to return the river to its natural course and stop draining that land around it. Further away from the floodplain, to the east and the west of the HEA, grassland and woodland could be planted and encouraged. The Ancient Woodland site could be increased in site and any hedgerows and secondary woodland could be brought into favourable management. The whole area could then become not only an important habitat but also a useful store of rainwater at time of flooding.
- 5.19. **Clay Tye Farmland-** This HEA would compliment the Ockenden Fens HEA. Similar measures should be employed here as in the HEA above. However fen, marsh, carr, grassland and woodland should be promoted to link the Mar Dyke, an important wildlife corridor, to the land owned and managed by the Thames Chase at their Forest Centre, on the east side of the M25.
- 5.20. **Cranham Farms-** Cranham Farms includes most of the Thames Chase Forest Centre and all of Franks Wood and Cranham Marsh. All of these sites include ancient woodland and this should be protected and enhanced. The HEA also features a number of other habitats including semi-improved and unimproved grassland to the north of Franks Wood and around the Forest Centre, and marsh and fen at Cranham Marsh.
- 5.21. Areas of ecologically important grassland to the north of the Forest Centre should be maintained and improved. Woodland should be planted in the remaining areas especially alongside the M25. Similarly woodland planting should be promoted to the south of the Forest Centre, forming a new block bordered by the railway, Pike Lane and the M25.
- 5.22. In the west of the HEA Cranham Marsh and its habitats should be extended. Here wetland habitats should have priority, although the three woodlands should also be linked and should eventually extend to the new woodland block to the south of the Forest Centre.

- 5.23. **Thorndon Park Woods-** Where possible the forest and the heath that make up the SSSI and Country Park should be consolidated conserved and enhanced. Links between the two parts of the country park should also be maintained. The location of the woodland means that expansion is very difficult; however there may be an opportunity to expand the wood to the open land to the northeast over the A128 and on to Birches and Hall Wood. Links between different parts of the forest should be improved too, especially between Holden's Wood and Ellen's Wood. Coniferous plantation woodland should also be phased out of the forest and replaced with broadleaved species and heathland glades. The heathland in the area should also be kept in a favourable condition. This HEA includes the Brentwood part of the Thames Chase Community Forest.

Habitat Linkages

- 5.24. **Link A-** Link A aims to reduce the fragmentation caused by the M25. HEAs 3 and 4 will have already promoted woodland planting either side of the motorway where it enters its cutting, to the south of the Thames Chase Forest Centre. A road bridge already spans this cutting proving that the embankments either side of the road are high enough to allow traffic to pass beneath. Once complete the green bridge could then link the new woodland south of the forest centre to the new woodland at the west of HEA 4, which in turn would connect it to the Mar Dyke River and its green corridor.
- 5.25. **Link B-** Link B looks to enhance the habitats and habitat linkages between HEA 3 and HEA 1, effectively linking the Thames Chase Forest Centre to Belhus Country Park. This link will not be easy because three large lakes, an activity centre and a caravan park stand in the way, however shelterbelts could be planted, the hedgerow network could be improved and the open land could be brought under more favourable management.
- 5.26. **Link C- The Mardyke River.** The Mar Dyke River acts as an important wildlife corridor. If properly managed it has the potential to link all of the habitats and HEAs in the eastern half of the action area. The river and its tributaries should all be allowed to return to their natural courses and fen, marsh and carr should be promoted along the river's length. This will produce a real boost to the areas ecology and provide a shining example of what can be achieved through ecological management of the aquatic environment.

THE EPPING/ HARLOW/ CHESHUNT ACTION AREA

Context

- 5.27. The Epping /Harlow/Cheshunt Action Area contains a number of features that have potential to aid and hinder biodiversity in the Green Arc. The most notable biodiversity resource is that of Epping Forest. It provides excellent woodland habitat for a number of species as well as areas of heath and unimproved grassland. The Forest is split into two main parts; the large southern extent bordering Loughton, and the smaller northern part north of Epping. The Forest is owned and managed by the Corporation of London, which also owns a considerable amount of land to the east of Epping, See **Figure 5.3** below and **Figure 1.3**.

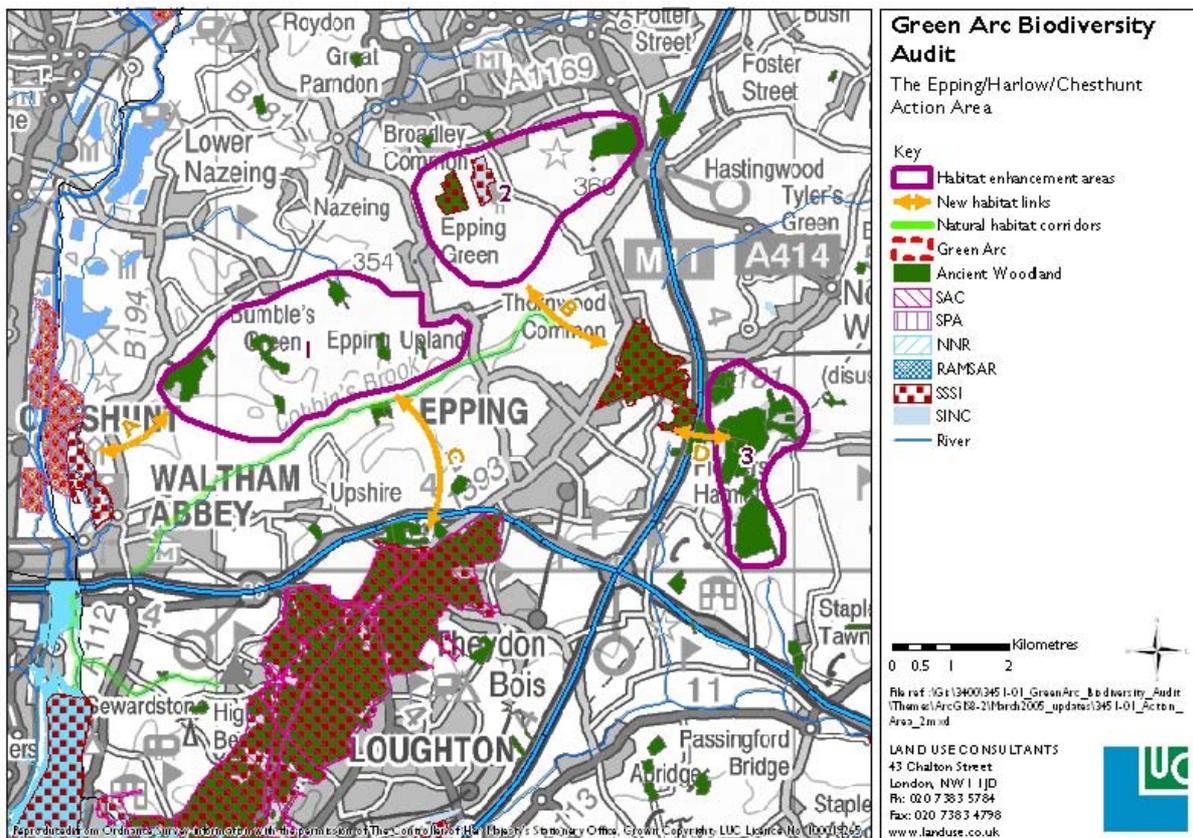


Figure 5.3 Nature Designations in the Epping /Harlow/Cheshunt Action Area

- 5.28. To the west of Epping Forest is the Lea Valley Regional Park. This runs from north to south along the route of the River Lea from Lower Nazeing, through Cheshunt and south of this Action Area to the East India Dock Basin. The park was formed to embrace all aspects of leisure and to protect and enhance the natural environment. The area the park covers now includes a number SSSIs, some of which have international designations, and several SINC. This action area features two notable SSSIs. The first near Cheshunt called Turnford and Cheshunt Pits, and the second south of Waltham Abbey called Chingford Reservoirs. These SSSIs include fen and grazing marsh habitats respectively.

- 5.29. Other important biodiversity features include the Harlow woods to the south of Harlow, the Roughtally to Beachet wood complex east of Epping, and a number of ancient and secondary woodlands that fall to the north and south of Cobbin's Brook. Cobbin's Brook itself acts as an important wildlife corridor as does the River Lea and the Stewardstone Stream.
- 5.30. The Epping /Harlow/Cheshunt Action Area also suffers from a high degree of fragmentation and development pressure. The most notable barriers to species movement are the M11 and M25 motorways. The M25 separates southern Epping Forest from the open land to the north and the M11 cuts off the northern part of Epping Forest from the Roughtally-Beachet Wood Complex. The A112 effectively separates the Lea Valley Regional Park from Epping Forest and some of the smaller roads in the area, such as the B181 and the B194, have a similar effect but to a lesser extent.
- 5.31. Various towns also separate biodiverse habitats. The most notable are Epping and Waltham Abbey, although smaller areas such as Stewardstone also have a role to play.
- 5.32. The Epping /Harlow/Cheshunt Action Area also includes golf courses and country parks (mainly along the Lea Valley), but most of the remaining open land is turned over to agriculture. Horticulture is the main form of agriculture around the edges of the action area whereas cereals are more predominant in the centre.

Actions

Habitat Enhancement Areas

- 5.33. **I. Cobbin's Woodland Complex-** The first HAE for this action area proposes linking together the various ancient and secondary woodland sites found to the north of Cobbin's Brook. This complex would include Galleyhill Wood in the west, Copy Wood in the north, Orange Wood in the East and would be bordered in the south by Cobbin's Brook. The woodland complex would stretch along the ridge between Epping and Hertford and run from Cheshunt to Epping Upland.
- 5.34. Developing a woodland complex here will have many benefits. Some of the woodlands are already linked by wide hedgerows and shelterbelts, developing these links further will allow core woodland species to spread further along the ridge. Increasing the amount of woodland will increase core woodland habitat, which has different conditions, and species, to peripheral woodland habitat. Various types of woodland habitat could also be developed. Wet woodland already thrives near Cobbin's Brook. An extension of the woodland would develop this habitat further. More woodland will also provide a buffer habitat to protect the ecology of ancient woodland sites from detrimental human-induced activities.
- 5.35. However, the complex does not necessarily have to be entirely woodland. A band of woodland should run as continuously as possible from one end of the complex to the other. This band could run along the length of field boundaries and should be wide and dense enough to allow species movement. It is known that many ancient woodland plants will not colonise woods that are over 200m away from an ancient

wood¹¹. This would suggest that where the woodland is not continuous it should be linked together by well-maintained hedgerows and that woodland stands should not be more than 200m apart.

