

# The status of Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling & Blasius, 1839) in the British Isles

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## Abstract

There are now 91 records of individual Nathusius' pipistrelle *Pipistrellus nathusii* examined 'in the hand' in the U.K., and bat detector records from a further 36 localities in Britain and Ireland. These records are distributed throughout all months of the year with clear peaks in spring and autumn suggesting migratory movements into and out of the British Isles in autumn and spring, respectively. Three maternity colonies have been located and the species must now also be regarded as a resident breeding species in Britain and Ireland.

**Key words:** *Pipistrellus nathusii*, biodiversity, migration, Chiroptera

## INTRODUCTION

Nathusius' pipistrelle *Pipistrellus nathusii* (Keyserling & Blasius, 1839) is found from western Europe to Asia Minor (Corbet & Harris, 1991; Strelkov, 1997a,b; Mitchell-Jones *et al.*, 1999). The most westerly nursery colony found to date, occurs in Co. Antrim in Northern Ireland (Russ, O'Neill & Montgomery, 1998), although there are indications of resident summer populations at similar longitudes in northern Spain (Rodriguez-Munoz *et al.*, 1993). In autumn and winter, *P. nathusii* migrates from its stronghold in eastern Europe in a south-westerly direction (Strelkov, 1969; Roer, 1995; Strelkov, 1997a,b) to central western Europe before returning to traditional breeding areas in eastern Europe during late spring (Aellen, 1983; Kapteyn & Lina, 1994; Limpens, Mostert & Bongers, 1997; Jarzembowski & Stepniewska, 1998).

Records of *P. nathusii* have been infrequent in the British Isles and, as a result, the species was initially regarded as a vagrant (Stebbing, 1988) until recently, when it was afforded the status of a migrant winter visitor (Speakman, Racey, Hutson *et al.*, 1991; Hutson, 1993). Suggestions that the species may mate while in this part of its range (Hutson, 1993; Harris *et al.*, 1995) have been confirmed by the presence of songflighting males and mating pairs in Avon, south-west Britain (Barlow & Jones, 1996). Recently, three maternity colonies have been discovered, one in Lincolnshire (Hutson, 1997), and two in County Antrim in Northern Ireland (Russ *et al.*, 1998; this paper) and it is now clear that

female *P. nathusii* give birth and lactate in the U.K. In addition to the presence of females in Northern Ireland, there is also evidence that males are present from late April to late September (Russ *et al.*, 1998; J. M. Russ, pers. obs.). However, despite these findings, distribution and population data are limited, and the status of *P. nathusii* in the British Isles remains unclear. The species has been selected for international collaboration on migration studies under the Agreement on the Conservation of Bats in Europe (Bonn Convention) and therefore it is important to review its status in the U.K. Here we present the first assembly of information on the occurrence of *P. nathusii* throughout the U.K. and Ireland and discuss its implications.

## METHODS

A questionnaire was sent to 89 voluntary bat groups in the U.K. during 1997 to assess the occurrence of *P. nathusii* in their designated areas. Each bat group normally covers one county or region so that the whole of the U.K. was covered. Details included in the questionnaire were presence, location, sex of bat, and month of occurrence. Additional records were obtained by personal communication and from the literature (Stebbing, 1970, 1986; Banks, Clark & Newton, 1983; Carroll, 1988; Young, 1989; Speakman, Racey, Hutson *et al.*, 1991; Herman, 1992; Speakman, Racey, McLean *et al.*, 1993; Thompson, 1993; Barlow & Jones, 1995; Herbert, 1995; Rydell & Swift, 1995; Haddow &

**Table 1.** Records of *Nathusius' pipistrelle* *P. nathusii* in the British Isles excluding bat detector records. Roost, maternity roost including juveniles; M, male; F, female; j, juvenile; A, adult; \*, no data. Recorder initials are: A, members of Aberdeen bat group; AAW, A. A. Wardhaugh; AD, A. Douse; AMH, A. M. Hutson; AP, A. Poole; AR, A. Ross; BC, B. Carroll; CB, C. Banks; CH, C. Hambly; CP, C. Pope; CS, C. Shaw; DE, D. Endacott; DEv, D. Eva; DK, D. King; DS, D. Streets; DY, D. Yalden; ES, E. Stuart; GB, G. Bemment; GS, G. Streets; HGY, H. G. Young; IM, I. Mackie; IP, I. Pilcher; JC, J. Childs; JF, J. Farley; JH, J. Haddow; JHe, J. Herman; JHy, J. Hayes; JKO, J. K. O' Neill; JM, J. McLean; JP, J. Pope; JMR, J. M. Russ; JRS, J. R. Speakman; KB, K. Barlow; KO, K. Osborn; KP, K. Pilcher; LH, L. Harrington; LR, L. Rendle; MC, M. Clark; MM, M. McLean; MP, M. Pennington; MR, M. Robinson; MRI, M. Richardson; MS, M. Smyth; ND, N. Downs; PAR, P.A. Racey; PC, P. Costen; PH, P. Heathcote; PS, P. Smith; RES, R. E. Stebbings; RF, R. Farley; RN, R. Newton; RR, R. Raynor; SB, S. Bevis; SP, S. Pritchard; SW, S. Wright; VB, V. Bayley; VD, V. Downer; VL, V. Little

