

**A review of British mammals:  
population estimates and conservation status of British  
mammals other than cetaceans**

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## Discussion

**Current status:** It should be clear from the extent of extrapolation required to achieve most of our population estimates that we do not intend the figures to be accepted uncritically. However, we feel that they indicate the likely order of magnitude of the numbers of each species, and therefore they have allowed the species to be ranked in order of abundance much more objectively than has been done previously (Table 14). One problem with this ranking, however, is that species should not be compared on a simple numerical scale, especially where a relatively non-mobile species is isolated into a number of sub-populations. Large species obviously have a greater biomass and economic impact, and so whilst roe deer and common dormice may be of comparable numerical status, they are very different in both biomass and economic importance. Equally, they differ in mobility, and so in their vulnerability to habitat fragmentation. This problem was considered by Bright (1993), who used five life-history traits to identify the species of mammal most at risk from habitat fragmentation. These were primarily low density, slow breeding, often poorly mobile species associated with semi-natural habitats, and included all riparian mammals.

For our assessment of the pre-breeding population of each species, a reliability grading has been included, and the implications of these gradings need to be considered in relation to the ranking in Table 14. For example, the field vole is listed as the commonest British mammal, but on the basis of one of the least reliable population estimates because population size had to be calculated relative to other species of small mammal. In general, the rarer species are often those with the most reliable population estimates, and confidence can be placed in the order of magnitude of these estimates. The greatest problems arose with the commonest and most widespread species. Invariably, population sizes were calculated from only a few density estimates, and in all but a few cases these did not include more than a few

habitats and rarely included any from Scotland or Wales. Other species for which the estimates have a low reliability rating are those which are relatively thinly spread over a wide variety of habitats, such as the hedgehog. Other problems occurred for species which locally can be very abundant, yet for which typical densities were virtually unknown, such as the harvest mouse.

Thus one aspect of this exercise has been to highlight the lack of basic data on population densities for many, if not most, species of mammal in Britain. More field data, particularly from unusual habitats and/or from Scotland and Wales, will allow the estimates for all species to be improved, and increase the confidence that can be placed both on individual estimates and the ranking of all the species.

**Changing status:** In judging conservation priorities, absolute population size is one important criterion, but its use is tempered by what is known of recent changes in status. No species has a stable population size, and we have tried to document the likely pattern of recent trends. Many species were reduced by persecution (e.g. polecat) or overhunting (e.g. roe deer) in previous centuries, and are slowly recovering their range and status. Others have been more recently reduced by pollution (e.g. otter) or disease (e.g. rabbit). What time span is important in assessing change? We have taken the last 30 years, that being the period over which the Biological Records Centre has been accumulating data (Arnold 1993). This at least provides some possibility of measuring trends, and this period is also well-covered by the Game Conservancy Trust's National Game Bag Census (Tapper 1992). This choice of time frame produces some surprises. The rarer carnivores, including the otter, have probably been increasing their ranges during this period, albeit from low levels; the greater horseshoe bat has probably been stable; and the species of most conservation concern in respect of recent declines are the red squirrel and the water vole.

**Relative status:** With the mammals arranged in relative order of abundance, it is possible to make comparisons with other vertebrates, particularly those of conservation interest. For birds, Schedule 1 of the Wildlife and Countryside Act 1981 lists those of special concern, and they are discussed further by Batten *et al.* (1990). Mostly, they have fewer than 1000 breeding pairs. For example there are 52 pairs of red kite *Milvus milvus*, 75 'pairs' of marsh harrier *Circus aeruginosus*, and 424 pairs of golden eagle *Aquila chrysaetos*. Few British mammals are so rare, but also few, if any, are so well documented, and none are so mobile. Generally, the rarest mammals are an order of magnitude more numerous. At the other end of the range, the most abundant breeding birds are the wren *Troglodytes troglodytes* with 7,100,000 pairs, the chaffinch *Fringilla coelebs* with 5,400,000 pairs, the blackbird *Turdus merula* with 4,400,000 pairs and the robin *Erithacus rubecula* with 4,200,000 pairs (Gibbons, Reid & Chapman 1993). Similarly, the commonest mammals, (rabbits and five of the small mammals) are roughly an order of magnitude more common. Of comparable abundance, however, are some of the domestic mammals. There are 41,050,000 sheep *Ovis aries*, 10,330,000 cattle *Bos taurus* (Government Statistical Service 1992), 7,300,000 domestic dogs *Canis familiaris* (Pet Food Manufacturers' Association pers. comm.) and 7,600,000 domestic cats *Felis catus* (Cats Protection League 1993). The abundance of these species must reduce their wild counterparts by competitive exclusion, e.g. dogs and urban foxes (Harris 1981) or sheep and red deer (Clutton-Brock & Albon 1989). The relative ecological impacts of wild and domestic mammals may also be judged from these population sizes. Of the 41,050,000 sheep in Britain, approximately 60% are in upland areas. These clearly have more impact on upland ecosystems than around 360,000 red deer.

Three species of reptile and amphibian are rare enough to be of conservation concern. It has been estimated that there are 20,000 natterjack toads *Bufo calamita*, 7000-8000

sand lizards *Lacerta agilis* and 2000 smooth snakes *Coronella austriaca* in Britain (Nature Conservancy Council 1983). These compare numerically with the rarer mammals, but suffer even more the problems imposed by small size and limited mobility.

**European status:** The conservation status of each species under British and European legislation is shown in Table 15. Whilst this summarises the protection thought to be required for each species, for most the information on their status across Europe is even worse than for Britain, which precludes most direct comparisons of population size. However, we can put British species into a European perspective by assessing the proportion of their range which Great Britain represents, since detailed distributions were given by Niethammer & Krapp (1978-1990) for the Insectivora, Rodentia and Artiodactyla, and all species were mapped by Corbet (1978). For this, we have considered 'western Europe' to include that area west of the former USSR, a total area of 4,909,989 km<sup>2</sup> (Novotny & Pankova 1981). Iceland and Ireland have been excluded since, being islands, their mammal fauna is limited. Some northern species extend south to the Alps and Pyrenees, but are largely absent from 'Mediterranean' countries (Albania, Bulgaria, Greece, Italy, Portugal, Spain and what was Yugoslavia), an area of 1,425,082 km<sup>2</sup>. Similarly, some southern species are largely absent from 'Scandinavia' (Finland, Norway and Sweden), an area of 1,110,916 km<sup>2</sup>. What we will term 'north-west Europe' ('western Europe' minus the 'Mediterranean' and 'Scandinavian' countries) covers an area of 2,373,991 km<sup>2</sup>. The area covered in this review thus forms approximately 9.7% of 'north-west Europe', 6.6% of 'northern Europe' ('north-west Europe' and 'Scandinavia'), 6.1% of 'southern Europe' ('north-west' and 'Mediterranean' Europe) and 4.7% of 'western Europe'. These percentages form the basis of the entries in Table 14. A species with more than 4.7% of its European range in Britain is more important from a European perspective than would be expected from the area available. Inherent inaccuracies

in these figures (for example, whether the species' range includes islands such as Corsica, Ireland, Sardinia and Sicily) are relatively trivial, given the approximations being attempted.

The insectivores are probably about as common in the rest of Europe as in Britain, though the hedgehog is replaced in the east by the eastern hedgehog *Erinaceus concolor*, and the common shrew is similarly replaced in France, Italy and Spain by three species: Millet's shrew *Sorex coronatus*, the Appenine shrew *Sorex samniticus* and the Spanish shrew *Sorex granarius* respectively. In Europe generally, as in Britain, the water shrew is much rarer than either the common or pygmy shrews. The lesser white-toothed shrew is obviously represented here in a minuscule segment of its overall range, but its density (in the absence of any competitors) is probably much higher in the Isles of Scilly than elsewhere.

