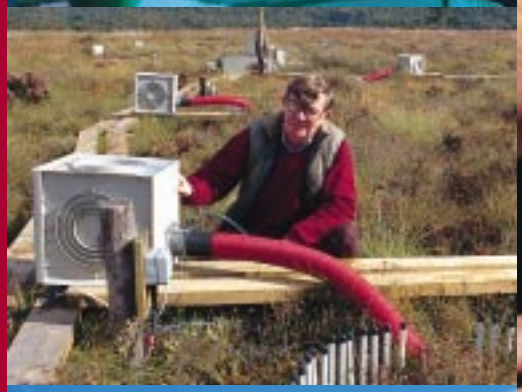
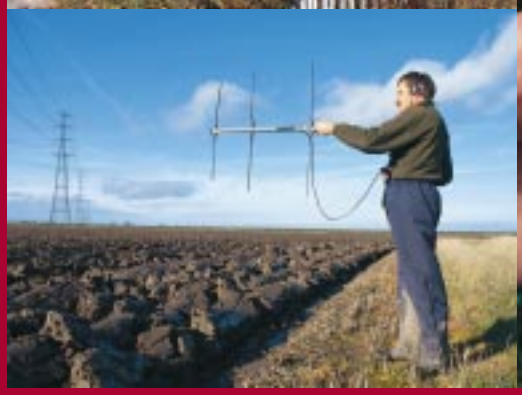
ENGLISH NATURE

Report Number
532

Greater horseshoe bat Project 1998-2003

English Nature Research Reports





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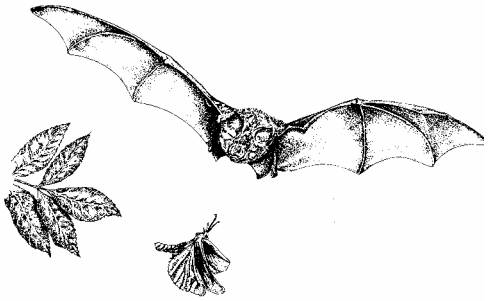
English Nature Research Reports

Number 532

Greater horseshoe bat Project
1998-2003

Dr Martin Longley
English Nature Devon Area Team



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Acknowledgements

The following Project Officers have worked on the Project over the last five years: David Appleton, James Bolton, Peter Burgess, James Diamond and Martin Longley.

Tony Mitchell-Jones procured the financial resources and provided technical expertise.

The Project has gained its success as a result of the co-operation and enthusiasm of the landowners around the roost sites.

Summary

The English Nature Greater horseshoe bat Project has been implementing key recommendations of the UK Biodiversity Action Plan since 1998. The Project aimed to deliver against two key actions: to prepare and distribute advice on the management of foraging areas; and to encourage favourable management and seek to implement this through management agreements.

Over the past five years the Project has visited and provided advice to 163 landowners managing approximately 13211 hectares of land in bat foraging areas around key maternity and hibernation roost sites in Devon, Cornwall and Somerset. To date, 46 of these farms, covering 4191 hectares, have entered Countryside Stewardship Scheme agreements, or have applications currently pending. In addition, extensive support has been given to partner organisations to improve their management advice and agreements for the bats, resulting in a further 31 bat-related management agreements covering approximately 2345 hectares.

The Project has also supported greater horseshoe bat conservation action in other counties in southwest England, through technical advice, training seminars and farm walks. The success of the Project continues to be widely publicised and promoted to appropriate audiences, including policy makers, conservation professionals, farming communities and local people near to the roosts.

Research involving radio-tracking individual bats has yielded important data on their commuting and foraging routes and is used to directly influence land management and development proposals around roost sites.

The Project has been a high profile English Nature success story, with a 58% increase of greater horseshoe bats recorded from the Devon maternity roosts since 1995.

Contents

1. Introduction

The Greater horseshoe bat Project was initiated in 1998 to implement recommendations of the UK Biodiversity Steering Group (Anon. 1995), as part of the English Nature Species Recovery Programme. The UK Biodiversity Action Plan identifies the greater horseshoe bat as a priority species and sets objectives and targets to maintain all existing maternity roosts and associated hibernation sites, and to increase the population by 25% by 2010 (Anon. 1995).

Within the actions proposed under the UK BAP, the Project aimed to deliver against two key areas: to prepare and distribute advice on the management of foraging areas; and to encourage favourable management and seek to implement this through management agreements. In addition, the Project is helping to achieve the integrated system of site protection, including the bat's feeding areas, as described by the Nature Conservancy Council (1989).

Dietary and radio-tracking studies have been used to make recommendations on habitat and land management around greater horseshoe bat roosts. A landscape of permanent pasture and ancient and semi-natural woodland, linked by a network of tall, bushy hedgerows has been identified as the ideal foraging habitat. Within such a landscape, dung beetles *Aphodius* and *Geotropus*, moths and cockchafers *Melollentha* have been identified as key prey species. The studies have also identified two important zones around maternity roosts: a one-kilometre radius juvenile sustenance zone and a four-kilometre radius roost sustenance zone (Ransome 1996; Ransome 1997; Ransome 2000).

This Report describes the methods employed by the Project and reviews progress made between January 1998 and June 2003; it synthesises all the information detailed in the four previous annual reports.

2. Methodology

2.1 Geographical scope of the Project

The majority of the work has been focussed on six large maternity roost sites in Devon, southwest England. This county was selected because it supports approximately one third of the current UK greater horseshoe bat population and it also holds the largest known maternity roost in western Europe. Four of the maternity roosts are designated as Sites of Special Scientific Interest (SSSI); three being constituents of the South Hams candidate Special Area of Conservation (cSAC).

The major maternity and hibernation roost sites in Devon are situated within:

- the Avon Valley
- Berry Head to Sharkham Point SSSI
- Buckfastleigh Caves SSSI
- Bulkamore Iron Mines, South Hams
- Caen Valley Bats SSSI, Braunton

- Chudleigh Caves and Woods SSSI

For the purposes of the Project, the one kilometre and four kilometre radius sustenance zones around each roost were targeted for particular attention. However, areas that lay between two or more geographically close roosts, or near to known hibernation sites, were also targeted.

Although Devon was the main target county for the Project, work has also been conducted in Somerset and Cornwall.

2.2 Preparing and distributing advice

Two advisory leaflets were prepared to help disseminate advice about land management for the bats:

- Managing landscapes for the greater horseshoe bat
- Managing landscapes for the greater horseshoe bat : detailed recommendations

Copies of these leaflets are contained at Appendix IV and are downloadable from the English Nature web page (www.english-nature.org.uk/science/srp/pdf/GHBAT.PDF).

The Project Officer has used these leaflets during advisory visits to farmers and other land managers. English Nature Local Teams and partner organisations working around other maternity roost sites beyond the main geographical area of the Project have also distributed the literature.

Training seminars and farm walks were held with partner organisations where the advice provided within the leaflets was discussed and applied in field situations.

2.3 Encouraging favourable land management

A number of methods were used to identify and contact farmers and other land managers within the roost sustenance zones. These included examining SSSI ownership records, searching electoral roles, mail drops, publicity in local media, and through word of mouth from neighbouring landowners and other conservation organisations active around the roost areas.

Visits were carried out with land managers where the following topics were discussed in the context of the current land management practice:

- conservation status, diet and habitat requirements of greater horseshoe bats
- positive hedgerow and field boundary management
- grassland management and grazing regimes to benefit the bats
- use of chemical wormers on grazing stock
- positive woodland management
- other general farm conservation management advice.

During these visits the advisory leaflets were used to illustrate the main landscape features required by the bats and left with the farmer for future reference.

Liaison with partner organisations such as the Department for Environment, Food and Rural Affairs (Defra) and the Forestry Commission was carried out to ensure that the bats and favourable management of the sustenance zones were considered for targeting by agri-environment schemes, including Environmentally Sensitive Areas (ESA), Countryside Stewardship Scheme (CSS) and the Woodland Grant Scheme (WGS).