Date	Sex	County/region	Location	Recorder	Reference
2 Nov 40	M	Shetland Islands	Whalsay	JHe	Herman (1992)
6 Oct 69	M	Dorset	*	RES	Stebbins (1970)
17 Aug 78	M	Hertsfordshire	Wormleybury Lake/ south-east of county	CB/MC/RN	Banks <i>et al.</i> (1983)
Jan 85	*	Essex	*	RES	Stebbins (1986)
2 Sep 85	F	North Sea	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
14 Dec 87	F	Jersey	*	BC	Carroll (1988)
15 Dec 87	M	Shetland Islands	Tingwall	PAR/JRS/ES	Unpublished
20 Feb 88	F	Jersey	*	BC	Carroll (1988)
3 Mar 88	F	Jersey	*	BC	Carroll (1988)
5 May 88	F	North Sea	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
10 May 88	F	North Sea	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
20 Jul 88	*	Jersey	*	HGY	Young (1989)
(individual 'long dead')					
Sep 88	F	Jersey	*	HGY	Young (1989)
Sep 88	M	Jersey	*	HGY	Young (1989)
17 Jan 89	Mj	Cornwall	Penlee Park, Penzance (one of three bats)	RES	Speakman, Racey, Hutson <i>et al.</i> (1991)
14 Apr 89	F	Guernsey	St Peter Port	PC/AMH	Speakman, Racey, Hutson <i>et al.</i> (1991)
3 May 89	M	Shetland Islands	Fair Isle	PAR/JRS/ES	Unpublished
8 May 89	*	NE Scotland	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
30 May 89	M	North Sea	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
7 Sep 89	M	Shetland Islands	Mainland		In Haddow & Herman (1997)
13 Sep 89	*	Shetland Islands	Levenwick	MRi/A	Speakman, Racey, Hutson <i>et al.</i> (1991)
19 Sep 89	M	Guernsey	*	PC/AMH	Speakman, Racey, Hutson <i>et al.</i> (1991)
21 Sep 89	*	NE Scotland	*	SP/JRS	Speakman, Racey, Hutson <i>et al.</i> (1991)
23 Sep 89	F	North Sea	*	A	Speakman, Racey, Hutson <i>et al.</i> (1991)
29 Sep 89	M	London	*	AMH/GB	Speakman, Racey, Hutson <i>et al.</i> (1991)
7 Feb 90	M	Shetland Islands	*	AMH	Unpublished
1991	*j	Cambridgeshire	Little Stukeley, TL 209 757	MR/A	Unpublished
26 Apr 91	F	Cleveland/ N. Yorkshire	North-east Yorkshire	AAW	Unpublished
4 Oct 91	F	North Sea	Oil Platform 'Esmond' off Redcar	RES	Unpublished
11 Dec 91	F	Guernsey	St Peter Port	PC	Unpublished
24 Jan 92	M	Shetland Islands	West mainland	PAR/JRS/AD	Speakman, Racey, McLean <i>et al.</i> (1993)
4 Feb 92	*	Shetland Islands	Unst	PAR/JRS/AD	Speakman, Racey, McLean <i>et al.</i> (1993)
7 Aug 92	M	Oxfordshire	Near Witney	DE	Unpublished
11 Oct 92	F	West Sussex	Worthing Broadwater, TQ1504	AMH	Unpublished
Sep 92	*A	Cambridgeshire	Little Stukeley, TL 209 757	MR	Unpublished
13 Sep 92	F	North Sea	North Allwyn Rig, 60°N2°E	PAR/JRS	Speakman, Racey, McLean <i>et al.</i> (1993)
19 Sep 92	F	North Sea	Santa Fe 135 Rig, Nelson Field, 57°N1°E	PAR/JRS	Speakman, Racey, McLean <i>et al.</i> (1993)
21 Sep 92	*	Isle of Wight	*	CP/JP/AMH	Unpublished
22 Sep 92	Mj	East Sussex	Eastbourne, TQ589009	VD/AMH	Unpublished
25 Sep 92	M	North Sea	Hutton TLP Conoco Rig (150 km NE of Shetland), 61°N2°E	PAR/JRS/JM	Speakman, Racey, McLean <i>et al.</i> (1993)
7 Oct 92	F	North Sea	Amarada Hess Rig, Rob Roy Field (150 km NE of Peterhead), 58°N1°E	PAR/JRS	Speakman, Racey, McLean <i>et al.</i> (1993)
1993	F	NE Scotland	*	AMH	Unpublished
1993	*	Cornwall	Truro	AMH	Unpublished
1993	M	Devon	Paignton	AMH	Unpublished

Table 1 (continued)