Most of the rare Chiroptera are at the edge of their ranges in Britain, and are relatively much more common in southern Europe. This applies particularly to the greater and lesser horseshoe and grey long-eared bats. In a European context, therefore, their British populations are even less significant than suggested by the small proportions of their European ranges which Britain contributes. Bechstein's bat is an exception to this, being rare everywhere. Saint Girons (1973), for instance, listed only 29 records for France, three for Belgium and one for the Netherlands; Benzal, Paz & Gisbert (1991) gave only 17 records for Iberia; and Pucek (1981) gave only 12 records for Poland. The barbastelle bat is as rare in France and Iberia, with only 27 recent records (Benzal, Paz & Gisbert 1991), as in Britain. Pucek (1981) considered it rare also in Poland, but mentioned a wintering group of about 50, and large numbers wintering elsewhere, suggesting that it is either more numerous or more obvious further east than in Britain.

Of the lagomorphs, the brown hare population appears to be more important in a European

context because it is largely absent from Scandinavia, and also from Iberia, where it is replaced by the African hare *Lepus capensis*. Moreover, populations of the brown hare have also declined over much, if not all, of its European range. Conversely, the mountain hare is probably more numerous in Scandinavia, where it is certainly widespread, and the British population is not especially significant. The rabbit, paradoxically in view of its Mediterranean origin, seems very strongly represented in Britain, though it is not so markedly 'over represented' here as various more recent introductions such as the grey squirrel, American mink, sika deer, Chinese muntjac and Chinese water deer.

Among the Rodentia, most of the common species have about 6-7% of their European ranges in Britain. The red squirrel, yellow-necked mouse, harvest mouse and common dormouse are less well distributed in Britain, and their populations are probably also much smaller than elsewhere in Europe. In Britain the red squirrel has lost much of its British range to competition from the introduced grey squirrel, and this decline is likely to continue. Whilst the European red squirrel population is currently not under threat, the grey squirrel has been introduced to two areas in Italy, and in 30-40 years has spread over some 200 km<sup>2</sup>. There is also a risk that they may be deliberately or accidentally translocated over the Alps elsewhere into Europe, or into other parts of Italy. Thus there is a real risk that the pattern of species replacement recorded in Britain may be repeated in Europe (Gurnell & Pepper 1993). The yellow-necked mouse is much more abundant in eastern Europe, where it may replace the wood mouse completely in forested localities. Conversely, in Britain the field vole is numerically much more important than the 6.2% of its European range would imply, because it is frequently displaced on the mainland by its competitors, the common vole *Microtus arvalis* and the burrowing vole *Terricola subterraneus*, particularly in agricultural areas.

The rarer British carnivores owe their current status to past levels of persecution which have

not been equalled elsewhere in Europe. The British pine marten and polecat populations are not especially significant on a European scale. For the otter, however, the factors which have adversely affected its English distribution have also reduced its range across much of central Europe (Mason & Macdonald 1986). As a consequence, 'fringe' populations in Iberia, Ireland, and Scandinavia are strongest, and the British - principally Scottish - population is a significant element in this European population. Although both foxes and badgers are distributed widely across western Europe, their European populations have been reduced by rabies and the associated control measures, as well as by hunting. When reviewing the status of the badger in western Europe, Griffiths & Thomas (1993) estimated that in 6% of the area badger numbers were probably or possibly declining, in 15% they were thought to be stable, they were increasing in 59% of western Europe, and no information was available for 21% of the area. They concluded that many European badger populations were recovering from population decreases during the rabies outbreak. When looking at population densities, badgers were particularly abundant in Ireland, Sweden and Great Britain, and Griffiths (1991) estimated that Great Britain had 17% of the total European badger population. The only country believed to contain more badgers was Ireland (Smal 1993). The impact of hunting on badger populations in Europe is reviewed by Griffiths & Kryštufek (1993). Badger hunting is most frequent in Norway, Sweden and Switzerland, although nowhere is the level high enough to affect the badger population.

The two seals are, in a European context, two of the most important of our mammals, a status emphasised even more by the fact that some populations elsewhere (e.g. the common seal in the Waddensee, the grey seal in the Baltic) are known to be declining due to pollution, the phocine distemper virus outbreak and other causes. Thus the common seal population in Britain in 1991 was about 5% of the total world stock, and 40% of the European sub species (Hiby, Duck &

Thompson 1993), while the grey seals in United Kingdom waters constitute over 55% of the world population (Bonner 1981).

Populations of Artiodactyla have been severely altered by overhunting, protection and introductions. Estimating the size of deer populations is notoriously difficult and in Europe a variety of techniques have been used, most of which significantly underestimate population size (Gill 1990). Thus it is difficult to put our deer populations into a European perspective. Niethammer & Krapp (1986) suggest a partial total for the European population of red deer of 811,000 in the 1970s, excluding France, Greece, Italy and Portugal. More recently, Gill (1990) has estimated that the total European red deer population in 1984 was at least 1,250,000. Of this, the British population contributed just under 30%. Of the other European deer, range considerations would suggest that 6.6% of the roe deer and 5.8% of the fallow deer should be in Britain. For roe deer, Gill (1990) estimated a European population in the early 1980s (excluding Great Britain, Greece, Portugal and Spain) of around 5,500,000. However, one study suggested that the estimate for Switzerland was 50-80% less than the actual population (Gill 1990). If the same level of under-estimation applied to the rest of Europe, the actual roe deer population would probably have been nearer 7,750,000-10,000,000, and the proportion in Britain is roughly what the range estimates would predict. For fallow deer, however, it is ironic that, having been introduced from Europe, numbers in Europe are now comparatively low and Ueckermann (1984) suggested that Britain has more free-living fallow deer than any other country in Europe. Gill (1990) estimated that the total European population of free-living fallow deer was only around 125,000 in the early 1980s, excluding Great Britain, Ireland and Spain. Thus Britain has about 40% of the entire European fallow deer population. Conversely, the introduced reindeer are insignificant in a European context: in 1984 there were estimated to be 51,000 wild reindeer in Norway and 600 in Finland (Gill 1990). In Europe, most of the

introduced Asian deer are confined to Britain. Muntjac are not found elsewhere in Europe, and there were fewer than 6000 sika in the rest of Europe in 1984 (Gill 1990).

For the feral caprines, there are two centres of distribution in Europe: the Mediterranean and Great Britain and Ireland. The 'wild' sheep on Corsica and Sardinia (*Ovis aries musimon*) and Cyprus (*Ovis aries ophion*) are the result of ancient introductions of domesticated stock, and so are technically feral. The Corsican population is, at the most, in the low thousands, in Sardinia in 1983 there were between 1150 and 1590 mouflon (Cassola 1985), and in the mid-1980s the total number on Cyprus was estimated to be 800 (Maisels 1988). Apart from the many introductions of Corsican/Sardinian mouflon to mainland sites, there are no other feral sheep populations in Europe (D. Bullock pers. comm.). As with the 'wild' Mediterranean sheep, the 'wild' Mediterranean goat populations are all believed to have their origins in anciently introduced domesticated stock and so are also technically feral. It also seems likely that all the goat populations have been genetically mixed with recently feral goats, although some populations, such as on Theodorou Island, off Crete, seem to be phenotypically close to the true wild goat *Capra aegagrus* (D. Bullock pers. comm.). The total Cretan population, including the off-shore islands, is probably at the most in the low thousands, with a similar population in all the other Aegean islands, and less than 1000 in the Parnitha Reserve on the

Peloponnese, Greece (D. Bullock pers. comm.). In 1971 there were 300-350 feral goats on Montecristo Island, Italy (Spagnesi *et al.* 1986). There are undoubtedly other feral goat populations in the Mediterranean of more recent origin. However, excluding these and the recent mouflon introductions to Europe, the Mediterranean feral caprine populations that are of ancient origin comprise fairly small, discrete units and for neither species is the total likely to exceed 5000 (D. Bullock pers. comm.). Thus roughly similar sized populations of feral caprines of ancient origin occur in the Mediterranean and in the British Isles. However, populations of feral sheep, such as the Soay and Boreray, and feral goats close to the 'old English goat', are unique to Britain.