2.4 Implementing management agreements

Where appropriate, advice and assistance was given to help land managers obtain grant-aid to assist with the implementation of the recommended management advice.

In particular, detailed assistance was offered with applications for agreements under the CSS, where the land manager was willing to include measures to benefit the bats. Support was also given to other partner organisations where they were preparing CSS applications for holdings within the roost sustenance zones, to ensure that the bat's requirements were taken into account within the application.

Support and advice was given during applications for grant-aid schemes such as the Forestry Commission's WGS, Woodland Improvement Grant Scheme and local authority environmental grant schemes.

3. Achievements

3.1 Encouraging favourable land management

A summary of the farm advisory work carried out under the Project in Devon, Cornwall and Somerset is given in Table One. The Project Officer has visited 163 farms and has also provided technical support to the following organisations to help continue or initiate programmes of targeted advisory work to landowners around other SSSI/cSAC greater horseshoe bat roosts:

- The National Trust
- Wildlife Trusts in Dorset, Wiltshire, Somerset, Cornwall, Devon, Bristol & Bath
- English Nature Local Teams in Wiltshire, Cornwall, Dorset, Gloucestershire and Somerset
- Farming & Wildlife Advisory Groups
- Westcountry Rivers Trust

Formal and informal training seminars and farm walks about the bats and their landscape requirements were held for Wildlife Trust and RSPB Farm Conservation Advisers and Defra CSS and ESA staff.

Table One : Farm visits carried out by the Greater horseshoe bat Project between January 1998 and June 2003

		Number of farms visited		
County	**Roost area**	**Joint with partner organisation**	**English Nature only**	**Total area of land visited (ha)**
Devon	Avon Valley	5	19	1460
	Berry Head	3	7	556
	Braunton	9	46	3354
	Buckfastleigh	2	16	1909
	Chudleigh	9	18	2495
	South Hams	-	9	1949
Cornwall	Boscastle	2	7	902
	Coombe	-	5	404
	Grampound	2	2	146
Somerset	Cheddar	-	1	25
	West Somerset	1	-	11
	TOTAL	**33**	**130**	**13211**

3.1.1.1

3.2 Implementing management agreements

To date, the Project has secured Countryside Stewardship Scheme (CSS) agreements on 31 holdings, covering 3302 hectares within the targeted areas. A further 15 applications, covering 889 hectares, were submitted in 2003 and are currently awaiting a decision on funding from Defra (Table Two).

The Project Officer has also been consulted about a further 31 CSS applications in Devon (covering 2345 hectares), submitted by partner organisations or private individuals. These farm holdings fell within the roost sustenance zones and the proposed land management practices were adapted to benefit the bats.

Defra was provided with the locations of the major maternity roost sustenance zones in England to allow them to be included within their Geographical Information System (GIS) constraints checking package. This allows Defra to check all agri-environment scheme applications against these locations and liase with English Nature to ensure that the bats requirements are taken into account within any land management agreements that fall within the sustenance zones.

Table Two: Countryside Stewardship Scheme agreements secured during 1998-2002 and applications made during 2003 under the Greater horseshoe bat Project*

		Existing		Pending (June 2003)	
County	**Roost area**	**Number of agreements**	**Agreement area (ha)**	**Number of applications**	**Application area (ha)**
Devon	Avon Valley	5	248	2	40
	Berry Head	-	-	2	107
	Braunton	14	2228	4	212
	Buckfastleigh	7	401	-	-
	Chudleigh	3	194	2	103
	South Hams	1	202	-	-
Cornwall	Boscastle	-	-	2	156
	Coombe	-	-	2	145
	Grampound	-	-	1	126
Somerset	Cheddar	1	29	-	-
	TOTAL	**31**	**3302 ha**	**15**	**889 ha**

* Includes only those agreements/applications directly submitted by the Project; not those negotiated through partner organisations

Maps at Appendix I show the location of sites under CSS land management agreements, or with applications pending, and also additional areas where the Project Officer has visited and provided land management advice to the owners.

Land management agreements negotiated under the Project focussed primarily on landscape improvements for the bats, as identified by English Nature research. Options used within the agreements included the following:

- improving important foraging areas by reverting arable land to grazed grassland
- management of permanent pasture and hay meadows with targeted grazing regimes to ensure plentiful supplies of key prey species for the bats
- creation of wide grassy arable field margins alongside hedgerows and woodland edges
- maintenance and improvement of bat commuting routes through the restoration of hedgerows (laying, coppicing and replanting gaps) and new planting of hedge boundaries, parkland trees and tree lines.

Through the work of the Project, 80 kilometres of hedgerow located within the roost sustenance zones has been designated for replanting or restoring under the CSS. In addition,

nearly 400 hectares of grassland has been brought under specialised management for the bats (Table Three).

Table Three: Uptake of Countryside Stewardship Scheme management options in agreements secured during 1998-2002 and pending applications made in 2003 under the Greater horseshoe bat Project

	Targeted grassland management (ha)	**Recreating grassland on former arable land (ha)**	**Six metre wide field margins around arable land (km)**	**Hedgerow restoration (km)**	**New hedgerow planting (km)**
Secured agreements	308	15	44	51	14
Pending applications	88	-	12	12	3
TOTAL	**396 ha**	**15 ha**	**56 km**	**63 km**	**17 km**

In addition to the 'bat-friendly' management options used in the CSS agreements, other options which have wider environmental, landscape, historical or public benefit have been included in the management agreements:

-
- summer fallow, winter stubbles and spring cropping on arable land to benefit farmland birds and rare arable plants
- restoration of traditional orchards
- coppicing of bank-side alders
- improved public access, including educational visits
- restoration of historic farm buildings

3.3 Links to sustainable agriculture

The Project has provided management advice, and assisted with CSS applications, on a number of organic, in-conversion or extensively managed farms. An example is Riverford Farm which is an organic dairy enterprise operating in South Devon within the Buckfastleigh roost sustenance zone. They entered the CSS, following advice from English Nature, with specific measures to benefit the bats.

During 2001, a marketing initiative was developed with Riverford Farm, whereby they featured information about the bats and English Nature on their milk cartons (Figure One). The simple message on the carton is used to inform consumers about the link between extensive agriculture and the provision of insect prey for the bats. At present, approximately 7000 cartons a week are sold across south-west England and in Hampshire and London. This initiative brings the Greater horseshoe bat Project and English Nature to a new audience both within, and beyond, the Project target area at no cost. Additional publicity is achieved

through the literature produced by Riverford Farm (including their website) and as part of their farm trail.

A similar initiative has been established with West Hill Farm, an organic dairy enterprise in North Devon. They carry the following message on their milk cartons:

"*Working with English Nature to conserve traditional hedgerows, skylarks and a rare colony of greater horseshoe bats, Chris and Susi Batstone combine the preservation of the wild beauty of North Devon's countryside with the best care and quality of life for their animals.*"

Figure 1. Riverford Farm organic milk carton with 'bat-friendly' message

3.4 Publicity

The Project's aims and achievements have been widely communicated to a variety of audiences. Presentations have been given at various conferences, and a large number of articles have appeared in the local and national press and on TV and radio stations (Table Four). The Project has also been used widely in English Nature's literature as an example of good practice in the targeting of agri-environment schemes to achieve biodiversity gains in the wider environment (e.g. Reid & Grice 2001 and English Nature 2002).

Table Four: List of media outlets for articles about the Greater horseshoe bat Project.