Date	Sex	County/region	Location	Recorder	Reference
Mar 93	*	Guernsey	St Peter Port	PC	Unpublished
9 Sep 93	M	Kent	Dover	PH	Unpublished
22 Sep 93	F	North Sea	Bruce installation, 100 miles off Shetland	PAR	Unpublished
25 Oct 93	F	NE Scotland	*	AMH	Unpublished
28 Oct 93	*	Shetland Islands	Burravoe, Yell	PAR/JRS/ES	Unpublished
1994	M	Pembrokeshire	Stackpole, near Pembroke	AP/RES	Unpublished
26 Feb 94	*	Oxfordshire	Botanic Gardens, Oxford	AMH	Unpublished
5 Apr 94	F	West Sussex	Shoreham by Sea	SW	Unpublished
3 Oct 94	*	Shetland Islands	Sandwick	KO/MP	Unpublished
Apr 95	F	Guernsey	St Peter Port	PC	Unpublished
14 Apr 95	F	Bedfordshire	Marston Moretaine	JC/VB/AMH	Unpublished
5 May 95	M	Cornwall	Fir Wood, Colan, SW870616	RF/JF/DK/DEv	Unpublished
12 Jun 95	M	Orkney	South Ronaldsay		In Haddow & Herman (1997)
17 Sep 95	F	North Sea	*	PAR/JRS	Unpublished
17 Sep 95	F	North Sea	*	PAR/JRS	Unpublished
17 Sep 95	M	North Sea	*	PAR/JRS	Unpublished
22 Sep 95	M	Avon	Chew Valley Lake	KB	Barlow & Jones (1996)
22 Sep 95	F	Avon	Chew Valley Lake	KB	Barlow & Jones (1996)
18 Oct 95	*	North Sea	130 miles off Aberdeen (one of 12 dead individuals)	PAR	Unpublished
21 Nov 95	M	Clackmannanshire, Central Scotland	Dollar	JH/JHe	Haddow & Herman (1997)
28 Nov 95	F	North Sea	*	AMH	Unpublished
Dec 95	F	Guernsey	St Peter Port	PC	Unpublished
2 Dec 95	F	West Sussex	Worthing Broadwater, TQ1504	SW/AMH	Unpublished
1996	Roost	Lincolnshire	Skegness	IP/KP/MR/RES	Hutson (1997)
Mar 96	*	Guernsey	St Saviour	PC	Unpublished
5 Mar 96	*	West Sussex	Near Chichester, West Boyle	JHy/AMH	Unpublished
18 Apr 96	F	East Sussex	TQ768082	AMH	Unpublished
30 Apr 96	M	West Sussex	Shoreham, Holmbush	SW	Unpublished
11 Jun 96	F	NE Scotland	Inverurie, NJ950025	AMH	Unpublished
9 Sep 96	F	Antrim, N. Ireland	Windsor Park, Belfast	LR/AR	Unpublished
16 Oct 96	*	Shetland Islands	Unst	KO/MP/PAR/JRS	Unpublished
1997	Roost	Antrim, N. Ireland	Clotworthy Arts Centre	JMR/JKO	Russ <i>et al.</i> (1998)
Mar 97	M	East Yorkshire/Humberside	Hull	DY	Unpublished
3 Jul 97	*	North Sea	Viking B platform	ND/IM/PS/PAR	Unpublished
5 Oct 97	M	Devon	Paignton	SB/CS	Unpublished
1 May 98	M	Isle of Wight	*	GS/DS	Unpublished
Jul 98	Roost	Antrim, N. Ireland	Old Mill, Muckamore Estate, J173855	JMR/MS	Unpublished
13 Jul 98	M	Antrim, N. Ireland	Antrim Boat Club	MS	Unpublished
21 Jul 98	F	Antrim, N. Ireland	Belfast	LH/JMR	Unpublished
6 Aug 98	*j	Cambridgeshire	West Perry, TL150672	MR	Unpublished
29 Aug 98	M	Antrim, N. Ireland	Shanes Castle, J110880	JMR/MS	Unpublished
7 Sep 98	M	North Sea	Texaco's CAPTAIN Wpp platform, 60 miles N of Peterhead	CH/MM/PAR/JRS	Unpublished
20 Sep 98	Mj	Devon	English Channel, between Start Point and Cherbourg	SB	Unpublished
30 Sep 98	*	NE Scotland	Aberdeen Harbour	PAR/ND/JRS	Unpublished
13 Nov 98	M	Shetland Islands	Whalsay	RR/ND/PAR	Unpublished
14 Dec 98	M	NE Scotland	Northern College	ND/IM/PAR	Unpublished
22 Dec 98	Fj	Cornwall	St Erth area	VL	Unpublished
1 Jun 99	F	North Sea	BP Forties Echo platform, 124 miles NE of Aberdeen (57°N1°E)	PAR/JS	Unpublished
28 May 99	F	Down, N. Ireland	Kircubbin Village, Rectory Way Housing Estate	JMR	Unpublished
11 Oct 99	F	Antrim, N. Ireland	*	MS	Unpublished

**Table 2.** Bat detector records of *Nathusius' pipistrelle* *P. nathusii* in the British Isles: ‡, identified sonographically; \*, no data. Recorder initials are: AP, A. Poole; CC, C. Catto; DK, D. King; HB, H. Baagøe; IA, I. Ahlén; IM, I. Mackie; JG, J. Goldsmith; JH, J. Haddow; JKO, J. K. O' Neill; JMR, J. M. Russ; JR, J. Rydell; KB, K. Barlow; KR, K. Ross; LH, L. Harrington; MS, M. Smyth; PG, P. Guest; PL, P. Lynch; SBr, S. Bradley; SS, S. Swift