In summary, most of the mammals we regard as rare in Britain are not rare in Europe. Two bats, Bechstein's and barbastelle, are certainly of conservation concern across the whole of western Europe. On a European scale, the wild mammals for which the British populations are most important are undoubtedly the badger, otter, common seal, grey seal, red deer and fallow deer; we are responsible for around 17%, a substantial but unknown proportion, 40%, 78%, 30% and 40%, respectively, of their western European populations. The populations of feral caprines that are of ancient origin are of particular interest, as the populations in Britain are unique, and constitute approximately half the ancient feral caprines in Europe.

**Table 1.** The number of 1 x 1 km squares, area of each land class (i.e. excluding the area of sea) in the survey area (i.e. Great Britain excluding the Channel Islands and the Isle of Man), the number of squares in each land class surveyed for habitat data and the proportion of each land class that was urban and rural.

Land class	Number of 1 x 1 km squares	Area of land (km <sup>2</sup> )	% of total land area	Number of squares surveyed for habitat data	% of total number of squares surveyed for habitat data	% of land area rural	% of land area urban
1	14,159	14,147	6.14	215	1.52	84.13	15.87
2	14,463	14,461	6.28	139	0.96	86.45	13.55
3	15,452	15,448	6.71	127	0.82	86.26	13.74
4	9012	8696	3.77	122	1.35	78.18	21.82
5	3870	3839	1.67	118	3.05	84.18	15.82
6	10,021	9961	4.32	104	1.04	89.69	10.31
7	2468	1325	0.58	78	3.16	90.43	9.57
8	4310	2749	1.19	77	1.79	79.81	20.19
9	11,781	11,666	5.06	128	1.09	81.83	18.17
10	13,905	13,826	6.00	107	0.77	84.59	15.41
11	8895	8895	3.86	44	0.49	87.47	12.57
12	3543	3540	1.54	43	1.21	85.05	14.95
13	7257	7094	3.08	92	1.27	83.59	16.41
14	933	721	0.31	43	4.61	76.12	23.88
15	4188	4175	1.81	57	1.36	87.07	12.93
16	3089	3072	1.33	46	1.49	87.66	12.34
17	12,998	12,998	5.64	147	1.13	95.11	4.89
18	6580	6580	2.86	66	1.00	97.44	2.56
19	5421	5421	2.35	51	0.94	98.06	1.94
20	2508	2508	1.09	54	2.15	96.74	3.26
21	9717	9716	4.22	50	0.51	98.78	1.22
22	12,549	12,549	5.45	107	0.85	99.02	0.98
23	6951	6951	3.02	46	0.66	99.50	0.50
24	7207	7206	3.13	43	0.60	98.67	1.33
25	10,552	10,512	4.56	93	0.88	95.06	4.94
26	6876	6748	2.93	87	1.27	85.14	14.86
27	6881	6839	2.97	82	1.19	89.83	10.17
28	7464	7353	3.19	57	0.76	96.67	3.33
29	5465	2461	1.07	87	1.59	95.67	4.33
30	4254	3475	1.51	42	0.99	96.35	3.65
31	3016	1750	0.76	31	1.03	95.10	4.90
32	3779	3685	1.60	37	0.98	98.73	1.27
Totals	239,564	230,367	100.00	2620	1.09	90.04	9.96

**Table 2.** The distribution of land classes, number of 1 x 1 km squares and the area of land (km<sup>2</sup>) in each land class in England, Scotland and Wales. Total number of squares 239,564, total land area 230,367 km<sup>2</sup>.

Land class	England		Scotland		Wales	
	Frequency of occurrence	Area of land	Frequency of occurrence	Area of land	Frequency of occurrence	Area of land
1	13,105	13,094	-	-	1054	1053
2	14,459	14,457	-	-	4	4
3	15,360	15,356	-	-	92	92
4	8954	8640	-	-	58	56
5	2471	2451	12	12	1387	1376
6	7276	7232	10	10	2735	2719
7	1375	738	262	141	831	446
8	3214	2050	258	165	838	534
9	11,027	10,919	53	53	701	694
10	13,641	13,564	129	128	135	134
11	8895	8895	-	-	-	-
12	3542	3539	1	1	-	-
13	4792	4684	1804	1764	661	646
14	603	466	301	233	29	22
15	1390	1386	336	335	2462	2454
16	2451	2438	315	313	323	321
17	3934	3934	63	63	9001	9001
18	2069	2069	3571	3571	940	940
19	3193	3193	2186	2186	42	42
20	1235	1235	1028	1028	245	245
21	9	9	9708	9707	-	-
22	3296	3296	9250	9250	3	3
23	844	844	6066	6066	41	41
24	197	197	7010	7009	-	-
25	2012	2004	8540	8508	-	-
26	1192	1170	5683	5577	1	1
27	1499	1490	5382	5349	-	-
28	962	948	6502	6405	-	-
29	-	-	5465	2461	-	-
30	-	-	4254	3475	-	-
31	-	-	3016	1750	-	-
32	-	-	3779	3685	-	-
Totals	132,997	130,298	84,984	79,245	21,583	20,824



**Table 3.** The area of the principal habitat types in England, Scotland, Wales and for the whole of Great Britain (excluding the Channel Islands and the Isle of Man). The habitat types are described by Cresswell, Harris & Jefferies (1990). Figures for hedgerows, treelines and linear waterways are in km, the rest are in km<sup>2</sup>.

	England	Scotland	Wales	Great Britain
Hedgerows	429,504	36,008	62,104	527,616
Treelines	76,886	13,711	12,434	103,031
Ditches and drains	62,593	11,722	3907	78,222
Semi-natural broadleaved woodland	5135	1390	783	7308
Broadleaved plantations	1119	54	87	1260
Semi-natural coniferous woodland	249	365	6	620
Coniferous plantations	3825	7125	895	11,845
Semi-natural mixed woodland	1082	426	69	1577
Mixed plantations	640	177	86	903
Young plantations	550	1682	119	2351
Recently felled woodland	182	148	29	359
Parkland	675	162	53	890
Tall scrub	385	86	62	533
Low scrub	785	261	176	1222
Bracken	723	976	461	2160
Coastal sand dunes	221	270	58	549
Coastal sand or mud flats	608	506	129	1243
Coastal shingle or boulder beaches	429	653	71	1153
Lowland heaths	482	16	45	543
Heather moorlands	2812	11,845	1314	15,971
Blanket bog	1557	10,198	413	12,168
Raised bog	40	143	9	192
Marginal inundation	290	132	76	498
Coastal marsh	122	30	21	173
Wet ground	506	490	241	1237
Standing natural water	221	1059	46	1326
Standing man-made water	547	314	55	916
Running natural water	575	460	104	1139
Running canalised water	90	13	7	110
Upland unimproved grassland	4686	12,824	2459	19,969
Lowland unimproved grassland	2107	458	319	2884
Semi-improved grassland	13,109	6461	3311	22,881
Improved grassland	18,104	5683	3771	27,558
Arable land	48,158	9573	3280	61,011
Amenity grassland	1571	175	126	1872
Unquarried inland cliffs	250	1187	82	1519
Vertical coastal cliffs	45	217	17	279
Sloping coastal cliffs	87	77	30	194
Quarries and open-cast mines	470	137	67	674
Bare ground	275	93	13	381
Built land	17,586	3379	1934	22,899
<b>Totals, excluding linear features</b>	<b>130,298</b>	<b>79,245</b>	<b>20,824</b>	<b>230,367</b>