Newsprint	**Television / Radio**
Western Daily Press	HTV News
Western Morning News	BBC West News
The Daily Telegraph	West Country TV
South Devon & Plymouth Times	Radio Devon
Bristol Evening Post	Radio Bristol
North Devon Journal	
Herald Express	**Conference presentations**
Weston Mercury	National Bat Conference, September 1998
Totnes Times	National Bat Conference, September 1999
Herald Express	Mammal Society Annual Conference, April 2001
Guardian	Devon Mammal Group Symposium, May 2001
Farmers Guardian	Bat Conservation Trust Conference, September 2001
The Times	English Nature SRP Conference, December 2001
DETR Biodiversity News	European Bat Research Symposium, August 2002
Devon FWAG Newsletter	GAP Marketing Workshop, December 2002
Devon Hedge Group magazine	Public seminars of radio-tracking research: Braunton; Chudleigh; Brockley Hall Stables
RSPB Cirl Bunting Bulletin	
Devon Biodiversity News	
Devon Life	
Devon Nature	
English Nature magazine	
Countryside Stewardship Newsletter	
Bat Conservation Trust, Bat News	
Biodiversity News	

3.5 Science

Research involving the radio-tracking of greater horseshoe bats from four different maternity roosts has been completed. The sites were Berry Head to Sharkham Point SSSI (summer 1999), Brockley Hall Stables SSSI (summer 2001), Caen Valley Bats SSSI (summer 2002) and Chudleigh Caves & Woods SSSI (summer 2002). The results have been published in the following English Nature Research Reports:

- Dispersal and foraging behaviour of greater horseshoe bats, Brixham, Devon. M.F. Robinson, M.Webber & R.E. Stebbings, 2000. EN Research Report No. 344.
- Radio tracking study of greater horseshoe bats at Brockley Hall Stables Site of Special Scientific Interest, May-August 2001. G. Billington, 2002. EN Research Report No. 442.
- Radio tracking study of greater horseshoe bats at Caen Valley Bats Site of Special Scientific Interest 2002. G. Billington, 2003. EN Research Report No. 495.
- Radio tracking study of greater horseshoe bats at Chudleigh Caves and Woods Site of Special Scientific Interest 2002. G. Billington, 2003. EN Research Report No. 496.

Maps showing the bats foraging and commuting routes are shown at Appendix II. The results were presented during public seminars at venues near to the roost sites. Large audiences, including local councillors, local authority officers, farmers and representatives of conservation organisations, attended the seminars. As a result, many copies of the research reports were directly distributed to those who influence the management of the landscape around the roosts. Significant media interest was also generated through the seminars, with features carried in local papers, television and radio. The results from this research are used to inform development control processes and guide the targeting of schemes such as Countryside Stewardship. A further radio-tracking study is currently underway (summer 2003) with bats from the Buckfastleigh Caves SSSI.

The Project Officer has also been actively involved in organising volunteer bat workers to help contribute to a national project attempting to assess the short-term impacts of stock removal (due to Foot and Mouth Disease) on greater horseshoe bat populations and diet. Volunteer projects initiated in 2001/02 involved a co-ordinated count of greater horseshoe bats at all maternity roosts in Devon and Cornwall. In addition, an undergraduate student is carrying out an assessment of habitat change in the landscape around the North Somerset cSAC roosts. The analysis of this work is ongoing.

4. Discussion

Population counts of bats from the maternity roost sites in Devon have, until recently, only been conducted on a sporadic basis. However, from the available data based on summer counts, the combined greater horseshoe bat populations from all the Devon maternity roosts have increased by 58% since 1995. It therefore appears that the ambitious Biodiversity Action Plan target of a 25% population increase by the year 2010 will be met. However, continued annual monitoring is still needed to track fluctuations in population numbers. It is hoped that over time new bat colonies will be established in the wider countryside away from the designated sites. Full details of the progress made against the UK BAP for the greater horseshoe bat are given in Appendix III.

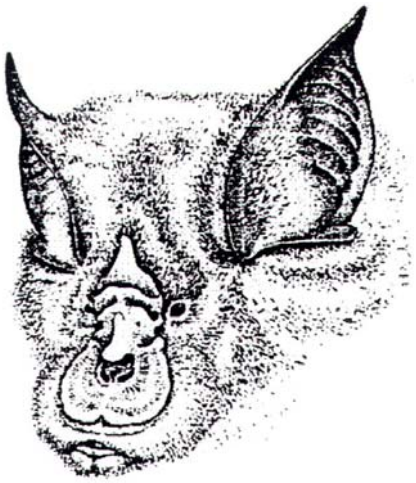
It proves difficult to directly attribute the increase in bat numbers with the Project's work of dramatically increasing the amount of land sympathetically managed around the roost sites. However, it is clear that the creation of 80 kilometres of new or restored hedgerows and the introduction of 400 hectares of extensively grazed grassland have, and will, greatly contribute to providing new commuting and foraging routes and insect-rich feeding areas for the bats. There are also wider benefits of sympathetic management of the landscape, especially for other bat species, farmland birds, mammals (e.g. brown hare) and invertebrates. By involving local landowners and the general public in the Project, they have become 'engaged' with their local wildlife. This will have a lasting and significant impact on how local landscapes evolve and in particular how the communities respond to ever increasing building development pressures and changes to agricultural land management.

The focussed approach of having a dedicated person working on the Project has proved crucial for the Project's success. The first couple of years required an intensive period of proactive marketing and raising public awareness of the bats and their requirements in the landscape. Once key landowners were contacted and entered into management agreements, the word of mouth factor then enabled the Project to snowball. Five years of high profile achievements has led to considerable success in encouraging favourable landscape management for the bats; through securing 77 management agreements and influencing

partner organisations. The marketing initiative between English Nature and Riverford Farm has proved a hugely successful tool in the promotion of the Project's aims and achievements. The 'bat milk' launch generated a large amount of media interest and the concept is still widely reported as an example of how sustainable agriculture can be directly linked to biodiversity gain.

The radio-tracking research has demonstrated that bats forage extensively away from their roost sites, commonly within a 4-kilometre radius and occasionally farther than 7 kilometres. They forage primarily over grazed pastures, scrub, around tall bushy hedgerows, and along tree lines, frequently next to watercourses. This work demonstrates that sensitive management of the surrounding landscape is important in ensuring that high quality feeding areas are within foraging range. The identified feeding areas and flight routes are now targeted for further environmental enhancement and the research is used to ensure that potential building developments do not have a negative impact on the bats or the landscape that supports them.

The Project has proved a high profile success story for English Nature. It is seen as a groundbreaking project, demonstrating a real example of how work on our designated sites (SSSI's and cSACs) can, and should, be linked to the wider countryside and how we can influence people and practical policy implementation. Other organisations and English Nature teams are now developing similar projects for other species. The Project has enabled English Nature to gain good publicity and informed large audiences including policy makers, conservation professionals, farming communities and local people about its aims and achievements. The continued sympathetic land management around the roost sites, with grazed pastures and hedge restoration and planting, will greatly enhance the landscape for the greater horseshoe bats. Combined with the UK and European legislative protection given to the major roost sites, this should ensure the bats' survival and continued population expansion in southwest England.