- 5.36. Other habitats could also be developed within the complex. Woodland glades on the ridge could provide opportunities to develop unimproved grassland and heathland habitats, whereas grassland nearer Cobbin's Brook would allow for floodplain grazing marsh. A number of recreational and flood storage/prevention opportunities could also result from this action.
- 5.37. **2. Harlow Woods-** The second HEA is aims to join the ancient woods to the south of Harlow. At present the land in the HEA is used for cemetery land and for farmland. Linking the habitats would involve extending the woods at the east of the action area (Mark Bushes/Latton Park) westwards and improving the quality and condition of the hedgerows where the woods cannot be extended. The HEA is bisected by a small road (called Rye Street Road), but species could move across this if the woods to the west are expanded to the south along the road and there is equivalent habitat on the eastern side of the road, perhaps near Rye Hill Common.
- 5.38. Extending the woodland will share many of the ecological benefits of the Cobbin's Wood complex. It also may provide an opportunity for additional burial space through 'green burials', as there is already a cemetery and crematorium in the area. Green burial space could provide funding for the tree planting, as well as extending the woodland habitat.
- 5.39. However the Harlow Options Study has proposed a southern bypass around the town. This development would cut off the Harlow Woods from the rest of the countryside. If a Harlow southern bypass were to be constructed, the area would probably require habitat bridges or similar mitigatory measures in order to avoid the adverse impacts of fragmentation.
- 5.40. **3. Roughtally to Beachet Wood Complex-** The third HEA looks to link Roughtally's Wood to Birching Coppice and Birching Coppice to Beachet Wood. Extending Roughtally's Wood to Birching Coppice is relatively easy as woodland could be planted along the eastern edge of the M11. The shelterbelt would have to be quite thick because of the road noise. To link the complex in the south Beachet Wood could either be extended to the west or a small amount of linking woodland could be grown on Tawny Common to the north.

Habitat Linkages

- 5.41. Four areas where habitat links could be improved where identified. These have been labelled A, B, C and D on Figure 3.3 above.
- 5.42. **Links A and B-** Links A and B highlight areas where wildlife corridors need to be created and maintained. Link A will involve maintaining hedgerows and small woodland copses between Galleyhill Wood and the River Lea Country Park. The most effective way to do this would be to have the linking habitats run alongside the

¹¹ Peterkin G (2002) Reversing Habitat Fragmentation in British Woods

Claygate Track. This track runs between the two sites and a small copse called Kennel Wood can be found on route.

- 5.43. Link B aims to link the Harlow Woods HEA to the northern part of Epping Forest. This habitat link could take a number of routes, but the most feasible would be to create a series of wooded copses and well managed hedgerows along the ridge forming the headwaters of Cobbin's Brook. This ridge runs east from Cobbin's Wood Complex HEA past Epping Green and Harlow Woods HEA, before curving south along Rye Hill Road and past Thornwood Common. A series of copses and managed hedgerows would link all of these habitats and these and have the benefit of wooding the upper reaches of a river catchment aiding in flood prevention.
- 5.44. **Links C and D-** Links C and D aim to solve the fragmentation effects caused by the two motorways. Link C firstly involves maintaining the wildlife corridor network between Cobbin's Brook and the M25. The second part of the link looks to create a 'green bridge' across the M25. This green bridge would link Epping Forest to the open land to the south of Cobbin's Brook. The bridge would have to be built over the motorway where it enters one of its cuttings; either north of The Warren or as an extension to the existing tunnel between the southern forest and Epping town. Wherever the green bridge is built, complimentary woodland land habitat should be planted on the other side to facilitate species movement.
- 5.45. Link D proposes a similar scheme over the M11. Here the scheme would aim to link the northern part of Epping Forest to the Roughtally-Beachet Wood Complex. A footbridge for the Essex Way already spans the motorway cutting between the two sites. Consultation with English Nature has suggested that this would be the perfect place for a green bridge to be developed. The bridge could span the existing cutting, providing two major benefits. Firstly it would provide a vital habitat link between the two areas of woodland. Secondly the link would provide a much better crossing for the Essex Way and its various users.

THE HODDESDON TO HATFIELD ACTION AREA

Context

- 5.46. This action area contains some of the largest extents of ancient woodland in the whole of the Green Arc (See **Figure 5.4** below). Millwards Park, Northaw Great Wood and the Wormley-Hoddesdon-Broxbourne Wood Complex make up the largest areas of ancient woodland with smaller ancient and secondary sites scattered in between.

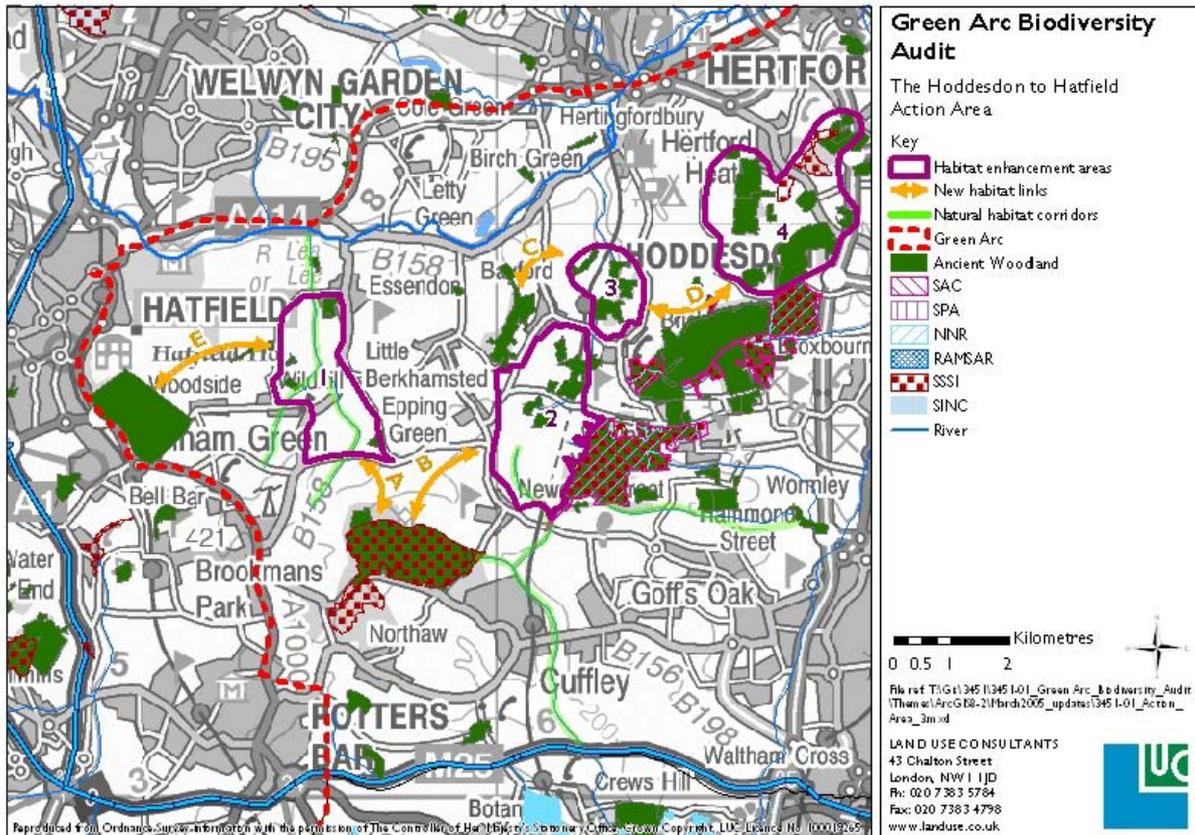


Figure 5.4 Nature Designations in the Hoddesdon to Hatfield Action Area

- 5.47. The action area also contains a large amount of heathland and acid grassland, which often forms a mosaic habitat with the woodland sites. Large areas of heathland can be found throughout Northaw Great Wood and the Wormley-Hoddesdon-Broxbourne Wood Complex, as well as on smaller sites such as Hertford Heath. The woods in this action area include and are surrounded by numerous small acid grassland sites. These areas have their own intrinsic interest but also add to the richness of the woodlands. Unfortunately these acid grassland sites are mostly undesignated and are under threat from poor management, horsiculture and development. One of the key actions in this area is to encourage their identification, retention and positive management. Reference should be made to the Heathland and Acid Grassland Action Plan in Section 3.
- 5.48. The action area is surrounded by urban development. There are few habitat links leading out of the area due to extensive linear developments between Potters Bar

and Welwyn Garden City in the west and Waltham Abbey and Hertford in the East. The M25 and London border the area to the south and a number of A roads are found to the north. This action area can truly be described as encapsulated countryside.

- 5.49. The area also includes a number of golf courses. Two particularly large courses can be found running from Epping Green to Essendon. This effectively locks this area of countryside into a managed landscape, reducing the biodiversity potential of the area. The remaining open land in the area is considered to be agricultural. According to DEFRA there are some Cereals grown between Millwards Park and across the top of Northaw Great Wood. To the south of Northaw Great Wood some lowland sheep and cattle grazing takes place. The rest of the action area is classified as 'Other Types', which could refer to many things including equestrian use and hay pasture.

Actions

Habitat Enhancement Areas

- 5.50. **1. Wildhill Stands-** This HEA already contains several woodland stands, many of which grow alongside Essendon Brook and its tributaries. This brook and the stands of trees that surround it provide a valuable green link between Millwards Park to the west and Northaw Great Wood to the south. However, these links could be strengthened through a series of actions.
- 5.51. Most importantly the existing woodland in this HEA must be maintained. Building on this, woodland could be planted along the length of the minor road between Wildhill and West End. This would directly link the Essendon Brook woodland stands to an uninterrupted woodland network stretching to Millwards Park. The remaining land in the area could remain farmland but should be entered into a more ecologically favourable management system. Funding could be provided by the new Environmental Stewardship Scheme to produce an area of unimproved acid and wet grassland.
- 5.52. **2. Ponsbourne Common-** The Ponsbourne Common HEA already includes and borders several sites of ancient wet woodland. Many of these sites are separate from each other, providing stepping-stones between the ancient woodland habitats but not actual links. There is however a great opportunity here to link these habitats where the railway goes into the Ponsbourne Tunnel. An extension of the southern edge of Wormley Wood across to Ashen Grove and then down to The Warren would link four woodlands. There could however be structural issues with the tunnel if trees were planted here. If woodland was not possible then scrub could be considered as linking habitat. Extending Ashen Grove to the north could make further woodland linkages by bringing it adjacent to Blackfan Wood, which itself could be linked to Bayford Wood by extending it to the west, along the road, past Ashendene Farm and into the land just east of Bucks Farm. Once again the remaining land in the HEA could be entered into an ecologically sensitive management regime to buffer the ancient woodland sites and to provide a variety of grassland and heathland habitats.