Date	Method	County/Region	Location	Recorder	Reference
24 Jun 93		NE Scotland	Seaton Park, Aberdeen	JR	Rydell & Swift (1995)
26 Jun 94		NE Scotland	River Dee, near Balmoral Castle	JR/SS	Rydell & Swift (1995)
Aug 94	‡	Avon	Chew Valley Lake	KB	Barlow & Jones (1996)
Aug 94	‡	Avon	Ubley, ST530582	KB	Barlow & Jones (1996)
Aug 94	‡	Avon	Blagdon Lake	KB	Barlow & Jones (1996)
Apr 95	‡	Avon	Ubley, ST530582	KB	Barlow & Jones (1996)
Apr 95	‡	Avon	Blagdon Lake	KB	Barlow & Jones (1996)
May 95	‡	Avon	Chew Valley Lake	KB	Barlow & Jones (1996)
Sep 95	‡	Avon	*	KB	Barlow & Jones (1996)
28 Aug 96	‡	Londonderry	Moneymore	JMR	Unpublished
01 May 97	‡	Antrim, N. Ireland	Near Shanes Castle	JMR	Unpublished
13 Jun 97	‡	Antrim, N. Ireland	Lough Beg, H9899	JMR	Unpublished
15 Jul 97		Dublin	Blessington Reservoir	IA/HB	Unpublished
07 Aug 97	‡	Armagh, N. Ireland	Address House, H9155	JMR/JKO	Unpublished
11 Aug 97	‡	Antrim, N. Ireland	Randalstown Forest	JMR/JKO/KR	Unpublished
13 Aug 97	‡	Antrim, N. Ireland	Crumlin	JMR/JKO	Unpublished
1998		Pembrokeshire	Stackpole, near Pembroke	AP	Unpublished
26 May 98	‡	Stirling	Stirling University	JH	Unpublished
Jun 98	‡	Norfolk	East Norfolk	JG/CC	Unpublished
Jul 98	‡	Antrim, N. Ireland	Outskirts of Antrim, Loughanmore Road, J210870	JMR/MS	Unpublished
19 Jul 98	‡	Down, N. Ireland	Dollingstown, J1058	JMR/LH	Unpublished
Aug 98		Lancashire	SD4860	SBr	Unpublished
Aug 98	‡	London	Lonsdale Reservoir, Hammersmith	CC	Unpublished
Aug 98		Sussex	West Sussex	DK	Unpublished
Aug 98		London	Lesnes Abbey Woods	PG	Unpublished
08 Aug 98	‡	Laois	Abbeyleix	PL/JMR	Unpublished
08 Aug 98	‡	Surrey	*	CC	Unpublished
27 Aug 98	‡	Londonderry, N. Ireland	H954792	JMR/LH	Unpublished
27 Aug 98	‡	Londonderry, N. Ireland	H948805	JMR/LH	Unpublished
27 Aug 98	‡	Londonderry, N. Ireland	H944806	JMR/LH	Unpublished
27 Aug 98	‡	Londonderry, N. Ireland	H964771	JMR/LH	Unpublished
27 Aug 98	‡	Londonderry, N. Ireland	H941795	JMR/LH	Unpublished
Sep 98		Leicestershire	Loughborough	IM	Unpublished
Sep 98		Somerset	Horner Wood, Holnicote Estate	IM	Unpublished
12 Apr 99	‡	Central Scotland	University of Stirling, Airthrey Loch, NS80996	JH	Unpublished
17 Jul 99	‡	Tyrone, N. Ireland	Coney Island, Lough Neagh	JMR/MS	Unpublished

Herman, 1997; Hutson, 1997; Russ *et al.*, 1998). Records were categorized as 'in the hand' or 'bat detector'. Records from known roosts, although included in distribution maps, were excluded from most analyses to avoid statistical bias resulting from colonies being present for extended periods of time and including large numbers of females. Apart from the roost records, most of the records presented are the result of chance discoveries by oilrig workers or bat workers on the mainland having their attention drawn to grounded bats or bats that are difficult to identify.

*Pipistrellus nathusii* can be identified using external characteristics, dentition and echolocation (Stebbing, 1970, 1986; Yalden, 1985; Ahlén, 1990; Greenaway & Hutson, 1990; Schober & Grimmberger, 1993; Russ *et al.*, 1998; Russ, 1999). However, the most useful diagnostics are: the relative size and position of the first

upper premolar ( $p^3$ ) and the front upper incisors (Yalden, 1985), the ratio of the forearm length to the length of the fifth digit when linked with a forearm length > 33 mm (excluding the wrist: > 1.25 indicates *P. nathusii*) (Stebbing, 1970, 1986; Greenaway & Hutson, 1990; Speakman, Racey, Hutson *et al.*, 1991) and the length of both the fifth digit and the third digit (both including the wrist: > 42 mm and 64 mm, respectively, indicates *P. nathusii*) (Greenaway & Hutson, 1990).