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Appendix I: Maps showing location of sites under land management around maternity roost sites in Devon

Appendix Ia : Avon Valley

Appendix Ib : Berry Head to Sharkham Point SSSI

Appendix Ic : Buckfastleigh Caves SSSI

Appendix Id : Caen Valley Bats SSSI

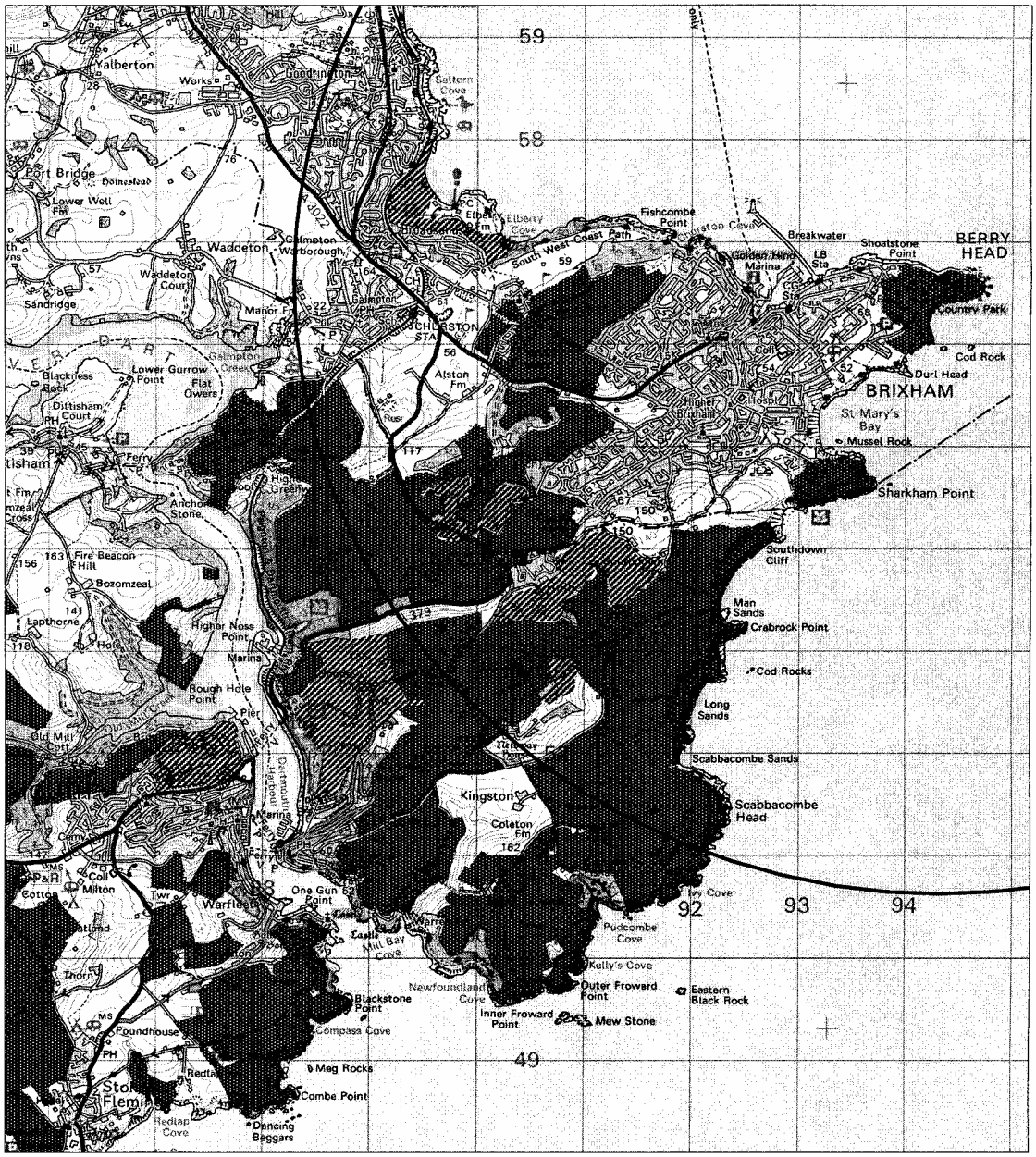
Appendix Ie : Chudleigh Caves & Woods SSSI

Appendix Ia : Avon Valley Roost Site
Areas of land under management agreements and which have received visits from the Greater horseshoe bat Project Officer

4 km roost sustenance zone shown
Dark shaded areas : land management agreement secured or pending
Striped areas : visited by Project Officer and bat-related land management advice given

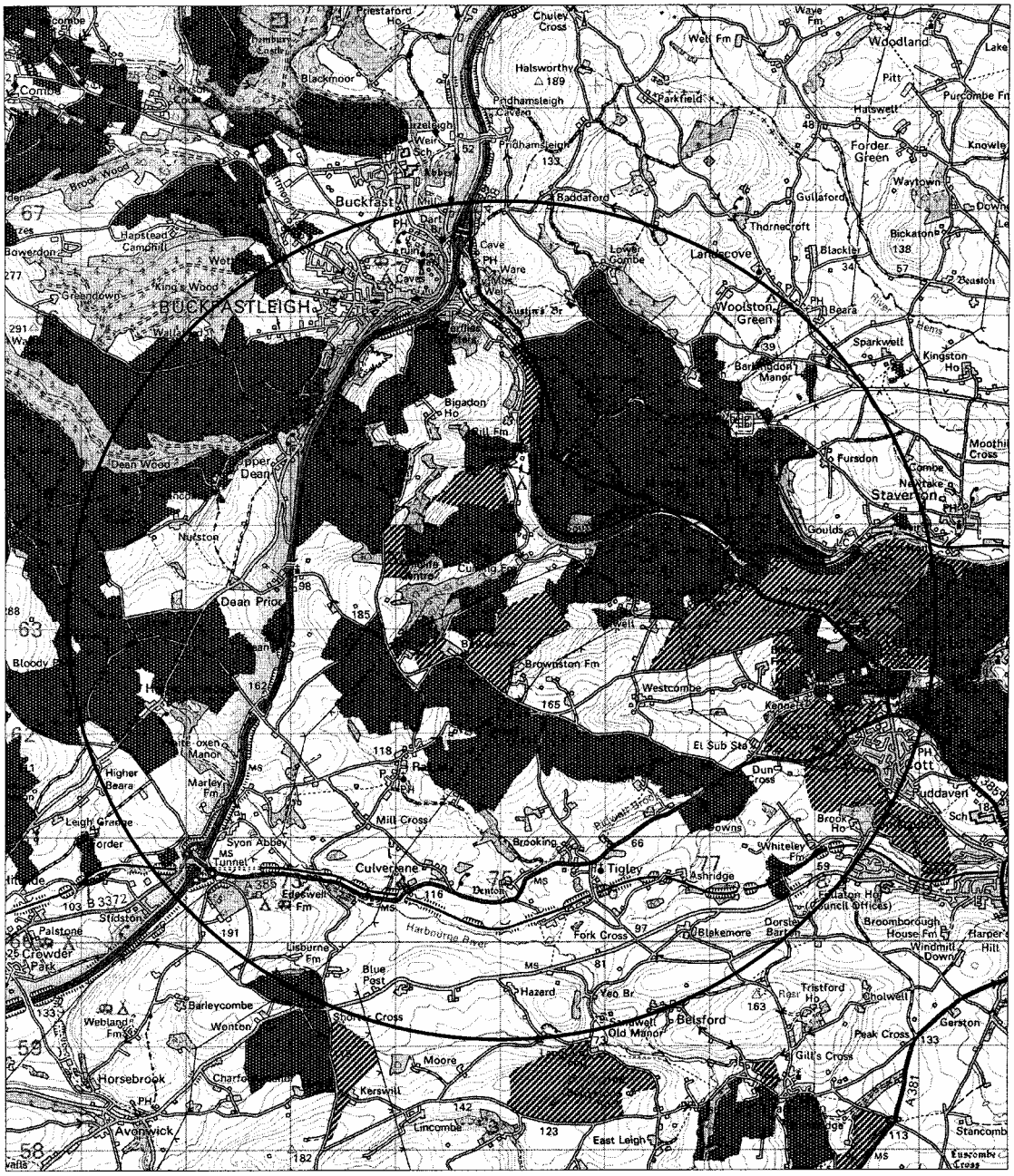
Appendix Ib : Berry Head to Sharkham Point SSSI Roost Site
Areas of land under management agreements and which have received visits from the Greater horseshoe bat Project Officer

4 km roost sustenance zone shown
Dark shaded areas : land management agreement secured or pending
Striped areas : visited by Project Officer and bat-related land management advice given