- 5.53. **3. Great Groves to Hook Grove-** This relatively small HEA aims to link the ancient wet woodlands of Great Grove, via Weepings Wood, to Hooks Grove. Great Grove is already linked to Blackfan Wood to the south and this link should be maintained. It is also linked to Harmonds Wood to the north, however this link should be strengthened at each wood's eastern edge to produce a woodland glade between the two.
- 5.54. A small woodland complex between Weepings Wood, Broadgreen Wood, Hooks Grove and Sailors Grove would strengthen each woodland provide opportunities for glades of unimproved grassland to develop. This complex would then be joined to the Great Groves Wood via a small wildlife corridor that runs alongside the Bayford Brook. This wildlife corridor should be protected and enhanced to facilitate species movement.
- 5.55. **4. Hertford Wood and Heath-** The final HEA for the Hoddesdon to Hatfield Action Area includes seven areas of ancient wet woodland and three sites of heathland / acid grassland mosaic, two of which are designated as the Hertford Heath SSSI. These habitats make this area particularly important for biodiversity and their condition, extent and quality should be maintained, enhanced and protected when possible. All farmland and amenity land that surrounds these woodland and heath sites should be entered into ecologically sensitive management regime where possible. Hedgerows that link habitats should be maintained and improved. Extending acid grasslands and heathland sites should also be looked into.

Habitat Linkages

- 5.56. **Links A and B-** Links A and B aim to improve the wildlife corridors between Northaw Great Wood and HEAs 1 and 2 respectively. There are several woodland copses along each of the links and these should be maintained to act as stepping-stones between the larger areas of woodland. The intermittent farmland is predominantly used for arable crops and is likely to be of high quality. This makes changing its use undesirable, however the farmland could be managed to be more ecologically sensitive. This would provide a favourable matrix for wildlife to move through.
- 5.57. **Links C and D-** Links C and D aim to produce favourable wildlife links between Bayford Wood, HEA 3, Wormley-Hoddesdon-Broxbourne Wood Complex and HEA4. The farmland between these different areas is predominantly 'Other Types'. This suggests that the land may not be high quality, but also that it may be under threat from development and other rural-urban fringe issues, such as lack of management. It is important that these areas are well managed and managed for wildlife as well as agriculture. Environmental Stewardship funding may be available to help with favourable management.
- 5.58. **Link E-** Link E runs between Millwards Park in the west and HEA 1 in the east. A large amount of woodland already exists between these two areas creating a situation where the two areas are almost joined by uninterrupted woodland. There is however a lot of coniferous woodland between the two sites that is likely to be plantation woodland. This woodland type has negligible wildlife interest, although some rare species do survive there it does not benefit any of the Green Arc Species

listed in Section 2. Link E aims to maintain the woodland link between the two sites but to eventually phase out the coniferous planting or at least plant conifers alongside broad-leaved species. This would provide a better woodland link between Millwards Park and HEA 1.

THE SAWBRIDGEWORTH / HATFIELD FOREST ACTION AREA

Context

- 5.59. The most northerly of the action areas probably has the most potential for habitat expansion. It features a number of habitats including wetlands, grasslands, woodland and small areas of heath. The most notable site for biodiversity is Hatfield Forest NNR which main habitats include ancient woodland and wood pasture with extensive acid grassland. There are also several other ancient woodland sites scattered throughout the action area (See **Figure 5.5** below).

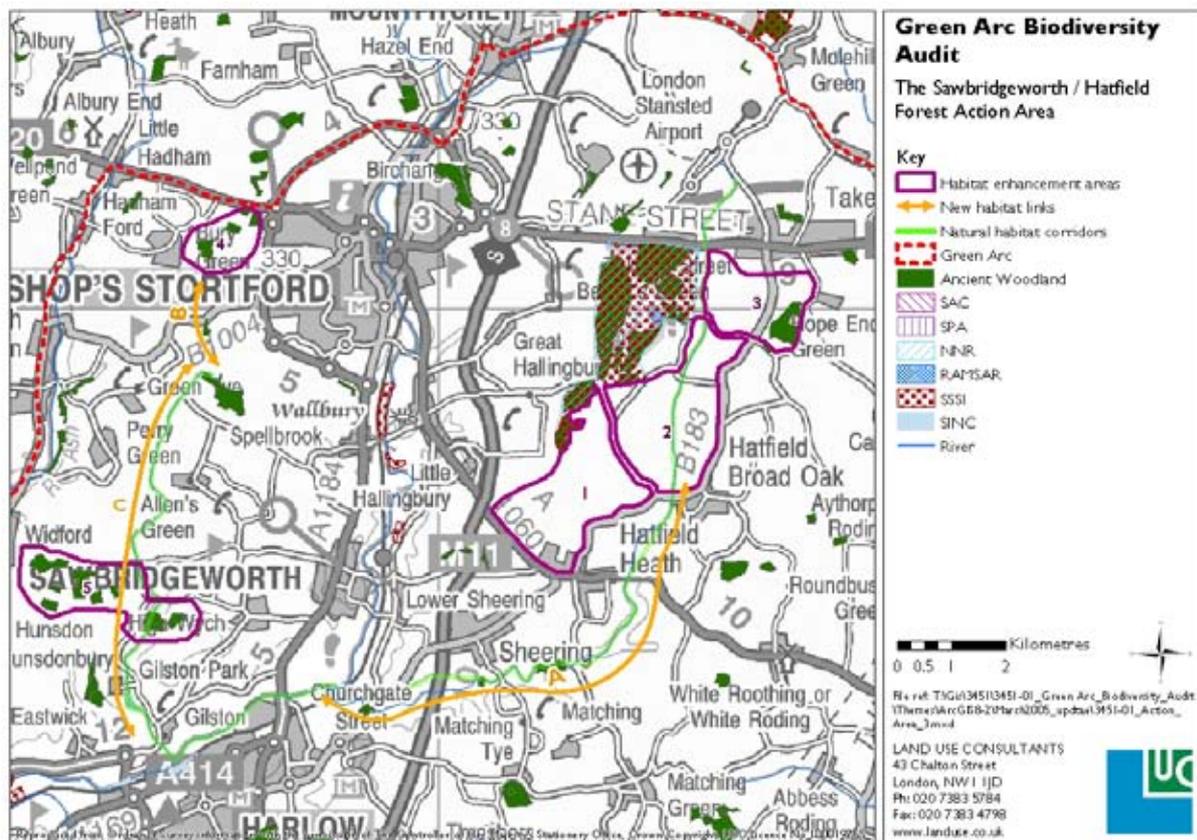


Figure 5.5 Nature Designations in the Sawbridge / Hatfield Forest Action Area

- 5.60. The area also includes three other SSSI sites. These all lie along the River Stort south of Bishops Stortford and, from north to south, are Thorley Flood Pound, Little Hallingbury Marsh and Sawbridgeworth Marsh. They are predominantly wetland habitats featuring swamp, fen, grazing marsh and small areas of wet woodland.
- 5.61. As well as the three SSSIs, several other sites of grazing marsh and grassland also border the River Stort from Bishops Stortford to Harlow. The River Stort, Pincey Brook (in the east), and Fiddler's Brook (in the west), all act as natural wildlife corridors. The action area also contains areas of heathland around Hatfield Heath and Great Hallingbury.

- 5.62. Compared to the other action areas the land is a lot more open. There are however several important developments that are worth highlighting. The major town in the area is Bishop's Stortford, which over the next couple of years is set to grow in size due to the growth area commitments in the Sustainable Communities Plan. The area is bisected by the M11 which provides a barrier to species movement from east to west. Smaller ribbon developments also occur along the length of the M11 and along the River Stort. Finally in the north of the action area is Stansted Airport, which is set to be London's third biggest airport and already handles the most airfreight. The airport already causes a number of impacts on the local environment, and its expansion will increase these adverse effects.
- 5.63. The remaining areas of open space are predominantly farmland dominated by cereals with some 'other' agriculture along the River Stort and around Perry Green in the west.

Actions

Habitat Enhancement Areas

- 5.64. **1. Hallingbury Park-** The first HEA aims to help improve the condition southern part of Hatfield Forest and extend the areas of heathland that already exists in the area. At present the land is mainly used for arable farming. This land will have to be purchased if it is to be converted from improved farmland to unimproved habitat.
- 5.65. The southern part of Hatfield Forest includes Wall Wood and Monks Wood. At present Monk's Wood is in an unfavourable condition due a lack of management and overgrazing by deer. These problems would have to be solved before extending the woods to the east and better linking the two parts of the wood. A number of options could be available to the rest of the area. Ideally this HEA could be transformed into a heathland/woodland mosaic complementing both the ancient woodland to the north and the smaller heathland sites throughout the area.
- 5.66. However this might not be possible as the improved nature of the arable land might not lend itself to establishing heathland. Equally extending these habitats may remove valuable hedgerow or farmland habitat. In this event a combination of habitat improvements should take place. Where possible woodland should be planted to buffer and extend Walls and Monk's Woods and heathland areas should also be extended. Any remaining farmland should be brought into the ESS, with hedgerows and farmland being management in line with this document.
- 5.67. **2. Barrington Farmland and Woods-** The main aim of this action area is to complement Hatfield Forest to the north and the two HEA either side, as well as providing an important habitat link to the natural wildlife corridor of Pincey Brook.
- 5.68. A number of small shelterbelts already exist in the east of the HEA. These should be matched by some small woodland and grassland planting in the west of the HEA. ESS should be implemented on any areas of remaining farmland and the hedgerows should be managed accordingly. It will be important to provide woodland planting along the north and west of the HEA to allow species movement between Hatfield