**Table 4.** Lengths of riparian habitats (km) in the water authority regions in England, and in Scotland and Wales.

	Length of river systems <sup>1</sup>	Length of streams <sup>2</sup>	Length of canals <sup>3</sup>	Length of lake shores <sup>4</sup>	Total length of riparian habitats
<b>England</b>					
Anglian	3771	20,424	125	373	24,693
North West	1091	10,907	4	457	12,459
Northumbria	983	10,771	-	109	11,863
Severn Trent	1115	23,048	990	375	25,528
South West	2002	10,138	29	68	12,237
Southern	1442	9875	41	186	11,544
Thames	174	11,799	210	340	12,523
Wessex	1020	8161	82	85	9,348
Yorkshire	874	14,751	268	257	16,150
<b>Total for England</b>	<b>12,472</b>	<b>119,874</b>	<b>1749</b>	<b>2250</b>	<b>136,345</b>
<b>Scotland</b>					
Mainland	17,021	109,271	-	4165	130,457
Jura	800	1980	-	178	2958
Orkney	110	130	-	110	350
Outer Hebrides	1320	2870	-	1642	5832
Shetland	1510	2980	-	278	4768
<b>Total for Scotland</b>	<b>20,761</b>	<b>117,231</b>	<b>-</b>	<b>6373</b>	<b>144,365</b>
<b>Wales</b>	<b>3873</b>	<b>23,708</b>	<b>152</b>	<b>403</b>	<b>28,136</b>

1.2 Figures calculated from the length of waterway for each water authority region in England plus Wales obtained by adding all the lengths for each hydrometric area (from digitised 1:50,000 map data supplied by the Institute of Hydrology); this includes rivers from their primary sources to drainage channels, and from the numbers of rivers and streams given by Smith & Lyle (1979).

3 From National Rivers Authority (1991).

4 Calculated using the median point for each size group of lakes given by Smith & Lyle (1979) and using this figure to calculate a total circumference for each lake.

**Table 5.** Relative proportion of different species of small mammals in bird of prey pellet samples from different regions of Britain. Figures marked \* are calculated back from percentages.

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood/yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field vole: bank vole	Wood/yellow-necked mouse: bank vole	Field vole: wood/yellow-necked mouse	Wood/yellow-necked mouse: harvest mouse	Wood/yellow-necked mouse: house mouse	Common shrew: wood/yellow-necked mouse	Common shrew: field vole
<b>Barn owl</b>																		
South-east England (n = 6725) <sup>1</sup>	1526	320	62	235	3650	784	78	70	48	246	52	15.5	3.3	4.7	10.1	11.2	2.0	0.4
South-west England (n = 9463) <sup>1</sup>	2305	576	202	459	4762	1046	36	77	40	11.4	2.9	10.4	2.3	4.6	29.1	13.6	2.2	0.5
East England (n = 7307) <sup>1</sup>	1792	273	86	308	3728	783	92	245	6.6	20.8	3.2	12.1	2.5	4.8	8.5	3.2	2.3	0.5
Midlands (n = 4536) <sup>1</sup>	1384	186	57	279	2103	461	38	28	7.4	24.3	3.3	7.5	1.7	4.6	12.1	16.5	3.0	0.7
North England (n = 4256) <sup>1</sup>	1382	246	46	146	2121	298	0	17	5.6	30.0	5.3	14.5	2.0	7.1	-	17.5	4.6	0.7
Scotland (n = 7427) <sup>1</sup>	2494	484	81	256	3355	720	0	37	5.2	30.8	6.0	13.1	2.8	4.7	-	19.5	3.5	0.7
Wales (n = 4424) <sup>1</sup>	1346	247	40	193	2187	379	4	28	5.5	33.7	6.2	11.3	2.0	5.8	94.8	13.5	3.6	0.6
Total for Great Britain (n = 44,138) <sup>1</sup>	12,229	2332	574	1876	21,906	4471	248	502	5.2	21.3	4.1	11.7	2.4	4.9	18.0	8.9	2.7	0.6
Surrey (n = 151) <sup>2</sup>	12	9	2	9	82	24	1	12	1.3	6	4.5	9.1	2.7	3.4	24.0	2.0	0.5	0.2
Devon (n = 553) <sup>3</sup>	98	27	8	56	194	149	15	6	3.6	12.2	3.4	3.5	2.7	1.3	9.9	24.8	0.7	0.5
East Norfolk (n = 15,324) <sup>4</sup>	3882	762	214	532	8290	1014	519	111	5.1	18.1	3.6	15.6	1.9	8.2	2.0	9.1	3.8	0.5
Sheffield and Peak District (n = 1818) <sup>5*</sup>	473	91	36	91	909	182	18	18	5.2	13.1	2.5	10.0	2.0	5.0	10.1	10.1	2.6	0.5
Peak District (n = 2400) <sup>6</sup>	582	87	6	496	1044	174	0	11	6.7	97.0	14.5	2.1	0.4	6.0	-	15.8	3.3	0.6
South Westmorland (n = 2023) <sup>7</sup>	889	74	13	25	898	123	0	1	12.0	68.4	5.7	35.9	4.9	7.3	-	-	7.2	1.0
Pembroke (n = 5574) <sup>8</sup>	796	150	154	518	2767	965	0	224	5.3	5.2	1.0	5.3	1.9	2.9	-	4.3	0.8	0.3
Mid-Wales (n = 3997) <sup>9</sup>	807	404	10	32	2573	168	0	3	2.0	80.7	40.4	80.4	5.3	15.3	-	56.0	4.8	0.3

Table 5 continued

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood/ yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field bank vole	Wood/ yellow-necked mouse: bank vole	Field wood/ yellow-necked mouse: harvest mouse	Wood/ yellow-necked mouse: harvest mouse	Common shrew: wood/ yellow-necked mouse	Common shrew: field vole
<b>Long-eared owl</b>																	
Britain and Ireland (n = 249) <sup>10</sup>	201	99	6	854	3679	1397	1	12	2.0	33.5	16.5	4.3	1.6	2.6	-	116.4	0.1
Sheffield and Peak District (n = 748) <sup>5*</sup>	45	75	1	30	500	96	0	1	0.6	45.0	75.0	16.7	3.2	5.2	-	96.0	0.1
Peak District (n = 920) <sup>6</sup>	61	157	2	6	573	118	0	3	0.4	30.5	78.5	95.5	19.7	4.9	-	39.3	0.1
South Lancashire (dunes) (n = 608) <sup>11</sup>	0	6	0	65	154	382	0	1	-	-	-	2.4	5.9	0.4	-	-	-
South Scotland (upland) (n = 504) <sup>12</sup>	46	51	0	0	407	0	0	0	0.9	-	-	-	-	-	-	-	0.1
<b>Short-eared owl</b>																	
Britain and Ireland (n = 3302) <sup>13</sup>	101	77	1	57	2657	393	6	10	1.3	101.0	77.0	46.6	6.9	6.8	65.5	39.3	<0.1
Sheffield and Peak District (n = 76) <sup>5*</sup>	3	4	0	1	55	13	0	0	0.8	-	-	55.0	13.0	4.2	-	-	0.3
Peak District (n = 117) <sup>6</sup>	12	14	0	1	87	3	0	0	0.9	-	-	87.0	3.0	29.0	-	-	0.1
Clwyd (n = 630) <sup>14</sup>	145	298	0	47	64	76	0	0	0.5	-	-	1.4	1.6	0.8	-	-	2.3
<b>Tawny owl</b>																	
New Forest (n = 69) <sup>15</sup>	6	0	0	8	8	47	0	0	-	-	-	1	5.9	0.2	-	-	0.8
London/Surrey (n = 936) <sup>16</sup>	31	2	2	110	454	301	1	35	15.5	15.5	1.0	4.1	2.7	1.5	-	8.6	0.7
Wytham Woods (n = 8330) <sup>17</sup>	1146	174	38	2920	1269	2783	0	0	6.6	30.2	4.6	0.4	1.0	0.5	-	-	0.9
Sheffield and Peak District (n = 450) <sup>5*</sup>	64	9	1	46	220	105	0	5	7.1	64.0	9.0	4.8	2.3	2.1	-	21.0	0.3
Peak District (n = 325) <sup>6</sup>	49	26	2	20	150	75	0	3	1.9	24.5	13.0	7.5	3.8	2.0	-	25.0	0.3
Aberdeen (n = 180) <sup>18</sup>	23	2	1	16	90	48	0	0	11.5	23.0	2.0	5.6	3.0	1.9	-	-	0.3