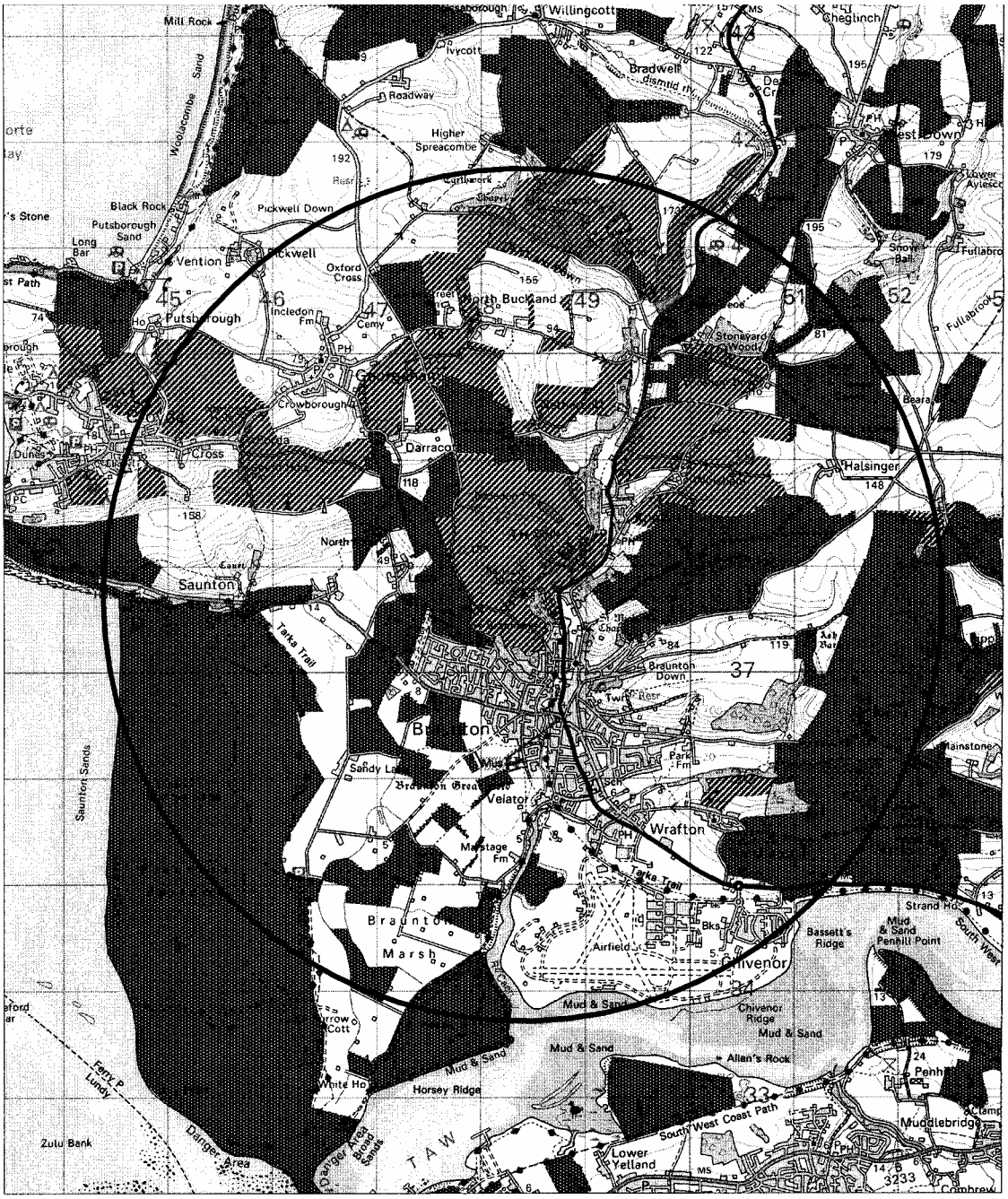
Appendix Ic : Buckfastleigh Caves SSSI Roost Site
Areas of land under management agreements and which have received visits from the Greater horseshoe bat Project Officer

4 km roost sustenance zone shown
Dark shaded areas : land management agreement secured or pending
Striped areas : visited by Project Officer and bat-related land management advice given



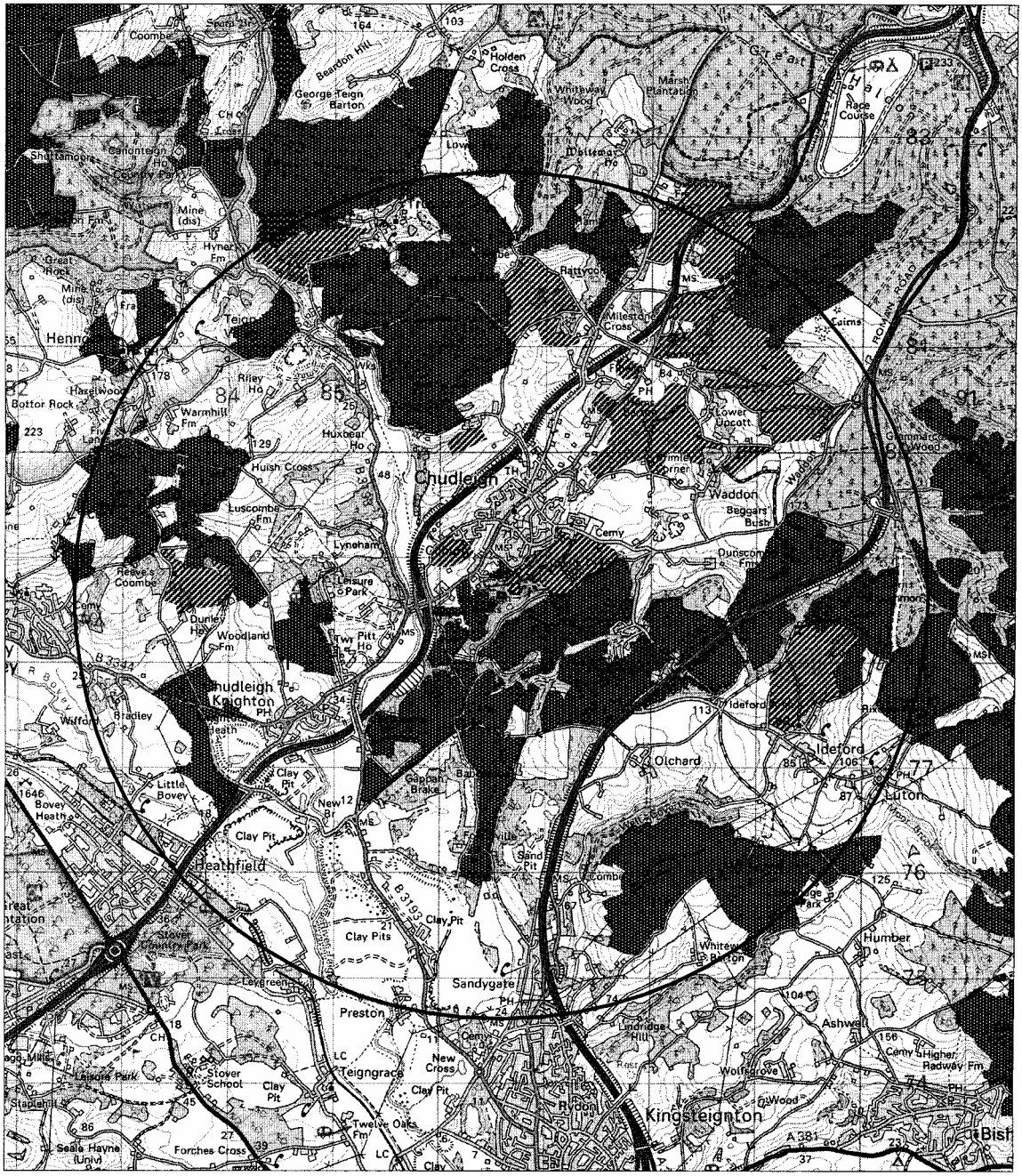
Appendix Id : Caen Valley Bats SSSI Roost Site
Areas of land under management agreements and which have received visits from the Greater horseshoe bat Project Officer