Forest and the other two HAE. Wet grassland and wet woodland habitats should be promoted along the length of Pincey Brook,

- 5.69. **3. Hatfield to Canfield Chase-** Canfield Hart is an area of ancient woodland in the east of this HEA. At present it is severed from Hatfield Forest by the B183 and Pincey Brook. To connect Canfield Hart to Hatfield Forest and Pincey Brook, Canfield will need to be extended to the north and west to border the B183, preferably at the point where a small stream passes under the road. To reduce the effect of the road tree planting will have to take place on the western side of the road too. Woodland planting should then follow the small stream to Pincey Brook and then south of Pincey Brook into HEA 2. The rest of the area should be transformed from farmland into grassland, heathland and woodland habitats, where possible. Where this is not possible the farmland should be managed for biodiversity.
- 5.70. **4. Bury Woods-** This relatively small HEA seeks to link together the small sections of woodland to the east of Cradle End and Bury Green. Broadleaved woodland planting should take place around and between all of these sites. The English Woodland Grant Scheme could fund the work. Once complete, the larger woodland would provide a better habitat for core woodland and ancient woodland species. Habitat links could then be provided to the north and south (see Link B below).
- 5.71. **5. Fiddler's Wood-** A number of small and medium sized copses can be found to the west of Sawbridgeworth and south east of Widford. Many of these woods are also ancient woodland. These woods include Gilston Park wood in the south, Marshland Wood in the west and Sayes Coppice in the east. The HEA also includes Fiddler's Brook and one or two of its tributaries.
- 5.72. The first action in this HEA is to link the woodland that falls between Great Pennys Farm, Hunsdon Lodge Farm and Marshland Wood. This would form an area of woodland with exceptional habitat potential. The woodland would then need to be extended along the length of the Fiddlers Brook tributary to the north of Acton's Farm, over the road until it joins with the shelterbelt to the south of 'Fryars'.
- 5.73. The new woodland complex could then be linked either by new woodland or by well-managed hedgerows to Sayes Coppice and Golden Grove, via Fiddlers Brook, and overland to Gilston Park wood in the south. The final woodland complex would then consist of well-managed hedgerows, ancient woodland, natural watercourses, secondary woodland and a network of glades and fields, preferably managed for nature conservation through the ESS.

Habitat Linkages

- 5.74. **Link A-** Link A looks to improve the natural green corridor that runs alongside the Pincey Brook from Hatfield Forest and the HEAs 1, 2 and 3 to the River Stort. The habitat link is especially important where it brook passes under the M11. Hedgerows and copses that grow alongside the brook should be managed to promote ecology and farmland should be less intensive and entered into ESS. Aquatic and Wetland habitats should also be promoted. The management of the stream and its banks could provide a best-case example for rural streams.

- 5.75. **Link B-** Link B runs along the hilltop between the upper tributaries of the River Ash near HEA 4 and the start of Fiddlers Brook and Mathams Wood. Once again this link aims to enhance the ecological matrix between these two sites, through positive agricultural management. Special efforts should be made to link habitats across the BI004. This would allow species movement between HEA 1 and Mathams Wood.
- 5.76. **Link C-** This link hopes to join Mathams Wood to HEA 5 and the River Stort by running alongside Fiddlers Brook. In this regard the ecological improvements should be similar to those listed in Link A above- enhance farmland, hedgerows and woodland as well as promoting the wetland and aquatic habitats where possible.
- 5.77. **Link D-** The final link for this action area is perhaps the most difficult as it aims to improve the links alongside the River Stort between Links A and C. This will have the effect of joining all of the HEAs and Links found in this action area. Being so close to the river the area would be best suited to wetland habitats, indeed some grazing marsh already exists, however in other areas the topography may be a problem and so woodland or unimproved grassland could be promoted instead.

6. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- 6.1. The main objective of this project was *'to produce a prioritised set of biodiversity targets for the Green Arc Area, with associated area or site specific targets, which can be incorporated into the Green Arc Project Plan.'*
- 6.2. This report develops a number of aims, targets and actions for the Green Arc and its project team. It identifies the key habitats and rarest species in the Green Arc and suggests various actions that could be carried out to safeguard their future.

Threats and Opportunities

- 6.3. At present the future of the Green Arc's biodiversity is far from secure. A number of threats face many of the area's habitats and species. Many of these threats are crosscutting, affecting more than one habitat or species.
- 6.4. The major threats that the various habitats face include:
 - Lack of or inappropriate management
 - Recreational impacts
 - Pollution
 - Development pressure
- 6.5. Of these perhaps the most challenging is the threat of either a lack of or inappropriate management. To many people, nature is something that looks after itself, however habitats such as heathlands and ponds are often just seral stages, before mature woodland develops again. These habitats and many others have to be managed if they are not to be lost. Implementing appropriate management on all of the Green Arc's most valuable sites will be a very challenging task.
- 6.6. The other threats should be taken seriously too. Pollution is a particularly bad problem that adversely affects nearly all of the Green Arc habitats. Pollution can come in many guises, these include, pesticides, litter, fertilisers etc. It can also have a wide-ranging effect; going from killing everything on a site to improving a site so much that another community develops instead. Epping Forest in particular, as well as some other areas in the Green Arc, suffers from air pollution, especially nitrogen deposition. Pollution is another threat that must be remedied.
- 6.7. The major threats that the Green Arc species face include:
 - Habitat loss
 - Habitat fragmentation
 - Lack of habitat management

- Agricultural Intensification
- 6.8. Of these threats the biggest problem is habitat loss. Nearly all of the species featured in Section 4 have it listed as threat. Many species rely on habitats of a certain size and quality to survive. Without these habitats a species will die out or move on. Fragmentation can be an equally big problem as it severs communities and may affect genetic viability. Agricultural Intensification can cause both habitat loss and fragmentation. The re-creation and re-connection of habitats is the best way to solve these problems. Once complete, species re-introduction can take place.
 - 6.9. As well as recognising the many threats biodiversity faces, the project team must remember that the Green Arc also provides a great opportunity to put right the mistakes of the past and to improve the landscape and countryside for wildlife and people.
 - 6.10. The opportunities available to the Green Arc project team are huge. The majority of the Green Arc falls within the Metropolitan Green Belt. This planning designation is very useful because it safeguards open space, precluding urban development, but allowing landscape and wildlife improvements. Indeed, improving the landscape and nature conservation are two of the positive objectives of the Green Belt laid out in PPG 2.
 - 6.11. The other opportunities for nature conservation come from this project's 'drivers'. The benefits of designated sites are obvious. They provide a haven for biodiversity throughout the Green Arc. Sympathetic landowners and land managers are equally vital to biodiversity of the Green Arc. However the real 'quick wins' will come from convincing more of the farmers in the Green Arc to adopt more ecologically sound farming practices and land management. Agriculture makes up the largest amount of open space within the Green Arc. This means that it also provides the greatest potential for ecological improvement. However, many of the major threats to the Green Arc's biodiversity originate from farming too.
 - 6.12. Acceptance of the ESS may well bring about the major change in farming that is required throughout the Green Arc. The real bonus for this new scheme is that it is non-discretionary. With the Green Arc Project Team's support a significant number of farmers in the Green Arc could be entered into the ESS. This would produce very real improvements for the biodiversity across the whole of the Green Arc.
 - 6.13. Several of the site-specific actions recommend implementing ESS on various areas of farmland in the Green Arc. Often this action is recommended to link habitats, but farmland that is managed more appropriately can also provide use habitat in its own right. Good farmland habitat is particularly important for the birds mentioned in this study, i.e. Skylark, Grey Partridge, Song Thrush and Tree Sparrow, two of which contribute to the farmland bird indicator found in DEFRA's PSA targets. Better farmland management may also reduce diffuse pollution, which in turn will help to improve the aquatic environment in the Green Arc.
 - 6.14. The site-specific actions aim to remedy many of the threats to biodiversity and capitalise on any opportunities that may exist. The study has identified a number of opportunities to re-create and re-connect habitats. These actions will reduce the

adverse effects of fragmentation and habitat loss, two of the main threats to the identified habitats and species, and will help to increase biodiversity in the wider countryside and the green infrastructure of the study area.

The Green Arc Project

- 6.15. This study concentrated solely on the biodiversity aspects of the Green Arc. There are however a number of strategic objectives relating to the Green Arc project. It will be important that any actions that aim to improve biodiversity can also, where possible, incorporate the other strategic objectives.
- 6.16. The other strategic objectives are:
- Improving the quality and accessibility of the land
 - Improving the rural-urban fringe for all people
 - To create attractive destinations for daytrips and holidays
 - To support sustainable development, including renewable energy, floodwater retention and water gathering areas
 - To provide burial space or woodland burials
- 6.17. The site-specific actions can meet these objectives in a number of ways. As habitats are improved or new habitats are created, education and recreation facilities can be built into their design. Improving the wetland habitats around the Mar Dyke River, or extending the woodland north of Epping Forest can offer opportunities for environmental education centres and new walks. These improved facilities can increase the attractiveness and 'offer' of the Green Belt.
- 6.18. Equally, many of the site-specific actions will help improve sustainability issues in the Green Arc. The strategic objective above lists three many themes of sustainability that the Green Arc project could address. The site specific actions listed in this report could go a long way in meeting two of them, specifically floodwater retention and water gathering areas. The increased woodland around Cobbin's Brook, Fiddler's Brook, and Pincey Brook will all help slow floodwater. Site-specific actions to improve wetland habitats around the Mar Dyke for example will increase water-gathering areas. Flood alleviation is a particular issue for Waltham Forest that has suffered from flash floods recently. Increasing the woodland in the gathering areas of Cobbin's Brook could help solve this problem.
- 6.19. The other issues relate to landscape and burial space. As long as the habitat improvements are in keeping with the existing environment then the overall landscape will benefit. However, significant habitat improvements will have to undergo some consultation. A shortage of burial space is an important issue in London. As space for burials runs out in cities, people will start to look elsewhere. Green burials in London's hinterland may be a useful method of creating secondary woodland, whilst helping to fund other actions.