## RESULTS

Records of *P. nathusii* 'in the hand' are given in Table 1 and bat detector records are given in Table 2, and include records up to the end of 1998. Although there were varying degrees of observer experience, most

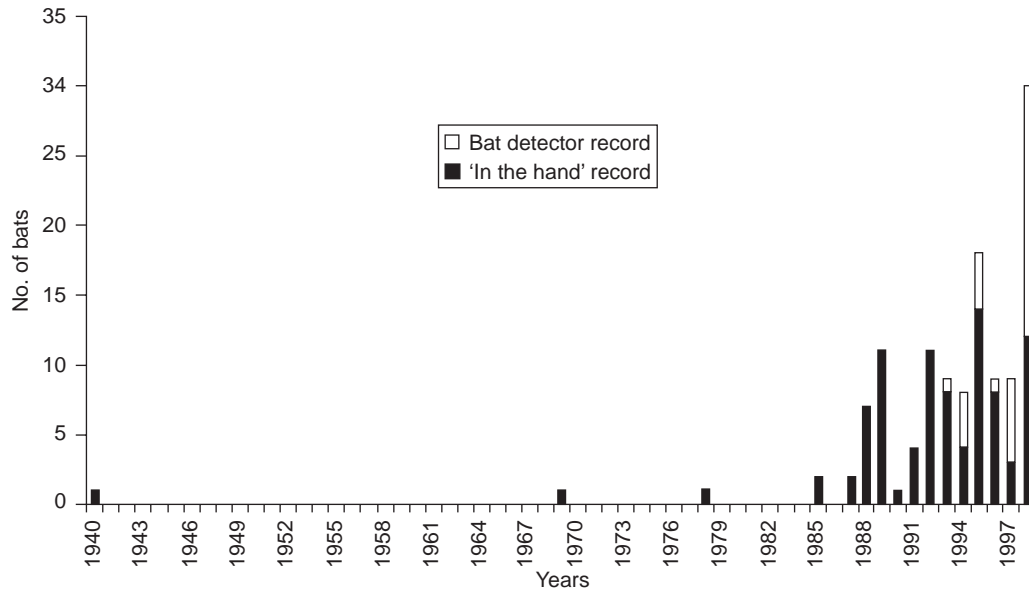


Fig. 1. The number of annual records of *P. nathusii* in the British Isles.

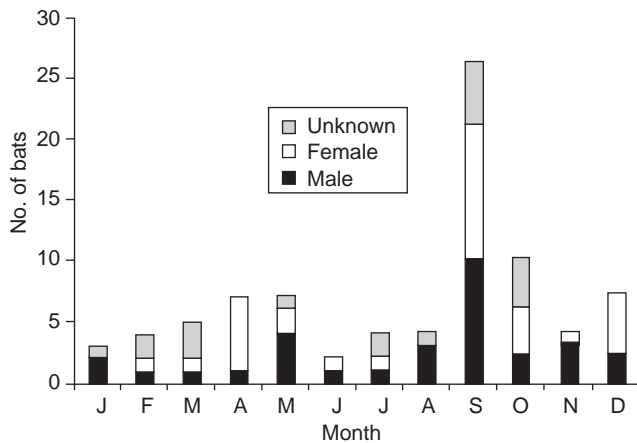


Fig. 2. Seasonal distribution of occurrences of *P. nathusii* in the British Isles.

recorders were experienced bat workers. Records where the identity of the species was considered uncertain were not included in the analysis unless confirmed either by a more skilled bat worker or, in the case of time-expanded bat detector records, sonographically by JMR. Of the total of 127 records (excluding roosts records but including published records and bat detector records), 53.1% contained details about sex and 76.9% about exact location; 26.2% were of male bats, 26.9% were of female bats, 19.2% were of unknown sex and 27.7% were bat detector records (unknown sex). There are three records of maternity roosts, one of which had not been recorded before (grid reference J173855, Northern Ireland). Of the 36 bat detector records, 76.5% were analysed sonographically.

**Yearly records**

The distribution of records per year is illustrated in

Fig. 1 ('in the hand records'  $n=91$ , 'bat detector records'  $n=36$ ).