4 km roost sustenance zone shown
Dark shaded areas : land management agreement secured or pending
Striped areas : visited by Project Officer and bat-related land management advice given



Appendix Ie : Chudleigh Caves and Woods SSSI Roost Site
Areas of land under management agreements and which have received visits from the Greater horseshoe bat Project Officer

4 km roost sustenance zone shown
Dark shaded areas : land management agreement secured or pending
Striped areas : visited by Project Officer and bat-related land management advice given



Appendix II : Maps showing radio-tracking results

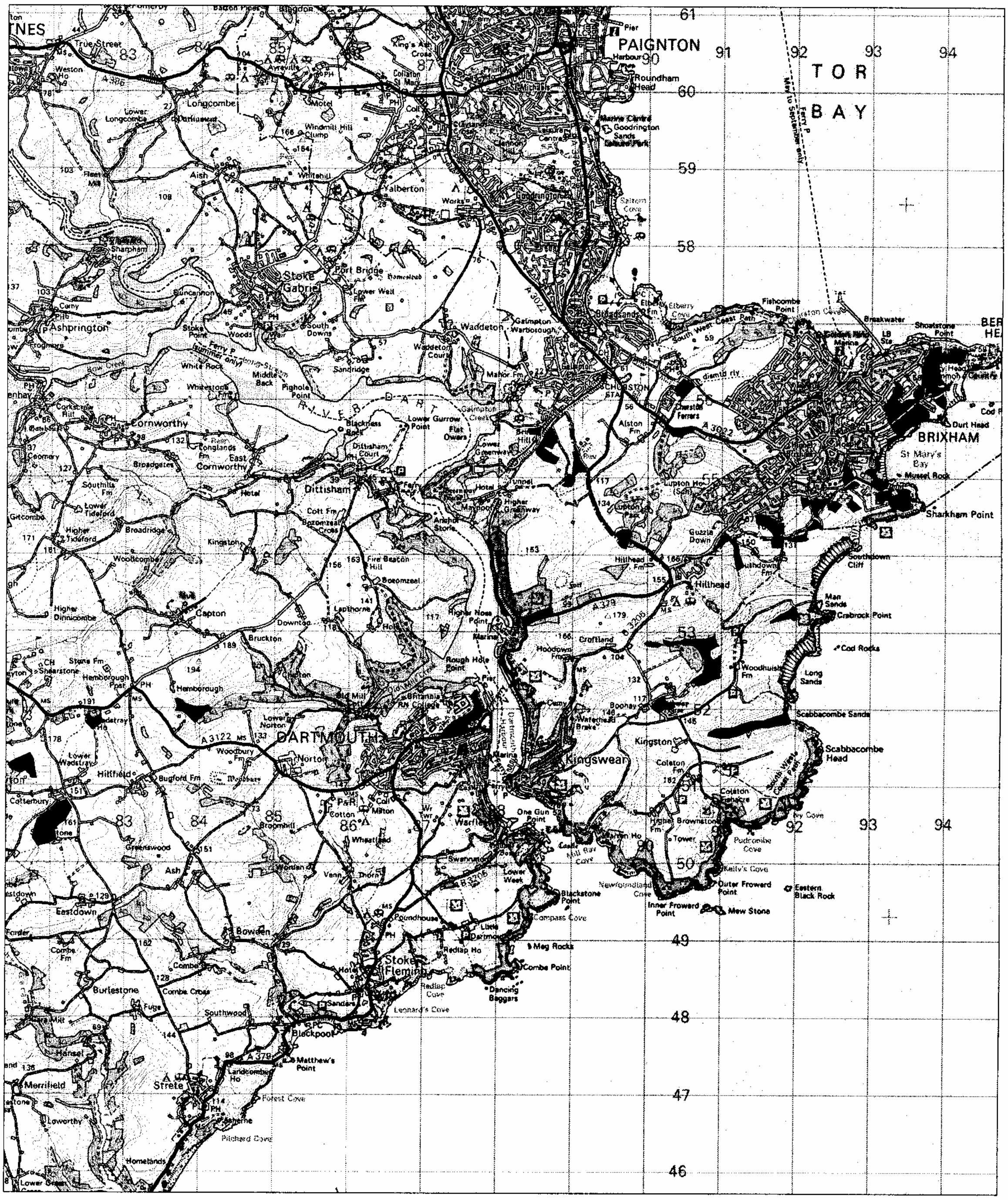
Appendix IIa : Berry Head to Sharkham Point SSSI