Recommendations

- 6.20. Part of the original brief specified identifying a number of 'quick wins', that the Green Arc project team could action as soon as the plan is up and running. These are listed below.
- 6.21. **Agri-Environment Schemes-** As mentioned above there is a lot of potential to improve the Green Arc's biodiversity resource by bringing as many farms as possible into the entry-level ESS. This will have a number of benefits and will help to reduce the deleterious impacts of intensive agriculture. Raising support and enthusiasm amongst landowners, land managers and farmers will be the key action. However the real win comes from the fact that the government will provide the funding for improving the ecological network of the Green Arc.
- 6.22. Funding is also available for woodland creation, restoration and management. This study recommends habitat creation on a large scale, especially woodland creation. The fact this action can be funded through the English Woodland Grant Scheme is a real quick win for the Green Arc. Similarly hedgerows, heathland and unimproved grassland may also receive funding for creation and management, through changes to the ESS entry level and higher level options system. For example reversion of arable to grassland or heathland, with management by grazing and/or hay cutting, would qualify for grant aid through the higher-level tier of the ESS.
- 6.23. **Identify redundant or poor grade farmland-** An important task for the Green Arc project team will be to identify areas where habitat re-creation and habitat improvement can take place. It is unlikely that the best farmland, i.e. Grade 1, 2 and 3a, will be allowed to be taken out of agricultural production. This means that it will be important to recognise the areas where there is real potential to improve habitats. Equally land that remains in agricultural use can be entered into one of the new agri-environment schemes. This action will save the Green Arc team a lot of time and so can be considered a quick win.
- 6.24. **Supporting existing actions and initiatives-** A relatively easy but vital task will be to support any local or regional environmental initiatives that already exist in the Green Arc. Supporting the major initiatives such as the Thames Chase Community Forest will be as important as supporting smaller specialist groups. It will also build goodwill amongst the various wildlife organisations throughout the study area, which in turn may provide a useful volunteer force for environmental projects. Supporting local initiatives may also help raise awareness of wider environmental issues amongst the wider community.
- 6.25. **Looking at SSSI site condition-** 95% of SSSIs have to be in favourable condition by 2010 (see Section 2). This deadline is fast approaching and the public bodies¹² that have to achieve this target are starting to focus on this goal. The Green Arc Project Team can take the lead in helping to improve the condition of all SSSIs. Some of the site-specific actions will aid in buffering and enhancing the integrity of protected habitats that already exist. Other SSSIs will require improved management to more

¹² Section 28G of the Countryside and Rights of Way Act (CROW) 2000, charges all public bodies that own SSSIs to bring 95% of them into favourable condition by 2010

them out of unfavourability. The Green Arc project could help with this by focusing funding to various projects and helping raise awareness of different funding schemes.

- 6.26. **Planning Gain-** One of the main drivers of this project was the Sustainable Communities Plan. This plan envisages a major increase in housing and its associated infrastructure within parts of the Green Arc. The risks that these developments pose to biodiversity of the Green Arc are considerable and should not be underestimated. However, there is also a real opportunity to help improve the rural-urban fringe habitats and the wider countryside. Planning obligations could help fund a number of environmental projects, and the larger the development the greater the funding potentially available. Some of the schemes suggested in this report will require large sums of money (such as the M11 and M25 Green Bridges), however the benefits they provide would be huge. The region's environmental organisations should work together, with the Green Arc taking a lead role, to secure environmental conservation, enhancement and compensation. For example, the Harlow Options Study considers building a southern bypass for Harlow. If this development was to go ahead maybe some of the actions proposed in this report, such as woodland creation and management, could form part of the consenting arrangements.
- 6.27. The five paragraphs above highlight five actions that could be considered quick wins. However, the biodiversity in the Green Arc should be considered a long-term objective, as with the initiative's overall vision. This report lists a number of actions and targets that look longer than the short term, towards 2015 and sometimes beyond. It will important that environmental improvements are not just quick wins, but sustained improvements that are beneficial to wildlife and people.

Land Use Consultants
March 2005

APPENDIX I
STEERING GROUP MEMBERS

STEERING GROUP MEMBERS

Corporation of London

Countryside Agency

English Nature

Essex County Council

Forestry Commission

Greater London Authority

Hertfordshire County Council

Lee Valley Regional Park Authority

Thames Chase Community Forest

Woodland Trust

APPENDIX 2
GREEN ARC OVERVIEW

The Biodiversity Matrix-

Table I- Species Action Plans

E= Essex, H= Hertfordshire, L= London, N=National, ()=Possible occurrence

National BAP Targets in Red Italics and Natural Area Targets in Blue Italics

	Species	Location	Combined Aims and Targets
Mammals	Water Vole	EHLN	<p>Aims-</p> <ol style="list-style-type: none"> 1. To halt the decline of the Water Vole in the Green Arc area. 2. To conserve the current population and increase their range to their 1970 distribution. <p>Targets-</p> <ol style="list-style-type: none"> 1. Establish a baseline population for the Green Arc area by 2007. 2. Assess the Water Vole’s population trend and identify the key threats to its survival by 2008. 3. Implement measures to remove these threats and manage riverine habitats for water vole, whilst maintaining current populations. 4. Facilitate re-colonisation of past sites and establish populations at suitable new sites. <p>Produce 20% new threat-free, well-managed habitat by 2012.</p>
	Bats (Pipistrelle, Greater Horseshoe, Lesser Horseshoe and Natterer’s. Natterer’s is not a national BAP species)	EHLN	<p>Aims-</p> <ol style="list-style-type: none"> 1. To maintain the present populations and geographical range of the bat species living in the Green Arc, particularly the two Pipistrelle species, the Greater and Lesser Horseshoe species and Natterer’s Bat. 2. To increase the range and populations of the bat species found in the Green Arc. 3. To redress any misconceptions the public may have about bats.

			<p>Targets-</p> <ol style="list-style-type: none"> 1. To disseminate Best Practice advice to all planners and land managers within the Green Arc area. 2. To establish what the baseline population for each of the Bat species is in the Green Arc area is by 2007. Collation of current information by 2006, other primary surveys completed by 2007. 3. Identify all maternity and hibernation roosts by 2008. 4. Identify declining populations and work with local groups to reverse the trend by 2010. 5. Establish 50 new roosting opportunities within the Green Arc by 2010. 6. <i>Increase the population of the Greater Horseshoe Bat by 25% and the geographic range of the Lesser Horseshoe by 2012</i>
Dormouse	EHN	<p>Aims-</p> <ol style="list-style-type: none"> 1. Maintain and enhance the current dormouse population. 2. Research the feasibility of increasing dormouse habitat and re-introductions. <p>Targets-</p> <ol style="list-style-type: none"> 1. Establish the current dormouse population and distribution by the end of 2006 2. Identify suitable areas of habitat that are currently unused by dormice by the end of 2006 3. Undertake a feasibility study looking at connecting viable dormouse habitat, the potential of re-introductions to viable habitat and positive land management techniques for the species. This should be completed by 2008. 4. <i>Re-establish</i> four additional <i>self-sustaining populations</i> by 2010 	
Otter	EHN	<p>Aims-</p> <ol style="list-style-type: none"> 1. Maintain and re-establish otter numbers in the Green Arc area 2. Reduce the impact of humans on otter populations 	

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Identify which river catchments the otter is present in and what their populations are by the end of 2005. 2. Work with local authorities and local groups to reduce the danger posed by road traffic. Identify high-risk road crossings and potential solutions by 2007 3. Encourage the fitting of otter guards on all fishery equipment within the Green Arc area. 4. Encourage otter sensitive riparian land-management throughout the Green Arc 5. <i>Restore breeding otter populations to all catchments where they were recorded in 1960 by 2010</i>
	Brown Hare	EN	<p>Aims-</p> <ol style="list-style-type: none"> 1. Maintain and expand existing hare populations. 2. Remove illegal hare coursing <p>Targets-</p> <ol style="list-style-type: none"> 1. Promote hare-friendly land management on agricultural land through discussions and incentives with local farmers and land owners. Produce a feasibility and implementation study by 2008. 2. Aid the authorities in identifying illegal hare coursing. 3. <i>Double spring numbers in the Green Arc by 2010</i>
Birds	Tree Sparrow	HN	<p>Aim-</p> <ol style="list-style-type: none"> 1. To halt the decline, maintain and expand the Tree Sparrow population <p>Targets-</p> <ol style="list-style-type: none"> 1. <i>Return the Tree Sparrow to its 1996/97 population levels by (2003) 2006.</i> 2. Identify sites which can be managed to increase the numbers and range of Tree Sparrows in the Green Arc area by 2006 3. <i>Continue Tree Sparrow recovery to 150% of 1996/97 population levels in (2008) 2010</i> 4. To restore 1970 population levels by 2020
	Bittern	EHN	<p>Aims-</p> <ol style="list-style-type: none"> 1. To maintain and expand the current number of booming males within the Green Arc area 2. To maintain and expand suitable habitat for Bitterns in the Green Arc area

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Maintain all existing reedbeds through appropriate management. 2. Create and maintain the 10Ha of new reedbed at Cheshunt Gravel Pits and Rye Meads by 2008 3. To create and manage an extra 5Ha of suitable reedbed habitat at other smaller sites across the Green Arc by 2010. 4. To increase the number of wintering Bitterns to 10 by 2010. 5. To attract at least one additional booming male by 2012
Sand Martin	L	<p>Aims-</p> <ol style="list-style-type: none"> 1. To protect and enhance sand martin populations in the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> 1. To identify sites where the sand martin lives in the Green Arc by 2007. 2. Create 15 new sand martin banks in the Green Arc by 2010 	
Stone Curlew	EHN	<p>Aim-</p> <ol style="list-style-type: none"> 1. Re-introduce and establish the stone curlew in its former breeding range across the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify appropriate sites for re-introduction and habitat improvement by 2006. 2. Realise an x% increase in the area of land appropriately managed for the stone curlew through liaison with landowners and managers and through agri-environment schemes by 2010. 3. Establish at least 3 new breeding pairs in the Green Arc area by 2010. 	
Song Thrush	EHN	<p>Aim-</p> <ol style="list-style-type: none"> 1. Halt the decline of the song thrush 2. Re-establish it to its former range and population within the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> 1. Continue to aid the RSPB in their Essex research programme 2. Return the Song Thrush to 1997 levels by 2007 3. <i>Return the Song Thrush to its' 1968-1972 geographical range and population size by (2010) 2015</i> 	
Skylark	EN	<p>Aim-</p> <ol style="list-style-type: none"> 1. To maintain and enlarge the Skylark population across the Green Arc area. 	