Table 5 continued

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood/yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field vole: bank vole	Wood/yellow-necked mouse: bank vole	Field vole: wood/yellow-necked mouse	Wood/yellow-necked mouse: harvest mouse	Wood/yellow-necked mouse: house mouse	Common shrew: wood/yellow-necked mouse	Common shrew: field vole
<b>Kestrel</b>																		
Sheffield and Peak District (n = 164) <sup>8*</sup>	20	11	0	16	112	5	0	0	1.8	-	-	7.0	0.3	22.4	-	-	4.0	0.2
Yorkshire (n = 119) <sup>19</sup>	9	0	2	0	101	7	0	0	-	4.5	-	-	-	14.4	-	-	1.3	0.1
Yorkshire (upland) (n = 644) <sup>20</sup>	53	138	0	30	352	65	0	6	0.4	-	-	11.7	2.2	5.4	-	10.8	0.8	0.2
South Cumbria (n = 200) <sup>21</sup>	50	11	0	24	105	10	0	0	4.5	-	-	4.4	0.4	10.5	-	-	5.0	0.5
Pembroke (n = 111) <sup>22</sup>	8	0	0	23	78	2	0	0	-	-	-	3.4	0.1	39.0	-	-	4.0	0.1

<sup>1</sup> Glue (1974); <sup>2</sup> Teagle (1963); <sup>3</sup> Linn & Scott (1980); <sup>4</sup> Buckley & Goldsmith (1975); <sup>5</sup> Clinging & Whiteley (1980); <sup>6</sup> Yalden (1985); <sup>7</sup> Webster (1973); <sup>8</sup> Bowman (1980a); <sup>9</sup> Bowman (1980b); <sup>10</sup> Glue & Hammond (1974); <sup>11</sup> South (1966); <sup>12</sup> Village (1981); <sup>13</sup> Glue (1977); <sup>14</sup> Roberts & Bowman (1986); <sup>15</sup> Hirons (1984); <sup>16</sup> Beven (1965, 1967, 1982); <sup>17</sup> Southern (1954); <sup>18</sup> N.D. Redgate (pers. comm.); <sup>19</sup> Ellis (1946); <sup>20</sup> Simms (1961); <sup>21</sup> Yalden & Warburton (1979); <sup>22</sup> Davis (1975).

N.B. Some of the data collected in the regional samples are also included in the samples from Britain as a whole, so there is a very small amount of replication in the data presented.

**Table 6.** Relative proportions of different species of small mammal in bottle samples from different regions of Britain.

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood/yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field vole: bank vole	Wood/yellow-necked mouse: bank vole	Field vole: wood/yellow-necked mouse	Wood/yellow-necked mouse: harvest mouse	Wood/yellow-necked mouse: house mouse	Common shrew: wood/yellow-necked mouse	Common shrew: field vole
Britain (n = 2054) <sup>1</sup>	886	52	57	542	82	419	2	14	17.0	15.5	0.9	0.2	0.8	0.2	209.5	29.9	2.1	10.8
Surrey (n = 805) <sup>2</sup>	313	13	11	218	43	205	0	2	24.1	28.5	1.2	0.2	0.9	0.2	-	102.5	1.5	7.3
Essex (n = 1031) <sup>3</sup>	526	38	32	254	22	154	1	4	13.8	16.4	1.2	0.1	0.6	0.1	154.0	38.5	3.4	23.9
Peak District (n = 1029) <sup>2</sup>	615	66	17	110	78	143	0	0	9.3	36.2	3.9	0.7	1.3	0.6	-	-	4.3	7.9
Sheffield (n = 2151) <sup>4</sup>	1215	141	39	279	167	308	0	2	8.6	31.2	3.6	0.6	1.1	0.5	-	154.0	3.9	7.3
Lake District (n = 153) <sup>2</sup>	84	7	3	44	1	14	0	0	12.0	28.0	2.3	<0.1	0.3	0.1	-	-	6.0	84.0
North and central Wales (n = 323) <sup>2</sup>	128	5	7	93	21	69	0	0	25.6	18.3	0.7	0.2	0.7	0.3	-	-	1.9	6.1

<sup>1</sup>P. A. Morris (unpubl.); <sup>2</sup>Whiteley & Yalden (1976); <sup>3</sup>Corke & Harris (1972); <sup>4</sup>Clinging & Whiteley (1980).

N.B. Some of the data collected in the regional samples are also included in the sample from Britain as a whole, so there is a very small amount of replication in the data presented.

**Table 7.** Relative proportion of different species of small mammals in trapping samples from different regions of Britain. All figures are the actual number of captures.

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood mouse	Yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field vole: bank vole	Wood/ yellow-necked bank vole	Field vole: yellow-necked mouse	Wood/ yellow-necked harvest mouse	Wood/ yellow-necked house mouse	Common shrew: field vole	
England and Wales (n = 8693) <sup>1</sup>	2104	191	35	2156	174	3912	52	43	26	11.0	60.1	5.5	<0.1	1.8	<0.1	92.2	152.5	0.5	12.1
Hampshire (n = 2198) <sup>2</sup>	44	7	0	396	0	1253	484	7	7	6.3	-	-	-	4.4	-	248.1	248.1	<0.1	-
Hampshire and Oxfordshire (n = 630) <sup>3</sup>	192	9	8	91	5	311	0	9	5	21.3	24.0	1.1	<0.1	3.4	<0.1	34.6	62.2	0.6	38.4
Arundel, Sussex <sup>4</sup> (n = 117)	10	0	0	25	0	82	0	0	0	-	-	-	-	3.3	-	-	-	0.1	-
Rogate, Sussex (n = 1613) <sup>5</sup>	202	181	0	314	126	653	0	137	0	1.1	-	-	0.4	2.1	0.2	4.8	-	0.3	1.6
Bookham Common, Surrey (n = 443) <sup>6</sup>	80	9	3	118	88	141	0	4	0	8.9	26.7	3.0	0.8	1.2	0.6	35.3	-	0.6	0.9
Windsor Park, Berkshire (n = 199) <sup>5</sup>	11	9	0	21	39	114	0	5	0	1.2	-	-	1.9	5.4	0.3	22.8	-	0.1	0.3
Silwood Park, Berkshire (n = 1254) <sup>7</sup>	82	33	0	15	965	157	0	2	0	2.5	-	-	64.3	10.5	6.1	78.5	-	0.5	0.1
Essex (general survey) (n = 852) <sup>8</sup>	174	16	3	125	48	421	13	15	37	10.9	58.0	5.3	0.4	3.4	0.1	28.1	11.4	0.4	3.6
Essex (Coptfold Estate) (n = 1965) <sup>8</sup>	65	5	2	531	1	1041	318	0	2	13.0	32.5	2.5	<0.1	2.0	<0.1	-	520.5	0.1	65.0
Matching Green, Essex (n = 1852) <sup>9</sup>	32	8	0	557	0	1215	40	0	0	4.0	-	-	-	2.3	-	-	-	<0.1	-
East Bergholt, Suffolk (n = 1174) <sup>10</sup>	40	6	8	788	1	288	42	1	0	6.7	5.0	0.8	-	0.4	-	-	-	0.1	-