Appendix IIb : Brockley Hall Stables SSSI

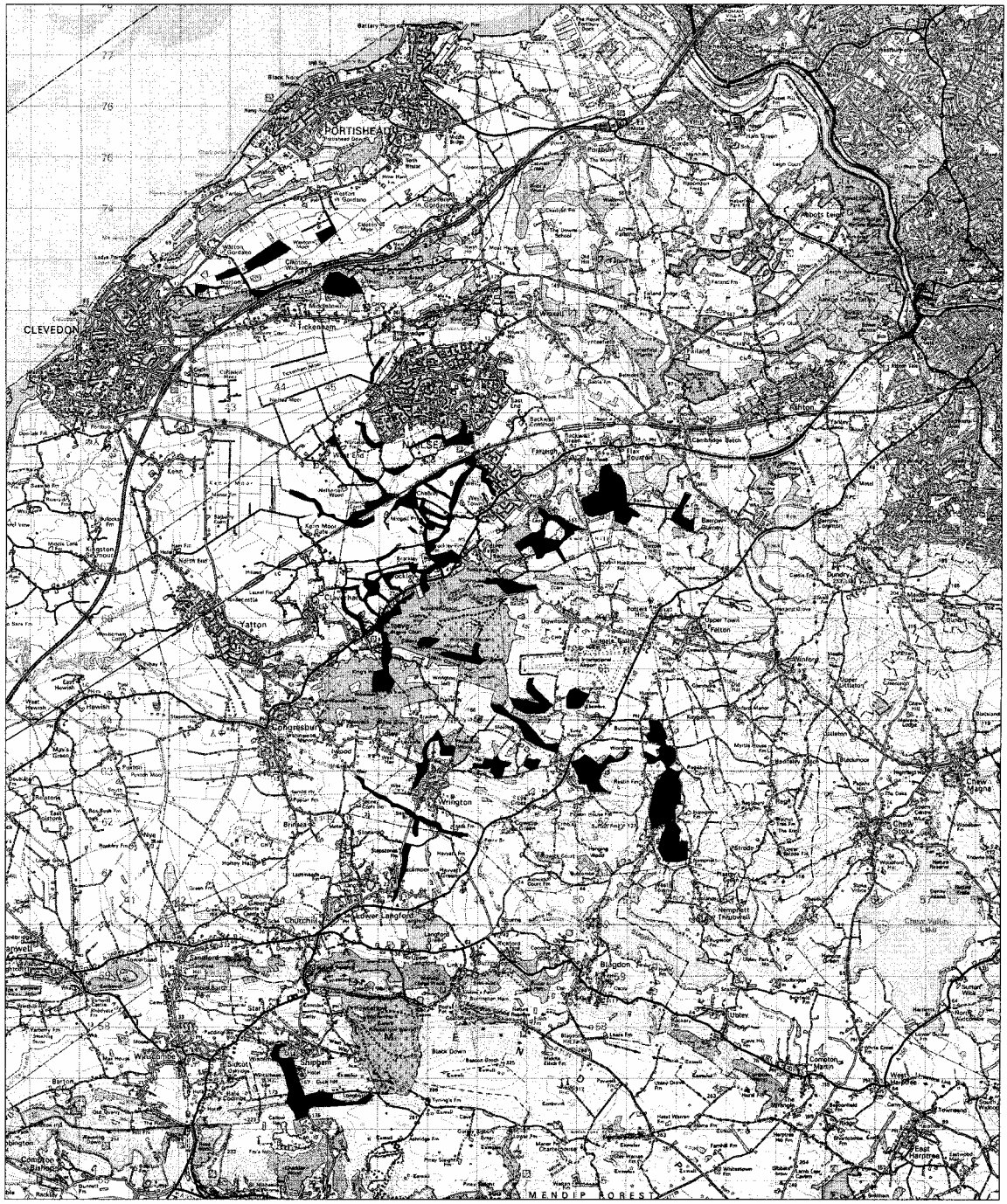
Appendix IIc : Caen Valley Bats SSSI

Appendix IId : Chudleigh Caves & Woods SSSI

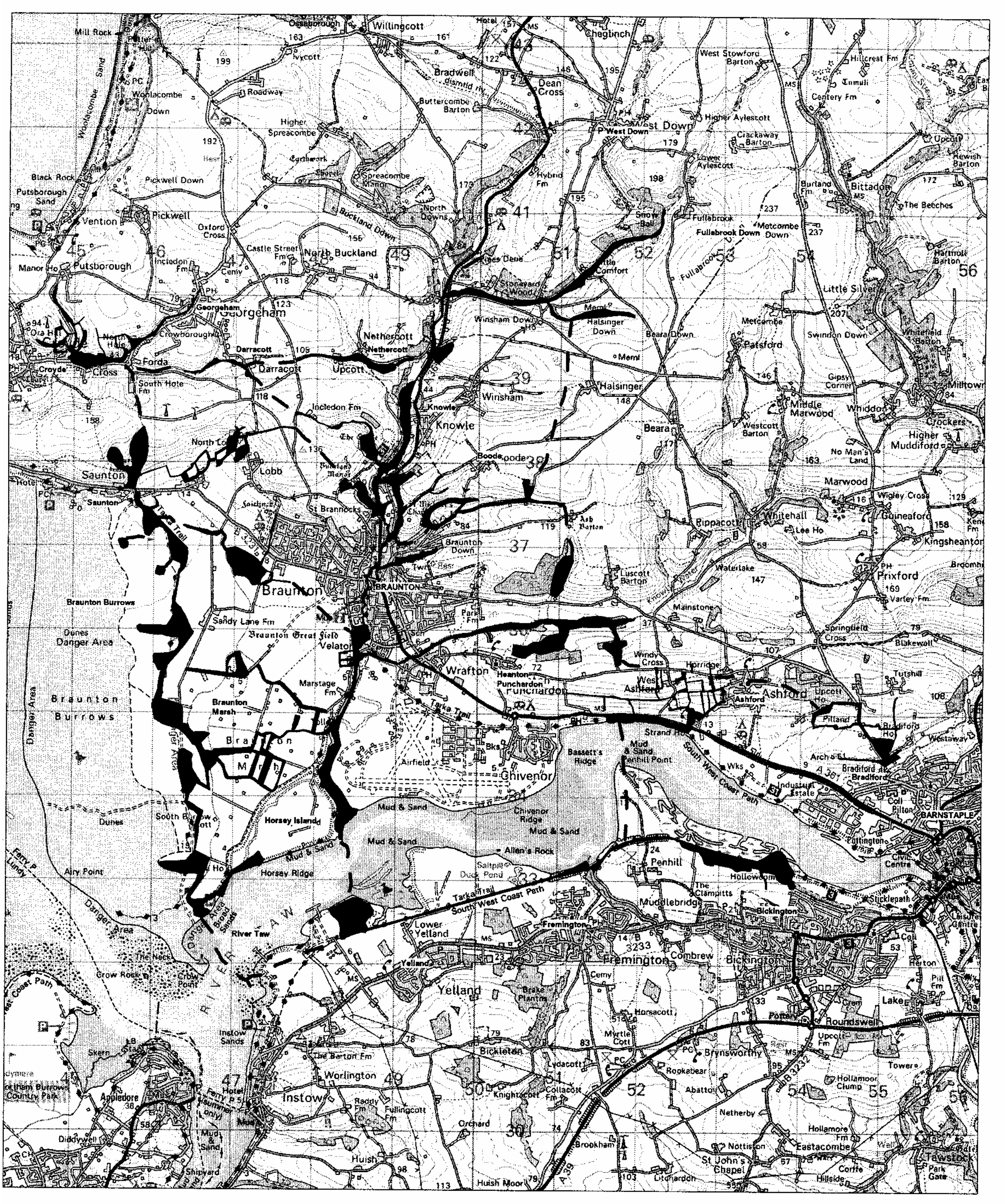
Appendix IIa : BERRY HEAD TO SHARKHAM POINT SSSI
Black areas indicate key foraging areas and commuting routes of greater horseshoe bats



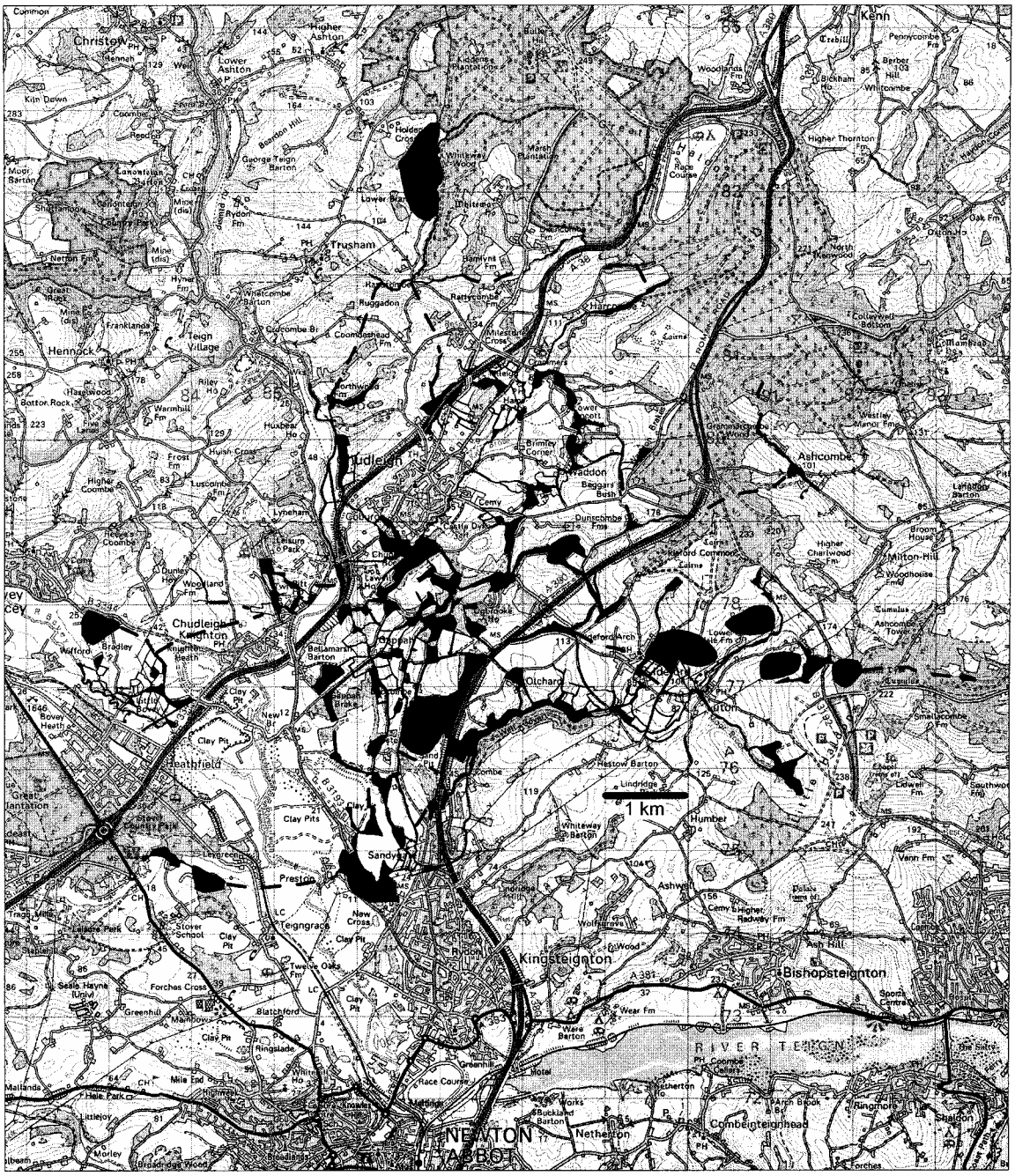
Appendix IIb : BROCKLEY HALL STABLES SSSI
Black areas indicate key foraging areas and commuting routes of greater horseshoe bats