			<p>Targets-</p> <ol style="list-style-type: none"> 1. <i>For the skylark population to equal or be higher than the 1995 BBS level by 2008</i> 2. <i>To reverse the skylark's decline on lowland farmland and other habitats where its population is dropping by 2012.</i> 3. To work with land owners and managers to maintain the skylark population in the Green Arc.
	Grey Partridge	EN	<p>Aims-</p> <ol style="list-style-type: none"> 1. To halt and reverse the decline in Grey Partridge in the Green Arc area 2. To, where feasible, expand the species' range and population <p>Targets-</p> <ol style="list-style-type: none"> 1. To halt the decline in the Grey Partridge's population by 2007 2. To identify sites where sensitive management can be introduced to create new habitats by 2010 3. To have a x% increase in population by 2012
Herptofauna	Great Crested Newts	EHN	<p>Aims-</p> <ol style="list-style-type: none"> 1. <i>Maintain the current range, population and viability of the Great Crested Newt</i> in the Green Arc area 2. <i>Re-introduce Great Crested Newts to former sites</i> and expand their range <p>Targets-</p> <ol style="list-style-type: none"> 1. Ascertain the newt's true distribution over the Green Arc area by 2006. 2. Restore populations to two former or unoccupied sites each year over the next ten years, by restoring existing ponds and creating new ones. These gains should be in addition to any loss through development or neglect.
	Adder	L	<p>Aims-</p> <ol style="list-style-type: none"> 1. To protect populations of adders and their habitats where they exist within the Green Arc 2. To facilitate the adder's re-population of the outer boroughs of London 3. To promote awareness of reptile conservation within the Green Arc

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Identify and safeguard populations of adders within the Green Arc by 2007 2. Produce and disseminate reptile conservation advice notes throughout the Green Arc by 2007 3. Identify sites within the Green Arc London boroughs where adders could be reintroduced and introduce two self-sustaining populations by 2010.
Invertebrates	Stag Beetle	EHLN	<p>Aims-</p> <ol style="list-style-type: none"> 1. <i>Maintain population size at all of the key sites</i> in the Green Arc 2. <i>Maintain the current geographic range</i> of the Stag Beetles in the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> 1. Establish the key sites and populations for the Stag Beetle within the Green Arc by 2006 2. Maintain the Green Arc's breeding populations by ensuring a continued supply of deadwood at all urban, sub-urban and rural key sites by the middle of 2006 3. Increase the usable deadwood resource at these sites by 20% over 20 years 4. Create three more Stag Beetle habitats in the North London Green Arc and facilitate the introduction of beetles to bolster smaller populations by 2009
	Chalkhill Blue	HL	<p>Aim-</p> <ol style="list-style-type: none"> 1. To maintain, protect and increase the breeding colonies of Chalkhill Blue within the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> 1. To identify breeding colonies of the Chalkhill Blue within the Green Arc by 2007 2. To increase the size of the existing colonies by 2009. 3. To restore the Chalkhill Blue to three of its former sites in the Green Arc by 2012
	Grizzled Skipper	H	<p>Aims-</p> <ol style="list-style-type: none"> 1. To halt the decline, maintain and enhance the current Grizzled skipper populations in the Green Arc. <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify and safeguard skipper populations in the Green Arc by 2006. 2. By 2055 to have restored the species to its 1970 range with at least half a dozen self-sustaining colonies or groups of colonies.

White Clawed Crayfish	(H)(E) N	<p>Aims-</p> <ol style="list-style-type: none"> <i>Maintain the present geographical extent of the species.</i> Limit the spread of non-native crayfish species within the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> Ascertain the distribution and population of the White Clawed Crayfish within the Green Arc by 2006. Safeguard these areas against adverse development, foreign species, pollution and bad river management to halt the decline of the White Clawed Crayfish by 2009 Restore White Clawed Crayfish to 25% of suitable open water habitats by 2020
Desmoulin's Whorl Snail	EN	<p>Aim-</p> <ol style="list-style-type: none"> Maintain, identify and protect populations of the snail within the Green Arc area. <p>Targets-</p> <ol style="list-style-type: none"> Undertake a survey of Desmoulin's Whorl Snail to establish its distribution within the Green Arc area by 2007 Ensure that viable populations are maintained in identified sites and that no further habitat loss or habitat degradation takes place.
Hornet Robberfly	EN	<p>Aim-</p> <ol style="list-style-type: none"> Identify, maintain and protect viable populations and keys sites for the Hornet Robber Fly in the Green Arc <p>Targets-</p> <ol style="list-style-type: none"> Identify all post-1980's Hornet Robber Fly sites and assess for viable populations, identifying key sites for the Green Arc by 2007 Maintain and protect all key sites through appropriate management to halt and reverse the species' population decline. Have measures in place by 2009
Shining Ramshorn Snail	EN	<p>Aims-</p> <ol style="list-style-type: none"> Identify, maintain and protect key sites for the survival of the species <i>Increase the size and range of the existing population</i>

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Confirm the snails population and identify key sites for its survival in the Green Arc by 2007 2. Maintain and protect all key sites through appropriate management to halt and reverse the species' population decline. Have measures in place by 2009. 3. <i>Increase the range and population</i> of the snail in the Green Arc through habitat management, habitat creation and species reintroduction. Create three addition sites by 2012
	Shrill Carder Bee	EN	<p>Aim-</p> <ol style="list-style-type: none"> 1. Protect, <i>maintain</i> and enhance any existing <i>viable populations</i> in the Green Arc 2. <i>Ensure their long-term survival using habitat restoration and re-introduction if necessary</i> <p>Targets-</p> <ol style="list-style-type: none"> 1. Confirm any existing populations by 2007. 2. If present aim to increase the population through favourable management by 20% over five years. 3. If absent, carry out a feasibility study looking into the possibility of re-introducing the species into the Green Arc. Identify sites and favourable landowners. Complete the study by mid-2008, introduce at least one viable population by 2011.
Plants	Black Poplar	EL	<p>Aims-</p> <ol style="list-style-type: none"> 1. To maintain and protect Black Poplar stands and individual trees. 2. To ascertain, maintain and increase a diverse age structure and genetic diversity for the Black Poplar population in the Green Arc. 3. Inform and educate landowners and managers about Black Poplars. <p>Targets-</p> <ol style="list-style-type: none"> 1. To survey all known trees to establish authenticity and sex by the year 2006. 2. Double the number of sites that contain Black Poplar by 2012 compared to the number in 2005. 3. First planting of new Black Poplar clones by 2010. 4. Provide information for landowners and managers by 2007.
	Great Pignut	H	<p>Aim-</p> <ol style="list-style-type: none"> 1. To maintain, enhance and increase Pignut populations in the Green Arc

			Target- 1. To increase the number of sites where Great Pignut is found by three by 2010
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Table 2- Green Arc Habitat Action Plans

E= Essex, H= Hertfordshire, L= London, N=National, ()=Possible occurrence

b= Broad Habitat, p= Priority Habitat

	Habitats	Location	Combined Aims and Targets
Habitats	Woodland	EHL Nbp	<p>Aims-</p> <ol style="list-style-type: none"> 1. To halt the further loss of ancient woodland and ensure that no more areas are lost in the future 2. To ensure all ancient woodland, Local Authority woodland and woodland complexes over 100 ha are appropriately managed to protect their size, integrity and biodiversity 3. Increase woodland cover especially in areas of woodland deficiency and to act as a buffer for ancient woodland 4. Manage the woodland reserve for a variety of objectives, including conservation, recreation and limited timber production 5. At appropriate sites increase production, use and markets for sustainable timber and woodland products <p>Targets-</p> <ol style="list-style-type: none"> 1. To have 50% of the woodland area and 100% of the ancient woodland area managed sensitively in line with the UK Forestry Standard by 2010 2. To ensure that all local authority woodlands are in agreed management schemes by 2006 3. Establish at least 15 Ha of new woodland a year particularly around ancient woodlands and woodlands that are accessible from urban areas 4. <i>To have 50% ancient woodland, wet woodland, and lowland beech and yew woodland in a favourable condition by 2010, with 100% in a favourable condition by 2015</i> 5. Formulate a woodland strategy for the Green Arc area which incorporates other woodland strategies (Thames Chase, London's Tree and Woodland Frame work, Epping Forest etc.) and can look at opportunities for new planting, improved management, best practice and economic benefit. Complete this by mid-2007. 6. Help develop markets for a range of woodland products, by bringing at least two London, two Hertfordshire and three Essex local councils under FSC certification by 2010. All local authorities should follow by 2015.

	Heathland	EHL Nbp	<p>Aims-</p> <ol style="list-style-type: none"> 1. To ensure no further loss of heathland extent or quality within the Green Arc area and maintain the existing area as a quality minimum. 2. <i>To maintain and enhance the wildlife value and biodiversity of existing heathland through appropriate management schemes.</i> 3. To create new areas of heathland habitat reflecting historical distribution and suitable geological conditions. 4. Increase peoples awareness and appreciation of conservation status and management requirements of heathland <p>Targets-</p> <ol style="list-style-type: none"> 1. To ensure appropriate management is in place on all existing heathland sites by 2008 2. To have established a restoration programme on all degraded heathland sites by 2007, bringing at least 50% back to favourable condition by 2011. 3. Identify key sites for the creation or re-introduction of new heathland by 2007, creating 20Ha of new habitat by 2010 4. Promote heathland appreciation by means of site visits and educational materials.
	Acid Grassland	HL Nbp	<p>Aims-</p> <ol style="list-style-type: none"> 1. To identify, maintain and protect acid grassland habitat within the Green Arc area 2. To implement appropriate management on all acid grassland sites to benefit the habitat itself and the species that live there 3. To raise the profile of the acid grassland in the Green Arc and develop appreciation of its ecological value

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Identify all acid grassland habitats and habitat mosaics and pinpoint areas of improvement and habitat recreation by 2007 2. To have appropriate management on all major acid grassland sites by 2010 starting with the SSSI's and larger sites. 3. <i>To ensure favourable condition on all acid grassland sites by 2015</i> 4. <i>To increase the acid grassland resource by 15ha in the lowlands and 15ha in the uplands by 2012</i> 5. To aid and spread the ideas of London's strategic conservation programme for invertebrate fauna into the Green Arc area by 2010. 6. Promote acid grasslands using flagship sites and by employing a strong invertebrate theme, through a series of public events by 2007
	Waterbodies (Rivers, Streams, Canals etc)	<i>EHL</i>	<p>Aims-</p> <ol style="list-style-type: none"> 1. To identify opportunities for improving the biodiversity of all waterbodies in the Green Arc 2. To stop chemical pollution of the Green Arcs waterbodies and <i>maintain the flow and quality of river water.</i> 3. To protect waterbodies that act as vital green corridors between different areas of natural habitat. 4. <i>Maintain the characteristic plants and animals of all rivers including any winterbourne stretches in chalk streams.</i> <p>Targets-</p> <ol style="list-style-type: none"> 1. To implement appropriate management and maintenance on all waterbody sites by 2008 2. To develop and implement a successful programme of habitat improvement and creation initiatives across the most degraded waterbodies by 2008. 3. To bring 95% of waterbodies to good ecological and chemical quality by 2015.