Table 7 continued

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood mouse	Yellow-necked mouse	Harvest mouse	House mouse	Common pygmy shrew	Common water shrew	Pygmy water shrew	Field bank vole	Wood/necked bank vole	Field vole/wood/necked mouse	Wood/yellow-necked mouse/harvest mouse	Wood/yellow-necked house mouse	Common shrew/wood/necked mouse	Common shrew/field vole
Sheffield (overnight) (n = 726) <sup>11</sup>	44	16	0	232	16	418	0	0	0	6.3	-	-	0.1	1.8	<0.1	-	-	0.1	2.8
Sheffield (day time) (n = 207) <sup>12</sup>	20	10	0	122	10	44	0	1	1	2.0	-	-	0.1	0.4	0.2	-	-	0.5	2.0
Sheffield and Peak District (n = 726) <sup>13</sup>	45	8	8	330	94	240	0	1	1	5.6	5.6	1.0	0.3	0.7	0.4	-	240.0	0.2	0.5
Peak District (n = 559) <sup>14</sup>	25	4	7	289	85	148	0	1	1	6.3	3.6	0.6	0.3	0.5	0.6	-	148.0	0.2	0.3
Peak District (n = 717) <sup>15</sup>	45	7	1	397	51	216	0	0	0	6.4	45.0	7.0	0.1	0.5	0.2	-	-	0.2	0.9
York, North Yorkshire (n = 1048) <sup>16</sup>	7	24	0	126	0	891	0	0	0	0.3	-	-	-	7.1	-	-	-	<0.1	-
North Yorkshire Moors (n = 108) <sup>11</sup>	22	10	0	25	6	45	0	0	0	2.2	-	-	0.2	1.8	0.1	-	-	0.5	3.7
Filey, North Yorkshire (n = 217) <sup>17</sup>	86	24	27	3	60	17	0	0	0	3.6	3.2	0.9	20.0	5.7	3.5	-	-	5.1	1.4
Knaresborough, North Yorkshire (n = 301) <sup>18</sup>	41	3	0	133	13	110	0	1	1	13.7	-	-	0.1	0.8	0.1	-	-	0.4	3.2
Loch Tay, Perthshire (low altitude) (n = 422) <sup>19</sup>	43	0	1	108	229	41	0	0	0	-	43.0	-	2.1	0.4	5.6	-	-	1.0	0.2
Loch Tay, Perthshire (high altitude) (n = 131) <sup>19</sup>	7	0	0	0	124	0	0	0	0	-	-	-	-	-	-	-	-	-	0.1
Clova, Angus (low altitude) (n = 155) <sup>19</sup>	9	0	0	1	142	3	0	0	0	-	-	-	-	3.0	47.3	-	-	-	-



Table 7 continued

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood mouse	Yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field vole: bank vole	Wood/ yellow-necked mouse: bank vole	Field vole: wood/ yellow-necked mouse	Wood/ yellow-necked mouse: harvest mouse	Wood/ yellow-necked mouse: house mouse	Common shrew: wood/ yellow-necked mouse	Common shrew: field vole	
																				14
Clova, Angus (high altitude) (n = 100) <sup>19</sup>																				
Sunart, Argyll (n = 317) <sup>19</sup>	29	0	0	59	155	74	0	0	0	-	-	-	2.6	1.3	2.1	-	-	-	0.4	0.2
North-west Scotland (n = 383) <sup>20</sup>	60	5	3	92	13	210	0	0	0	12.0	20.0	1.7	0.1	2.3	0.1	-	-	-	0.3	4.6

<sup>1</sup>ADAS unpubl., from Cambridgeshire, Essex, Gloucestershire (two sites), North Yorkshire, Northumberland, Oxfordshire (two sites), Powys (two sites), Warwickshire (two sites); <sup>2</sup>Tarrant *et al.* (1990); <sup>3</sup>Tew (1989); <sup>4</sup>Toms (1990); <sup>5</sup>S.E. Randolph (pers. comm.); <sup>6</sup>Lord (1961); <sup>7</sup>Brown (1954); <sup>8</sup>Corke & Harris (1972); <sup>9</sup>A. Gudgion (pers. comm.); <sup>10</sup>S. Bullion (pers. comm.); <sup>11</sup>Brown (1980); <sup>12</sup>Lazenby, Johnson & Whiteley (1986); <sup>13</sup>Clinging & Whiteley (1980); <sup>14</sup>Whiteley & Yalden (1976); <sup>15</sup>Shore (1988); <sup>16</sup>Zhang & Usher (1991); <sup>17</sup>G.L. Woodroffe (pers. comm.); <sup>18</sup>Fraser (1988); <sup>19</sup>Corbet (1960); <sup>20</sup>Delany (1961).

**Table 8.** Summary of the data in Tables 5-7 showing the ratios of various species of small mammal in pellet, bottle and trapped samples.

	Common shrew	Pygmy shrew	Water shrew	Bank vole	Field vole	Wood/yellow-necked mouse	Harvest mouse	House mouse	Common shrew: pygmy shrew	Common shrew: water shrew	Pygmy shrew: water shrew	Field bank vole	Wood/yellow-necked mouse: bank vole	Field wood/yellow-necked mouse	Wood/yellow-necked mouse: harvest mouse	Common shrew: wood/yellow-necked mouse	Common shrew: field vole
<b>Barn owl pellets</b>																	
Totals (n = 75,978)	19,768	3936	1017	3635	38,663	7270	801	888	5.0	19.4	3.9	10.6	2.0	5.3	9.1	8.2	2.7
<b>Long-eared owl pellets</b>																	
Totals (n = 9029)	353	388	9	955	5313	1993	1	17	0.9	39.2	43.1	5.6	2.1	2.7	-	117.2	0.2
<b>Short-eared owl pellets</b>																	
Totals (n = 4125)	261	393	1	106	2863	485	6	10	0.7	261.0	393.0	27.0	4.6	10.5	80.8	48.5	0.5
<b>Tawny owl pellets</b>																	
Totals (n = 10,290)	1319	213	44	3120	2191	3359	1	43	6.2	30.0	4.8	0.7	1.1	0.7	-	77.0	0.4
<b>Kestrel pellets</b>																	
Totals (n = 1230)	132	160	2	93	748	89	0	6	0.8	66.0	80.0	8.0	1.0	9.4	-	14.8	1.5
<b>Bottle samples</b>																	
Totals (n = 75,46)	3767	322	166	1540	414	1312	3	22	11.7	22.7	1.9	0.3	1.1	0.3	37.3	59.6	2.9
<b>Trapping samples</b>																	
Totals (n = 27,107)	3533	586	106	7065	2519	12,994	223	81	6.0	33.3	5.5	0.4	1.8	0.2	58.3	160.4	0.3
<b>Overall totals</b>	29,133	5998	1345	16,514	52,711	27,502	1035	1067	4.9	21.7	4.5	3.2	1.7	1.9	26.6	25.8	1.1
(n = 135,305)																	

**Table 9.** Percentages of different species of bat from various British samples (excluding vagrants). Samples from local studies are excluded.