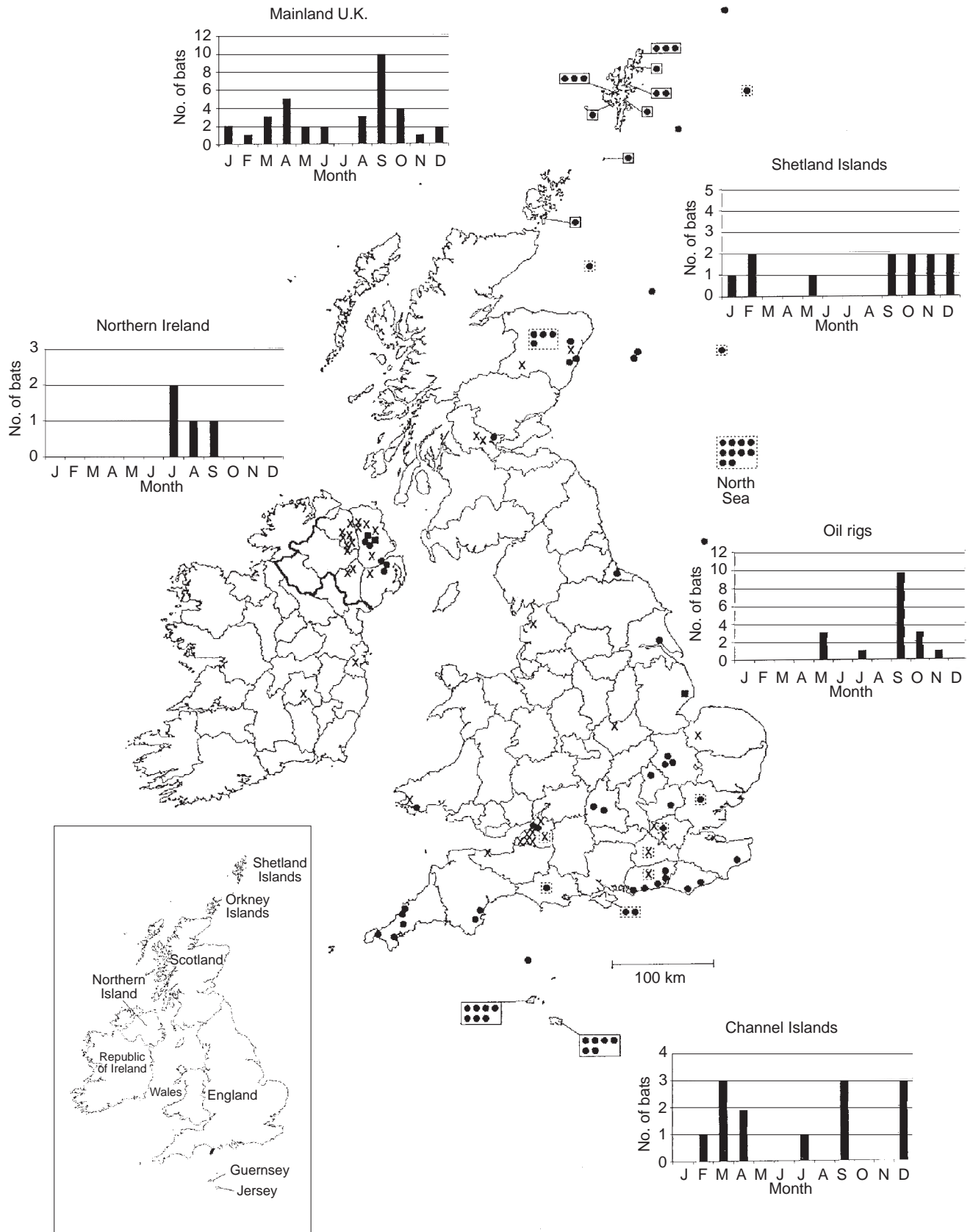
*Pipistrellus nathusii* was first recorded in the U.K. from Dorset in 1969 (Stebbing, 1970) but the earliest record in the U.K. is of a specimen taken from the Shetland Islands in 1940 but not identified until 1992 (Herman, 1992). Subsequently, it was not until 1978 that the next occurrence was recorded and, from this time, records increased until 1998 when they reached a peak of 30. All records up to and including 1993 were of bats in the hand. The first bat detector record was in 1994 and such records occurred in each subsequent year, with the largest number in 1998 ( $n=18$ ).

**Seasonal occurrence**

This section refers only to 'bat in the hand' records to avoid sampling bias ( $n=83$ ). The seasonal distribution of *P. nathusii* records is presented in Fig. 2. There was significant variation in numbers of records with a peak in September ( $\chi^2=65.19$ , d.f. = 11,  $P<0.001$ ) when the largest number of records occurred ( $n=26$ ). Fewest occurred during late winter and mid-summer. The sex ratio did not vary significantly throughout the year.

**The distribution of records in the U.K. and the Republic of Ireland**

Replies were received from 79 local volunteer bat groups. Of these, 39% had found *P. nathusii* in their county or region, and 61% had not. The geographic distribution of these results and additional records from other sources are shown in Fig. 3. Bats were found in a wide range of counties and regions throughout the British Isles. Records were obtained from the Shetland Islands in the north, to the Channel Islands in the south,



**Fig. 3.** The distribution of records of *P. nathusii* in the British Isles including seasonal records in mainland U.K., Shetland Islands, North Sea oil platforms, Northern Ireland, and the Channel Islands. Symbols with a broken border, exact geographic location is unknown; symbol with a solid border and a line pointing to the location, sites where lack of space prevents symbols being directly applied; x, bat detector record; ◆, 'in the hand' record; ■ roost record. Bar charts refer to 'in the hand' records.

and from County Laois (Republic of Ireland) in the west, to Norfolk in the east. In addition, records were obtained from oil platforms located in the North Sea. All records of bats on North Sea oil platforms, where the exact location was known, were distributed off both the coast of the Shetland Islands and Aberdeen with one record off the coast of north-east England. Regional clusters of records occur in the Channel Islands (Jersey and Guernsey), the Shetland Islands, north-east Scotland, the south of England and in Northern Ireland. There were records of three maternity roosts, two in Northern Ireland (Antrim) and one in England (Lincolnshire).