	Eutrophic and Mesotrophic standing waters	EHL	<p>Aims-</p> <ol style="list-style-type: none"> 1. <i>Identify, protect and maintain all mesotrophic and eutrophic standing waters within the Green Arc.</i> 2. Maintain all characteristic plant and animal communities in the best standing waterbodies protecting them from all adverse effects. 3. <i>Take action to restore the quality of unfavourable standing waters and to realise opportunities for habitat creation.</i> 4. <i>To agree mineral extraction and after-use strategies which will ensure a balance between nature conservation, mineral winning, recreation and agriculture</i> <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify all mesotrophic and eutrophic standing waters in the Green Arc by 2006 2. Return at least 50% of unfavourable standing waterbodies to favourable condition (Tier 2 to Tier 1) by 2020.
	Coastal Grazing Marsh	L E	<p>Aims-</p> <ol style="list-style-type: none"> 1. <i>Maintain and safeguard all areas of coastal grazing marsh within the Green Arc boundary</i> 2. <i>Maintain the quality of the existing grazing marsh and restore areas of marsh that may have dried out</i> <p>Target-</p> <ol style="list-style-type: none"> 1. <i>Restore 50ha of degraded grazing marsh to favourable condition by 2010.</i> 2. Identify opportunities create new coastal grazing marsh and to link the marsh with other habitats by 2012 3. <i>Secure the re-establishment of 25 Ha of wet grassland/grazing marsh, principally on arable/improved pasture, with the emphasis on areas adjacent to existing wet grassland to increase block size by 2010</i>
	Wetland	H	<p>Aims-</p> <ol style="list-style-type: none"> 1. To identify, maintain and protect any wetland sites within the Green Arc area. 2. To ensure that there is appropriate water quality and quantity in wetland areas. 3. To restore the integrity and hydrology of river valley corridors. 4. To raise public awareness about the flood prevention benefits of wetlands.

			<p>Targets-</p> <ol style="list-style-type: none"> 1. To identify and protect wetland sites throughout the Green Arc area by 2007. 2. To bring 95% wetlands to good ecological and chemical quality by 2015. 3. To have restored 150ha of seasonally inundated wet grassland from drier, semi-improved or improved sites where ditches and other features remain by 2010. 4. To have begun the re-creation of at least 500ha of wetland habitat by 2012. 5. To run an educational event for planners and councillors stressing the benefits provided by wetlands in the Green Arc by 2008.
	Reedbeds	L Np	<p>Aims-</p> <ol style="list-style-type: none"> 1. Identify, maintain and protect areas of reedbed within the Green Arc area. 2. <i>Where possible restore degraded sites and enlarge the best sites.</i> 3. Increase public awareness, knowledge and understanding of reedbeds. <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify all areas of reedbed within the Green Arc area and highlight key sites that can be improved by 2007. 2. Introduce sustainable management on all sites above 0.5ha by 2008. 3. Enhance degraded sites through management, restoring them to favourable condition by 2010. 4. Increase the amount of reedbed in the Green Arc by 20% before 2011 through habitat restoration and recreation especially around Lea Valley, Ingrebourne marshes and Walthamstow marshes. 5. Provide cultural and ecological interpretation at all key sites by 2010.
	Urban	EH Nb	<p>Aims-</p> <ol style="list-style-type: none"> 1. To utilise the huge variety of habitats found within the Green Arcs urban areas. 2. To make people aware of the biodiversity found on their own doorstep. 3. To promote green infrastructure, green wedges and green corridors through towns and cities. 4. 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.

			<p>Targets-</p> <ol style="list-style-type: none"> 1. To identify the most important sites and corridors within the urban and built up centres by 2007. 2. To safeguard these sites and manage them appropriately by 2010. 3. Produce a database of best practice for parks, amenity grassland, cemeteries, churchyards and other biodiverse areas to allow expertise and best practice to be shared by 2008. 4. To see that every urban area has Local Nature Reserves at a minimum level of 1 ha per 1000 population by 2010. 5. Compile baseline information on wildlife in gardens by 2007. 6. Publish a 'wildlife gardening guide' and a 'guide to managing your gardens for wildlife' to raise public awareness about the biodiversity potential of their gardens by 2008.
	Wasteland	L	<p>Aims-</p> <ol style="list-style-type: none"> 1. Identify and protect the best wasteland sites in the Green Arc. 2. Raise public awareness about the biodiversity found at wasteland sites. <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify and assess all wasteland sites within the Green Arc by 2008. 2. Protect the sites with the best biodiversity resource ensuring no further loss from 2008 onwards. 3. Hold wasteland awareness events with developer, planners and the public to highlight the diversity of these derelict sites. Have this up and running by 2009.
	Calcareous Grassland	H	<p>Aims-</p> <ol style="list-style-type: none"> 1. To protect and prevent any further loss or damage to important calcareous grasslands in the Green Arc area 2. To implement appropriate management on all calcareous grasslands habitat 3. To identify two key areas where the calcareous grassland resource can be reintroduced and expanded in its extent.

			<p>Targets-</p> <ol style="list-style-type: none"> 1. Identify all calcareous grassland habitat in the Green Arc by 2006 2. Manage all remaining unimproved calcareous grassland sites to ensure they maintain their full wildlife interest. Have this management in place by 2007, <i>with all sites reaching 100% favourable condition by 2015</i> 3. Look to expand and buffer the most biodiverse calcareous grassland sites especially those found in the lowlands. Provide 50ha of new habitat by 2010. 4. Implement restoration programmes on unfavourable and degraded habitat by 2008
	Neutral Grassland	H	<p>Aims-</p> <ol style="list-style-type: none"> 1. To identify, protect and maintain areas of unimproved neutral grassland <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify all unimproved neutral grassland in the Green Arc area by 2006 2. Look into opportunities to expand the neutral grassland habitat by 2009.
	Farmland	H	<p>Aims-</p> <ol style="list-style-type: none"> 1. To promote and recommend sustainable agriculture throughout the Green Arc. 2. To seek reductions in agricultural chemical use 3. To promote the conservation of notable farmland species 4. To identify, maintain and protect lowland hay meadows, lowland wood pasture and Purple Moor Grass (<i>Molinia</i>)/rush pasture. <p>Targets-</p> <ol style="list-style-type: none"> 1. To develop a more strategic approach to agri-environment schemes, ensuring that an additional 3000 ha of farmland is entered into such schemes by 2008. 2. To help introduce two flagship organic farms to teach best practice techniques to other land owners and land managers in the Green Arc. These should be up and running by 2012 3. <i>To seek favourable management for 100% of all lowland hay meadows, lowland wood pasture and Molinia/rush pasture by 2010.</i> 4. Attempt to link separate areas of lowland hay meadows, lowland wood pasture and <i>Molinia</i>/rush pasture by increasing their habitat by 30% for each sub-habitat by 2010.

	Hedgerows	E Np	<p>Aims-</p> <ol style="list-style-type: none"> 1. <i>To halt the net loss of ancient and species rich hedgerows</i> 2. To implement management that that brings all species rich and ancient hedgerows to a favourable condition 3. <i>Maintain the overall number of hedgerow trees in the Green Arc area</i> <p>Targets-</p> <ol style="list-style-type: none"> 1. <i>To protect and safeguard all ancient and species rich hedgerows by 2005</i> 2. To achieve the favourable management of 75% of species rich and ancient hedgerows by 2010 3. To carry out a hedgerow audit to note the number of hedgerow trees in the Green Arc whilst also indicating opportunities to manage other hedgerows for biodiversity. Complete this audit by 2012
	Cereal Field Margin	E Np	<p>Aim-</p> <ol style="list-style-type: none"> 1. <i>Maintain, improve and restore by management the biodiversity of cereal field margins in the Green Arc</i> <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify 750 ha of cereal field margins in the Green Arc to be improved by 2006 2. <i>Introduce favourable management for biodiversity on all cereal field margins by 2010</i>
	Old Orchards	E	<p>Aims-</p> <ol style="list-style-type: none"> 1. Prevent any further loss of existing old orchards 2. Restore and manage existing old orchards 3. Create new orchards where possible using local characteristic stock <p>Targets-</p> <ol style="list-style-type: none"> 1. Identify existing old orchards sites by 2006 2. Safeguard these sites and identify areas where new sites could be planted by 2008

APPENDIX 3
CONSULTEES

KEY BIODIVERSITY CONTACTS FOR GREEN ARC AREA

Essex

Claire Cadman- Essex BAP coordinator

clairec@essexwt.org.uk

Hertfordshire

Hertfordshire is currently without a co-ordinator and replacement not likely to be appointed within timescale of this project. In the interim, the Hertfordshire & Middlesex Wildlife Trust and the Hertfordshire Biological Records Centre were contacted.

info@hmwt.org

biorec.info@hertscc.gov.uk

London

William Moreno- London BAP Coordinator

wmoreno@wildlondon.org.uk

Lee Valley

John Foster- Chairman of the Lee Valley BAP Steering Group

johnfoster29@hotmail.com

London Borough of Waltham Forest

Jez Elkin- Ecology Officer

jez.elkin@lbwf.gov.uk

Corporation of London (Epping Forest office)

Jeremy Dagley- Ecologist

jeremy.dagley@corpoflondon.gov.uk

RSPB (Rainham Marshes)

Mark Underhill and Dominic Funnell

01708 520145

mark.underhill@rspb.org.uk

University of Greenwich (doing pilot study for Epping Forest District Council)

Project Manager- Dr Debbie Heaphy

Project Assistant- Julie Urquhart

d.heaphy@gre.ac.uk

Forest Enterprise

Jonathan Spencer

jonathan.spencer@forestry.gsi.gov.uk

APPENDIX 4
CONSULTATION BRIEF

Green Arc Biodiversity Audit and Objective Setting- Consultation Brief

Green Arc Background

English Nature has commissioned Land Use Consultants (LUC) to undertake a Biodiversity Audit and Objective Setting exercise for the Green Arc area.