	Enquiries from public to NCC May 1982-December 1983 (n = 628) <sup>1</sup>	Relative frequency of each species recorded in houses (n = 1807) <sup>2</sup>	Enquiries from public to NCC 1983-1992 (n = 11,152) <sup>3</sup>	Recorded in bat boxes in six forests 1976-1990 (n = 3054) <sup>4</sup>	Number of post-1960 10 x 10 km square records (n = 4271) <sup>5</sup>	Number of post-1960 records received by BRC (n = 11,482) <sup>6</sup>	Bat carcasses submitted for testing for rabies (n = 1194) <sup>7</sup>
Greater horseshoe bat	0.3	0.4	1.0	0	2.7	3.6	0.3
Lesser horseshoe bat	1.8	2.1	4.4	0	5.6	7.6	0.3
Whiskered bat				0.4			
Brandt's bat				0.2			
Whiskered bat/ Brandt's bat*	3.2	3.4	2.9		7.7	6.5	3.5
Natterer's bat	1.4	1.2	2.8	7.6	7.8	6.3	3.0
Bechstein's bat	0	<0.1	<0.1	0	0.4	0.8	0.1
Daubenton's bat	0.2	1.0	1.7	0	6.9	5.8	1.6
Serotine	3.6	4.1	4.9	0	3.0	2.2	2.3
Noctule	0.3	1.2	1.2	6.3	4.7	3.4	2.0
Leisler's bat	0.2	0.1	0.3	1.1	1.0	0.8	0.2
Pipistrelle	58.4	54.9	49.2	22.5	33.7	37.9	66.2
Nathusius' pipistrelle	-	-	-	-	-	-	1.0
Barbastelle	0.2	<0.1	<0.1	0	1.0	1.2	0
Brown long-eared bat				62.0			19.3
Grey long-eared bat				0			0.3
Brown long-eared bat/ Grey long-eared bat*	30.4	30.3	31.3		25.6	24.3	

<sup>1</sup> Mitchell-Jones *et al.* (1986); <sup>2</sup> Mitchell-Jones *et al.* (1989); <sup>3</sup> A.J. Mitchell-Jones (pers. comm.); <sup>4</sup> Stebbings & Walsh (1991); <sup>5,6</sup> Arnold (1993) and H.R. Arnold (pers. comm.); <sup>7</sup> A.M. Hutson (pers. comm.).

\* Figures are averages between two species that are difficult to differentiate.

**Table 10.** The reliance of British species of bat on buildings, trees and caves (and other underground sites) as roost sites, excluding vagrant and migrant species. From Hutson (1993).

Species	Reliance on buildings	Reliance on trees	Reliance on caves	Status	Distribution
Greater horseshoe bat	5	1	5	4	5
Lesser horseshoe bat	5	1	5	4	4
Whiskered bat	?3	?	3	3	2
Brandt's bat	?3	?	3	3	2
Natterer's bat	?4	?	4	3	2
Bechstein's bat	?2	?	3	5	5
Greater mouse-eared bat	?3	?	5	5	5
Daubenton's bat	3	4	4	2	1
Serotine	5	1	1	2	4
Noctule	1	5	1	2	2
Leisler's bat	3	?5	1	4	3
Pipistrelle	4	2	1	1	1
Barbastelle	1	?	2	5	3
Brown long-eared bat	4	3	2	2	1
Grey long-eared bat	4	?	2	5	5

The reliance of British species of bat on basic roost types and their relative status and distribution. Each category is scored out of 5: a score of 5 is high reliance, rare status or restricted distribution; a score of 1 indicates low reliance, common status or widespread distribution.

**Table 11.** Comparison of the relative number of records and population size for British bats (excluding vagrants).

	Relative proportion (%) of records (mean of columns 3,4,6,7 in Table 9)	Population size	Relative proportion (%) of total British bat population	Bat carcasses submitted for testing for rabies (%) (n = 1194) <sup>1</sup>
Greater horseshoe bat	1.2	4000	0.2	0.3
Lesser horseshoe bat	3.1	14,000	0.5	0.3
Whiskered bat		40,000		
Brandt's bat		30,000		
Whiskered bat/ Brandt's bat*	3.3		2.7	3.5
Natterer's bat	5.0	100,000	3.8	3.0
Bechstein's bat	0.2	1500	0.1	0.1
Daubenton's bat	2.2	150,000	5.7	1.6
Serotine	2.4	15,000	0.6	2.3
Noctule	3.2	50,000	1.9	2.0
Leisler's bat	0.6	10,000	0.4	0.2
Pipistrelle	44.5	2,000,000	76.3	66.2
Nathusius' pipistrelle	(0.8) <sup>2</sup>	?	?	1.0
Barbastelle	0.3	5000	0.2	0
Brown long-eared bat		200,000	7.6	19.3
Grey long-eared bat		1000	<0.1	0.3
Brown long-eared bat/ Grey long-eared bat*	33.9			

<sup>1</sup>A.M. Hutson (pers. comm.); <sup>2</sup>figures only available from one source and so this percentage is not averaged over the four samples.

\* Figures that lie between lines are averages between two species that are difficult to differentiate.

**Table 12.** Population trends since 1978 in counts of bats from colonies in houses. These data are summer counts of nursery roosts and are predominantly, but not exclusively, pipistrelle colonies. Population trends are shown by assuming a colony size of 100 in 1978. Data from R.E. Stebbings (pers. comm.).

Area (and mean colony size $\pm$ s.e. in 1978)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
South-east England (105 $\pm$ 17, n = 34)	100	60.4	51.2	55.2	44.4	49.6	44.7	39.3	36.2	39.3	38.0	37.2	34.4	27.6	23.5
South-west England (105 $\pm$ 13, n = 10)	100	77.1	78.1	84.3	64.6	63.9	72.8	57.9	68.5	59.0	51.0	47.3	52.2	45.0	41.9
Midlands (123 $\pm$ 23, n = 25)	100	48.2	33.7	26.2	21.6	25.8	24.0	27.1	28.1	22.9	25.6	26.0	27.0	27.4	22.3
North England (116 $\pm$ 54, n = 5)	100	86.4	130.6	146.9	130.3	75.2	75.8	82.9	82.0	70.1	80.8	84.1	68.5	56.9	46.3
Scotland (94 $\pm$ 26, n = 3)	100	114.9	51.0	86.7	71.8	108.6	124.9	163.1	175.7	176.0	168.2	169.0	165.5	177.9	185.9
Wales (296 $\pm$ 116, n = 4)	100	60.0	40.9	42.8	38.9	46.4	34.6	19.0	20.1	20.1	20.0	19.9	19.3	15.0	16.1
Britain (119, n = 81)	100	61.4	47.3	48.5	40.3	44.3	42.0	36.2	37.4	35.3	35.5	35.4	32.6	29.4	26.8

**Table 13.** Population trends since 1980 in counts of bats from colonies in houses. These data are summer counts of nursery roosts and are predominantly, but not exclusively, pipistrelle colonies. Population trends are shown by assuming a colony size of 100 in 1980. Data from R.E. Stebbings (pers. comm.).

Area (and mean colony size $\pm$ s.e. in 1980)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
South-east England (52 $\pm$ 7, n = 57)	100	108.0	86.9	97.1	86.2	75.9	70.0	76.1	73.5	72.0	66.5	53.3	45.5
South-west England (55 $\pm$ 7, n = 48)	100	107.9	82.7	81.8	93.3	74.3	87.9	75.8	65.5	60.7	67.0	57.8	53.8
Midlands (41 $\pm$ 6, n = 71)	100	77.6	63.9	76.5	71.3	80.4	83.3	68.0	76.0	77.2	80.3	81.3	66.3
North England (45 $\pm$ 9, n = 16)	100	112.5	99.8	57.6	58.1	63.6	62.8	53.7	61.9	64.4	52.4	43.5	35.4
Scotland (59 $\pm$ 18, n = 8)	100	170.0	140.8	213.0	245.0	320.0	344.6	345.3	330.1	331.8	324.8	349.2	364.9
Wales (97 $\pm$ 26, n = 14)	100	104.7	95.1	113.5	84.6	46.4	49.1	49.5	49.0	48.7	47.3	36.8	39.4
Britain (52 $\pm$ 4, n = 214)	100	102.5	85.1	93.5	88.5	76.4	78.9	74.4	74.8	74.6	68.8	62.0	56.5

**Table 14.** Estimated pre-breeding population size and conservation status of the 64 species and one sub-species of mammal included in this review. Due to the different methods used to obtain the population estimates, direct comparisons between species should be made with caution. The numbers after the total population estimates denote the reliability of the estimate, where <sup>5</sup> is thought to be least, and <sup>1</sup> most, reliable; see the text for further details. The numbers after the population estimate for each of the three countries denote the rank order of abundance for that country, with <sup>1</sup> being the rarest.