Appendix IIc : CAEN VALLEY BATS SSSI
Black areas indicate key foraging areas and commuting routes of greater horseshoe bats



Appendix IId : CHUDLEIGH CAVES AND WOODS SSSI
Black areas indicate key foraging areas and commuting routes of greater horseshoe bats



Appendix III : Update on progress against the UK Biodiversity Action Plan for the greater horseshoe bat.

This document details current and prospective English Nature progress against each action within the UK BAP, as at June 2003. Progress against the biological BAP targets is also summarised.

Consider the obligations of the Habitats Directive and Agreement on the Conservation of Bats in Europe and seek to develop appropriate policies on wider habitat conservation for bats.

- Six candidate Special Area of Conservation (cSAC) identified (includes Wales) for greater horseshoe bat conservation.
- English Nature represented in UK delegation to Advisory Committee for the Agreement on the Conservation of Bat in Europe (see www.eurobats.org/PartyReports/) for latest report of delegation).
- Species Recovery Programme includes work to protect and enhance foraging areas (see below).

Consider statutory protection for roost sites not already covered, and seek to ensure that consideration is given to key areas, or population centres, in respect of planning and land-use strategies

- 27 SSSI's where greater horseshoe bats are an interest feature (includes 14 maternity sites). These figures included Wales.
- On-going programme to identify and, where appropriate, notify remaining maternity sites and significant hibernation sites.
- Consultation zones established with local planning authorities and other statutory bodies (i.e. Forestry Commission, Environment Agency) around cSACs and SSSIs.
- Advocate work with DEFRA has resulted in Countryside Stewardship Scheme targeting foraging zones throughout region.

Following further research to identify the ecological requirements of this species more precisely, encourage favourable habitat management (aiming for up to 4km around each roost), seeking to implement these through voluntary or formal agreement.

- Conservation strategies for management of feeding areas published as English Nature Research Reports (see below).
- Phase One habitat survey maps prepared for 4km zones around most major maternity roosts during early 1990's.
- Full-time Project Officer in post to July 2003, to secure favourable management in foraging zones, primarily using Countryside Stewardship Scheme (CSS) to deliver management agreements. Work focussed on Devon where over 77 holdings (6536 hectares) have now entered CSS agreements with management for the bats as a result of the Project's work. Extensive support given to similar projects throughout region:

Dorset (financial and technical support), Avon/ Somerset (financial and technical), Cornwall (technical), Gloucestershire (technical).

- Project also working with local food producers to promote economic sustainability of appropriate enterprises within foraging zones.

Continue to implement the current advisory mechanisms for roost sites

- English Nature will continue to advise roost owners and encourage the management of buildings to maintain and enhance roosts, with extensive support from the voluntary bat warden network.
- Site enhancement and protection works funded on SSSI's to help achieve favourable condition of roost sites.

Prepare and distribute advice on the management of foraging areas by the year 2000.

- Advisory leaflet *Managing landscapes for greater horseshoe bats* produced and reprinted during 2000 in full colour. Multiple copies available from Tony Mitchell-Jones (EN Peterborough), Devon English Nature Local Team, and as a downloadable PDF file at **www.english-nature.org.uk/science/srp/pdf/GHBAT.PDF**

Seek to maintain the current level of research into the ecological and conservation requirements of this species, identifying further areas of research as necessary. This should include studies on the population genetics and feeding requirements of this species.

- Extensive research programme has continued, published Research Reports with greater horseshoe bat research content, available from English Nature Enquiry Service (01733 455101 or enquiries@english-nature.org.uk) are:

Ransome (1996) The management of feeding areas for greater horseshoe bats No 174
Ransome (1997) The management of greater horseshoe bat feeding areas to enhance population levels No 241
Ransome (1998) The impact of maternity roost conditions on populations of greater horseshoe bats No 292
Ransome (2000) Monitoring diets and population changes of greater horseshoe bats in Gloucestershire and Somerset No 341
Robinson, Webber and Stebbings (2000) Dispersal and foraging behaviour of greater horseshoe bats, Brixham, Devon No 344
Billington (2000) Radio tracking study of greater horseshoe bats at Mells, near Frome, Somerset No 403
Robertson, Crowle and Hinton (2001) Interim assessment of the foot and mouth disease outbreak on England's biodiversity No 430
Reid and Grice (2001) Wildlife gain from agri-environment schemes No 431
Billington (2002) Radio tracking study of greater horseshoe bats at Brockley Hall Stables SSSI, May-August 2001 No 442
Billington (2003) Radio tracking study of greater horseshoe bats at Caen Valley Bats Site of Special Scientific Interest 2002 No 495
Billington (2003) Radio tracking study of greater horseshoe bats at Chudleigh Caves and Woods Site of Special Scientific Interest 2002 No 496

- Unpublished documents available on request from EN Devon:

Jones and Billington (2000) Radio tracking study of greater horseshoe bats at Cheddar, Somerset

- On-going research:

Winter diet studies, awaiting publication as Research Report (contractor: Ransome)

Radio-tracking studies at Buckfastleigh caves SSSI 2003 (contractor: Billington)

Impact of FMD on diet at maternity and hibernation sites in Gloucestershire (contractor: Ransome)

Supporting genetic studies (Bristol University research)

Promote research to assess the importance of sites used by small numbers of bats and implement a strategy for their conservation. Investigate the rate of loss of minor sites and their importance for population structure.

- English Nature *Batsites* database holds all known roost sites used by this species; database recently updated under contract.
- Data available to *bona fide* researchers.
- Proposed small sites research project in collaboration with BCT/ NBMP.

Identify key areas or population centres for this species

- Areas have been identified as inputs to SSSI and SAC designation process

Develop and implement a systematic recording scheme to standardise population estimates between sites and between years

- Good data available for most major sites
- Maternity and hibernation site monitoring proposals made under Research Report Number 341
- NBMP monitoring a sample of hibernation sites

Pass information gathered during survey and monitoring of this species to JNCC in order that it can be incorporated in a national database and contribute to the maintenance of an up-to-date Red List

- Key supporter of National Biodiversity Network process to enable easy access to biological data. Pilot project based in southwest England.

Progress against biological BAP targets

Maintain all existing maternity sites and associated hibernation roosts

Progress: no significant loss since BAP written in 1995

Increase population by 25% by 2010

Progress: appear to be on target, based on various measures (see below)

Roger Ransome:
Woodchester (total population) +15% 1996-98
Littledean Hall (total population) +7% 1996-98

Vincent Wildlife Trust**:**
Rock Farm (number of births) +c27% 1995-2000
High Marks Barn (number of births) +c192% 1995-2000

English Nature**:**
All Devon maternity sites (index of population based on July counts) + 58% 1995-2001
North Devon maternity site (index of population based on July counts) +45% 1995-2001

Appendix IV : Advisory leaflets

Managing landscapes for the greater horseshoe bat

Managing landscapes for the greater horseshoe bat – detailed recommendations

ENGLISH NATURE

English Nature is the Government agency that champions the conservation of wildlife and geology throughout England.

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Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: Co_2 experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888