### Regional and seasonal occurrences

Regional and seasonal occurrences are shown as bar charts in Fig. 3. Only data from the hand records are included in these, as bat detector records were obtained only during summer and autumn. In mainland U.K., *P. nathusii* was present all year round with peaks occurring during March–April and August–October (Fig. 3). In Northern Ireland, the species was present only during May–October (Fig. 3, Tables 1 & 2). The Shetland Island records occurred from September to February with one record in May. Records from North Sea oil platforms had a bimodal peak during May and September–November with a single record in July. In the Channel Islands, there were records from September to April with the exception of a single individual recorded during July. However, this individual was 'long dead' (Young, 1989) and was therefore omitted from Table 1.

### DISCUSSION

There are now 93 records of individual *P. nathusii* examined in the hand in the U.K. and bat detector records from a further 36 localities in the British Isles. These records are distributed throughout all months of the year with peaks in spring and autumn. Three maternity colonies have been located and the species must now be regarded as a resident breeding species in Britain and Ireland.

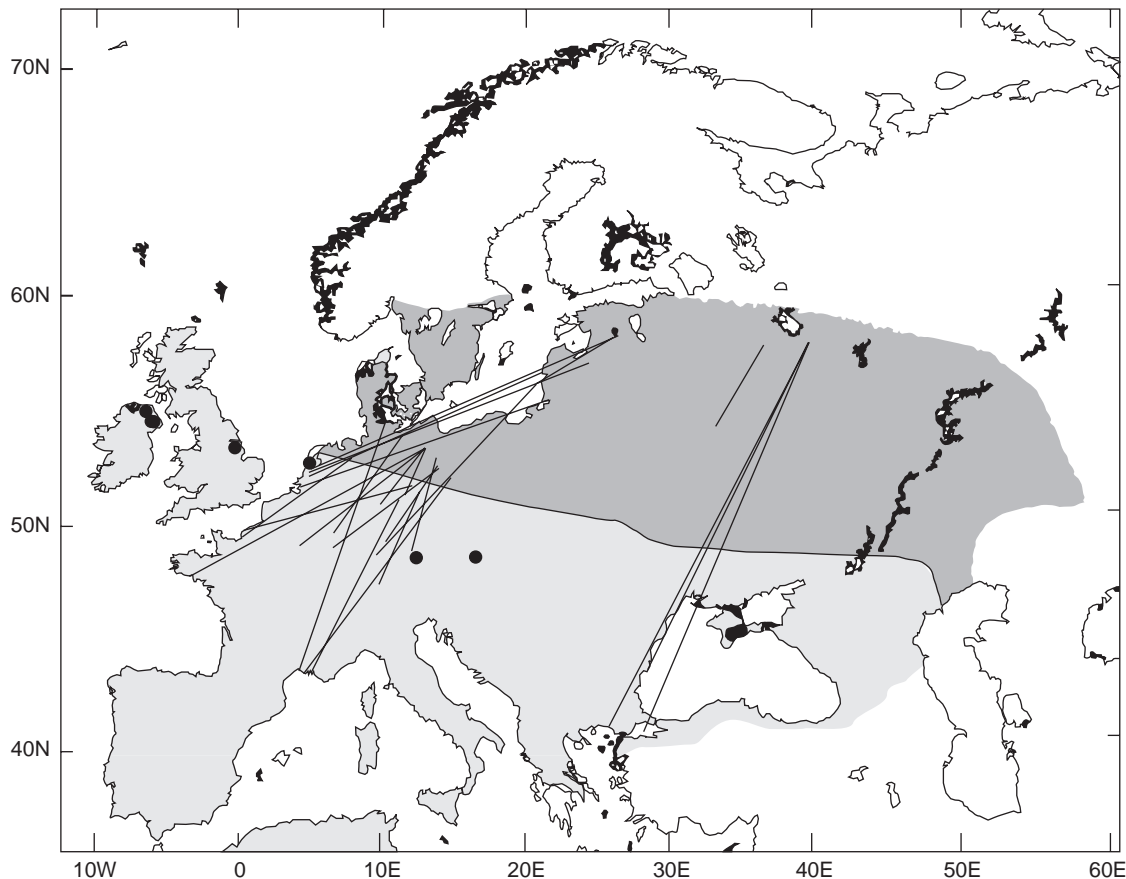
The genus *Pipistrellus* has been the subject of much recent attention in the British Isles. The widespread, common pipistrelle *Pipistrellus pipistrellus* has recently been separated into two species (Jones & van Parijs, 1993; Barratt *et al.*, 1997; Jones & Barratt, 1999) distinguished by their echolocation calls (Jones & van Parijs, 1993). It is possible that specimens of *P. nathusii* in the U.K. may have been misidentified and, hence, overlooked, before the recognition of the two phonic types of pipistrelle. This is because the latter and *P. nathusii* have a superficially similar appearance (Schober & Grimmberger, 1993) and similarity in echolocation calls (as heard through a heterodyne detector).