The Green Arc's main aim is to significantly improve the environment and accessibility of the Green Belt, open space and countryside around north and east of London and the southern parts of Essex and Hertfordshire (See Figure 1). The aim and scope of the concept is wide reaching and provides a number of positive opportunities for the environment and biodiversity of the area.

The Green Arc is currently managed by a steering group made up of a number of local and national government organisations as well as other environmental groups and initiatives found in the area. From Spring 2005 a project team will take over this role and start to formulate a plan to meet the aims of the project. English Nature is keen to use this window of opportunity to produce a document that will influence policy makers as well as advise the new Green Arc project team about the study area's biodiversity and what improvements can be made.

Project Method and Consultation

As part of this project, LUC will produce a prioritised set of biodiversity targets for the Green Arc area, with associated area- or site-specific targets, which can be incorporated into the Green Arc Project Plan. To do this we have completed an audit of the relevant county Biodiversity Action Plans (BAPs), Local BAPs and Natural Area Profiles, to identify the habitat, species and natural area targets that fall within the Green Arc's boundary. The precautionary principal was employed to make sure that no species or habitat targets were missed out, although some initial scoping has taken place. These targets are summarised in the matrix overleaf.

The matrix (please see the separate sheet) is made up of two tables. Table 1 deals with the species. Table 2 deals with the habitats, whilst incorporating the natural area targets. Both tables only consider species or habitats that actually fall within the boundary of the Green Arc and feature in either the London, Hertfordshire or Essex BAP, or are mentioned in the natural area profiles. Each species or habitat has a number of aims and targets associated with it. These aims and targets have either been copied directly or have been amended from the aims, objectives and targets laid down in the relevant BAP or natural area profile. The location column in the matrix indicates from which BAP the aims and targets originated.

It is important that the Green Arc project team sets objectives appropriate to the area it covers and that local experts are consulted when prioritising the various aims, targets, species and habitats. Overleaf are a number of questions and tables that LUC would like you and/or your organisation to complete. Your responses will help us prioritise the most appropriate habitats and species and will help identify conflicts that may exist between different targets and action plans.

Questionnaire

Prioritisation

1. It is clear from the matrix that there are too many species and habitats to be successfully dealt with by the Green Arc (GA) project team. To make the final document workable, and the outcomes a success, the habitats and species will have to be prioritised. Guidance¹³ suggests that this should be an objective process that considers a number of criteria.

To assess each of the species and habitats objectively they have been listed in two tables. **Table A** on page 3 deals with the species and **Table B** on page 4 deals with the habitats. Each table contains different criteria that will need to be scored. The following part of this question explains how to score the criteria in each table.

For **Table A**, please score the criteria on a scale of 1-5 or place a letter for each species as follows:

Local Decline	1= Rapidly Declining, 5= Rapidly Increasing
Local Rarity	1= Extinct, 5= Common
Local Threat	D= Directly Threatened, I=Indirectly Threatened
Position in Geographic Range	1= Endemic, 3= Localised, 5= Outlying
Local Distinctiveness	F= Flagship, K= Keystone, T= Typical

For **Table B**, please score the criteria on a scale of 1-5 or place a letter for each habitat as follows:

Local Decline	1= Rapidly Declining, 5= Rapidly Increasing
Proportion of UK habitat in GA	1= Endemic (100%), 5- Isolated (<10%)
Local Rarity	1= Rare, 3= Scarce, 5= Common
Local Threat	D= Directly Threatened, I=Indirectly Threatened
Fragmentation	1= Highly Fragmented, 5= Highly Continuous
Restoration Potential in GA	1= Potential to increase, 5= No potential
Importance for Key Species	1= Important, 5= Not Important
Local Distinctiveness	A= Distinctive in the GA, B= Not Distinctive

For each species and habitat action plan please answer with regard to your own expert opinion. If you feel that you do not have an opinion on any of the species or habitats then please leave that row blank. To indicate how to fill in both of the tables two examples have been included at the bottom of both of the tables.

Questions continued on page 5.

¹³ Guidance for Local Biodiversity Action Plans- Evaluating priorities and setting targets for habitats and species. Guidance Note 4. (1997) UK Local Issues Advisory Group

Table A- Species Action Plans

Species	Criteria				
	Local Decline	Local Rarity	Local Threat	Position in Geographic Range	Local Distinctiveness
Water Vole					
Bats					
Dormouse					
Otter					
Brown Hare					
Tree Sparrow					
Bittern					
Sand Martin					
Stone Curlew					
Song Thrush					
Skylark					
Grey Partridge					
Great Crested Newts					
Adder					
Stag Beetle					
Chalkhill Blue					
Grizzled Skipper					
White Clawed Crayfish					
Desmoulin's Whorl Snail					
Hornet Robberfly					
Shining Ramshorn Snail					
Shrill Carder Bee					
Black Poplar					
Great Pignut					
<i>Species A</i>	<i>2</i>	<i>3</i>	<i>I</i>	<i>4</i>	<i>T</i>
<i>Species B</i>	<i>1</i>	<i>2</i>	<i>D</i>	<i>2</i>	<i>F</i>

Table B- Habitat Action Plans

Habitats	Extent Criteria				Quality Criteria			
	Local Decline	Proportion in Local Area	Local Rarity	Local Threat	Fragmentation	Potential for Restoration	Importance for Key Species	Local Distinctiveness
Woodland								
Heathland								
Acid Grassland								
Waterbodies								
Standing Waters								
Coastal Grazing Marsh								
Wetlands								
Reedbeds								
Urban								
Wasteland								
Calcareous Grassland								
Neutral Grassland								
Farmland								
Hedgerows								
Cereal Field Margins								
Old Orchards								
<i>Habitat A</i>	<i>3</i>	<i>5</i>	<i>5</i>		<i>4</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Habitat B</i>	<i>2</i>	<i>2</i>	<i>1</i>	<i>D</i>	<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>

Questionnaire Cont.

Conflicts

2. Presuming that that the biodiversity matrix remains the same, are there any obvious HAP or SAP targets that might conflict with each other?
3. Different species may require varying levels of habitat management. Are there any species mentioned in Table A that share the same broad or priority habitat, but require different types of habitat management? If so which ones are they?
4. Do any of the other SAPs or HAPs clash? If so which ones and why?

Other Questions

5. Some of the timescales suggested in the matrix have been changed from the original timescales in the BAPs and natural area profiles to give the Green Arc project team a better chance of meeting them. Should this have been done, or should we change them back to the original timescales?
6. In your opinion how many species and habitat action plans should the Green Arc be focusing on?
7. Are the targets suggested appropriate to the Green Arc area?
8. Are there any species or habitats left out of the matrix that you would like to see included?
9. Are there any particular areas of the Green Arc that should be concentrated on with regards to site-specific actions and targets? If so where are they and why?
10. Are there any other issues or concerns regarding the biodiversity of the Green Arc?

Thank you for taking the time to complete this consultation document. Please return it as soon as you can. If there are any other questions about the biodiversity audit or the questionnaire please call or email Will Miles on:

020 7383 5784 or miles_w@london.landuse.co.uk

APPENDIX 5
GLOSSARY

GLOSSARY

BAP	Biodiversity Action Plan
CROW	Countryside and Rights of Way Act
CSS	Countryside Stewardship Scheme
DEFRA	Department for Environment, Food and Rural Affairs
EHCAA	Epping/Harlow/Cheshunt Action Area
ESA	Environmentally Sensitive Area
EWGS	English Woodland Grant Scheme
HEA	Habitat Enhancement Areas
HAP	Habitat Action Plan
LNR	Local Nature Reserve
LUC	Land Use Consultants
NGO	Non-Governmental Organisation
NNR	National Nature Reserve
PSA	Public Service Agreements
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAP	Species Action Plan
SINC	Site of Importance for Nature Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

APPENDIX 6
BIBLIOGRAPHY

Bibliography

Atkins (2003) *Harlow Options Study: Draft Final* Atkins

DEFRA (2001) *The Countryside Stewardship Scheme: Traditional Farming in the modern environment* DEFRA

DEFRA (2003) *Farm Woodland Premium Scheme- Rules and Procedures* DEFRA

DEFRA (2003) *The English Woodland Grant Scheme- A public consultation on future incentives for the sustainable management and creation of woodlands* DEFRA and the Forestry Commission

DEFRA (2004) *Environmental Stewardship: An introduction note for staff and stakeholders* DEFRA

Essex Wildlife Trust (1999) *Essex Biodiversity Action Plan* Essex County Council

Herts and Middlesex Wildlife Trust (1998) *Hertfordshire Biodiversity Action Plan* Hertfordshire County Council

HMSO (1981) *The Wildlife and Countryside Act (As amended)* HMSO, London

HMSO (1994) *Statutory Instrument No. 2716- The conservation (Natural Habitats &c.) Regulations* HMSO, London

HMSO (2000) *The Countryside and Rights of Way Act* HMSO, London

Lee Valley Regional Park (2000) *Biodiversity Action Plan for the Lee Valley Regional Park*. Found on the World Wide Web: <http://www.leevalleypark.com/fe/master.asp?nodeid11=3&nodeid12=10&level=3&nodeid13=163>

London Biodiversity Partnership (2001) *London Biodiversity Action Plan* Greater London Authority

Land Use Consultants (2004) *Bringing the Big Outdoors closer to people. Improving the countryside around London: The Green Arc Approach* Green Arc Steering Group

ODPM (2003) *Sustainable Communities: Building for the Future* ODPM

Peterkin G (2002) *Reversing Habitat Fragmentation in British Woods* WWF

European Union (1979) Council Directive 79/409/EEC of 2nd April 1979 on the Conservation of Wild Birds

European Union (1992) Council Directive 92/43/EEC of 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora

UK Local Issues Advisory Group (1997) *Evaluating priorities and setting targets for habitats and species* UK Biodiversity Group

Cover Images
Large Image- Will Miles (2005) Land Use Consultants
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