The increase in the number of records of *P. nathusii*

since 1986, could be interpreted as reflecting an expansion in the range of the species (Stebbing, 1988) or it may simply reflect the increase in the number of skilled recorders since the mid-1980s (Speakman, Racey, Hutson *et al.*, 1991). Certainly, the construction of keys since the mid-1980s (e.g. Yalden, 1985; Stebbing, 1986; Greenaway & Hutson, 1990) has allowed non-specialist taxonomists to recognize the species. In addition, the implementation of the Wildlife and Countryside Act in 1981 and the Wildlife (Northern Ireland) Order 1985, has had a large influence on the resources available for bat work and seen a rapid increase in the numbers of local volunteer bat groups (Hutson, 1993). The availability of cheaper time-expansion bat detectors and sound analysis software, coupled with a higher awareness and understanding of the three pipistrelle species found in the U.K. in recent times, have facilitated the increase in bat detector records.

Research in continental Europe on the ecology and behaviour of *P. nathusii* is relevant in interpreting the status of this species in the British Isles. The distribution, breeding range and known migrations of *P. nathusii* in Europe are presented in Fig. 4. It has been established from ringing studies in continental Europe, that *P. nathusii* migrates in a north-easterly direction in early spring, with males establishing territories at stages along the migration routes (Kapteyn & Lina, 1994; Jarzembowski & Stepniowska, 1998). The species is associated with mixed and broad-leaved forests, forest steppe, and afforested flood plains (Strelkov, 1997b). During early autumn, females begin to migrate in a south-westerly direction to mate with the males, who may have been holding territories since spring (Strelkov, 1969; Brosset, 1990). In late autumn/early winter, both sexes begin to migrate further south-west to hibernation sites in western Europe (Bastian, 1988; Brosset, 1990; Lina, 1990; Roer, 1995). This is consistent with the absence of records of hibernating *P. nathusii* in eastern Europe (Gerell, 1987; Roer, 1995). Arnold *et al.* (1996) suggest that in south-west Germany, where *P. nathusii* is present all year round, the resident population is augmented during the winter by migrating bats returning from summer sites in eastern Europe. This also happens in Switzerland and Austria (Roer, 1975) and may also apply in the Netherlands, where a nursery colony has been discovered recently (Kapteyn & Lina, 1994; Limpens *et al.*, 1997). Hence, there may be a transitional area in continental Europe where migrating populations mix with resident populations of *P. nathusii*.

The occurrences of individuals recorded during September–November on oil platforms in the North Sea is consistent with a suggestion by Gerell (1987) and Ahlén (1997) that *P. nathusii* migrates in a south-westerly direction from Scandinavia to avoid the harsh winter. Conversely, the occurrence of bats during May on North Sea oil platforms is consistent with migration in a north-easterly direction. This suggested pattern of migration might be supported further by the existence of records predominantly from winter in the Shetland



**Fig. 4.** Distribution (grey tones), assumed breeding range (light grey) and known migrations (lines) of *P. nathusii* in Europe. Migrations are from Roer (1995) and assumed breeding range is from Strelkov (1997*a,b*). Black dots, breeding roosts outside the assumed breeding range: Netherlands (Kapteyn & Lina, 1994); Ireland (Russ *et al.*, 1998, this paper); Britain (Hutson, 1997); Crimea, Czech Republic and Germany (Strelkov, 1997*a,b*).

Islands where the bats are probably hibernating after migrating. The Shetland Islands does not support a resident summer population, probably because of its extreme climatic conditions relative to the mainland and its lack of suitable habitat, but these northerly islands may support overwintering or migratory populations.

The occurrences on oil platforms and in the Shetland Islands suggest that *P. nathusii* migrates from Scandinavia to avoid the harsh winters and then overwinters in the British Isles as predicted by Speakman, Racey, Hutson *et al.* (1991), Hutson (1993), and Barlow & Jones (1996). It is possible, however, that some arrive earlier than this to begin mating (Barlow & Jones, 1996). In addition to the winter records in mainland Britain, *P. nathusii* is present throughout the summer and breeds successfully (Hutson, 1997; Russ *et al.*, 1998) indicating that there is a resident population in the British Isles.

The records from the Channel Islands are difficult to interpret and more data are required. However, there is little doubt that *P. nathusii* can cross the English Channel and an individual male landed on a fishing vessel halfway between Cherbourg and Start Point in Devon during September 1998 (S. Bevis, pers. comm.). There is also some indication of mixing between the

continental and the British Isles population, since an individual ringed in Plo Holstein, West Germany, was recorded in Jersey in July 2 years later (Speakman, Racey, Hutson *et al.*, 1991).

Russ *et al.* (1998) suggested that in Britain, and especially Ireland, where the winters are relatively mild, *P. nathusii* might relinquish its migratory behaviour in favour of a more sedentary lifestyle. However, although there is evidence to show the species is resident in the British Isles, most records indicate that *P. nathusii* is highly migratory. It is probable that the U.K., and possibly Ireland, lie in a transitional region (Roer, 1995), with migratory individuals returning from the north-east of the species' range supplementing the resident bats during the winter.

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