	Total	Population size			Wales	Changing status (see footnote)	British range (see footnote)	European status (see footnote)	Population threats (see footnote)
		England	Scotland	Wales					
Greater mouse-eared bat	E <sup>1</sup>	0	0	0	0	5	?	-	
Coypu	E <sup>1</sup>	0	0	0	0	172	?	-	
Nathusius' pipistrelle	?	?	?	?	?	?	?	-	
Red-necked wallaby	29	3 <sup>1</sup>	26 <sup>2</sup>	0	0	14	100	R	
Park cattle	45	45 <sup>2</sup>	10 <sup>1</sup>	0	0	-	?	-	
Reindeer	80	0	80 <sup>4</sup>	0	0	-	?	-	
Chinese water deer	650	650 <sup>9</sup>	0	0	0	33	95*	Cl,Pr?,R?	
Grey long-eared bat	1000	1000 <sup>11</sup>	0	0	0	19	+ 0.4	Cl,H,P	
Ship rat	1300	<750 <sup>10</sup>	<550 <sup>8</sup>	0	0	23	1	K,P	
Bechstein's bat	1500	1500 <sup>12</sup>	0	?	?	19	0.7	H,P	
Feral sheep	2100	150 <sup>4</sup>	1850 <sup>10</sup>	100	5	-	?	D?	
Feral ferret	2500	200 <sup>5</sup>	2250 <sup>11</sup>	50	2=	166	?	-	
Wildcat	3500	0	3500 <sup>13=</sup>	0	0	347	4.6	I,K,P?	
Feral goat	>3565	315 <sup>6</sup>	>2650 <sup>12</sup>	600	11	113	?	-	
Pine marten	3650	<100 <sup>3</sup>	3500 <sup>13=</sup>	50	2=	262	1.8	C?,K	
Greater horseshoe bat	>4000	3500 <sup>16</sup>	0	500	9=	114	0.4	H,P	
Barbastelle	5000	4500 <sup>17</sup>	0	500	9=	41	4.8	H,P	
Skomer vole	7000	0	0	7000	15=	1	100	C?	
Otter	>7350	350 <sup>7</sup>	6600 <sup>16</sup>	400	8	1308	1	7.8	
Leisler's bat	10,000	9750 <sup>20</sup>	250 <sup>5=</sup>	?	?	41	4.9	H?,P?	
Fat dormouse	10,000	10,000 <sup>21</sup>	0	0	0	9	0.003	-	
Sika deer	11,500	<2500 <sup>14</sup>	9000 <sup>17</sup>	0	0	153	32.3	I,K	
Lesser white-toothed shrew	14,000	14,000 <sup>23</sup>	0	0	0	3	0.0007	-	
Lesser horseshoe bat	14,000	7000 <sup>19</sup>	0	7000	15=	238	1.3	Cl?,H	
Serotine	15,000	14,750 <sup>24</sup>	0	250	7	128	2.0	H?,P?	



Table 14 continued

	Total	Population size				Wales	Changing status (see footnote)	British range (see footnote)	European status (see footnote)	Population threats (see footnote)
		England	Scotland	Wales	Wales					
Polecat	15,000	3	15	12,500	22=	+	235	0.5	C?,H,I?,K?,R?	
Brandt's bat	30,000	5	25	7000	15=	?	43	6.3	H,P	
Common seal	35,000	2	13	0	22	+	387	40*	D,P	
Whiskered bat	40,000	4	27	8000	18	?	112	4.2	H,P	
Chinese muntjac	40,000	3	28	<250	6	++	417	100*	C,I,K?	
Noctule	50,000	3	29	4750	14	--	199	4.6	H?,P?	
Grey seal	93,500	1	18	1600	13	++	553	78*	K,P?	
Natterer's bat	100,000	4	31	12,500	22=	±?	331	7.6	H,P	
Fallow deer	100,000	4	32=	<4000	12	±?	546	40*	I?,K?,R	
American mink	>110,000	3	30	9750	19	++	1051	21.6	C?	
Daubenton's bat	150,000	4	32=	15,000	24	±?	293	7.6	H?,P?	
Red squirrel	160,000	3	26	10,000	20=	--	386	1.7	C,F,H	
Brown long-eared bat	200,000	4	35	17,500	25	--?	436	6.3	H,P	
Red fox	240,000	4	36=	22,000	26	+	1744	4.7	K	
Badger	250,000	2	36=	35,000	27=	±?	1800	17*	F?,H,K,R	
Mountain hare	350,000	3	8	0	34=	--	363	5.0	CI?,F,H?,K	
Red deer	360,000	2	22	<50	1	++	783	30*	L,K	
Weasel	450,000	4	39	36,000	29	--	1490	4.7	C?,K?	
Stoat	462,000	4	38	37,000	30	--	1514	6.6	K	
Common dormouse	500,000	3	40	35,000	27=	--?	352	1.1	CI?,F,H	
Roe deer	500,000	3	34	50	2=	++	1237	6.6	--	
Yellow-necked mouse	750,000	4	43	87,500	34	--	219	0.5	F,H	
Feral cat	813,000	4	42	58,000	32=	±?	1594	?	--	
Brown hare	817,500	2	41	58,000	32=	--	16	7.0	D?,H,K,Pr?	
Orkney vole	1,000,000	1	0	0	41	--	1060	0.04	H	
Water vole	1,169,000	3	44	41,000	31	--	693	6.6	F,H,Pr	
Harvest mouse	1,425,000	5	48	10,000	20=	--	1980	3.5	CI,F?,H,P?	
Hedgehog	1,555,000	4	45	145,000	35	--	654	8.9	H?,Pr?R?	
Water shrew	1,900,000	4	46	300,000	38	±?	1438	6.6	H	
Pipistrelle	2,000,000	3	47	200,000	36	--		5.5	H,P	

Table 14 continued

	Total	Population size			Wales	Changing status (see footnote)	British range (see footnote)	European status (see footnote)	Population threats (see footnote)
		England	Scotland						
Grey squirrel	2,520,000	<sup>49</sup> 2,000,000	<sup>31</sup> 200,000	320,000	<sup>39</sup>	1476	98.0	-	
House mouse	>5,192,000	<sup>50</sup> 4,535,000	<sup>39</sup> 657,000	206,000	<sup>37</sup>	851	8.7	C?,K,P	
Common rat	>6,790,000	<sup>52</sup> 5,240,000	<sup>40</sup> 870,000	680,000	<sup>40</sup>	1380	6.6	H,K,P	
Pygmy shrew	8,600,000	<sup>51</sup> 4,800,000	<sup>42</sup> 2,300,000	1,500,000	<sup>41</sup>	948	5.6	H?,P?	
Bank vole	23,000,000	<sup>54</sup> 17,750,000	<sup>43</sup> 3,500,000	1,750,000	<sup>42</sup>	1062	6.6	-	
Mole	31,000,000	<sup>56</sup> 19,750,000	<sup>44</sup> 8,000,000	3,250,000	<sup>43</sup>	2223	8.6	K?,P?	
Rabbit	37,500,000	<sup>57</sup> 24,500,000	<sup>45</sup> 9,500,000	3,500,000	<sup>44</sup>	2249	6.0	D	
Wood mouse	38,000,000	<sup>55</sup> 19,500,000	<sup>47</sup> 15,000,000	3,500,000	<sup>44</sup>	1362	6.4	P?	
Common shrew	41,700,000	<sup>58</sup> 26,000,000	<sup>46</sup> 11,500,000	4,200,000	<sup>46</sup>	1429	7.8	H?,P?	
Field vole	75,000,000	<sup>53</sup> 17,500,000	<sup>48</sup> 41,000,000	16,500,000	<sup>47</sup>	1301	6.2	H	

**Population size:** the estimated number of animals at the beginning of the breeding season.

**Changing status:** population changes over the last 30 years. This is an assessment of recent population changes rather than current population trends. E extinct; ++ strong evidence of increase in numbers and/or range; + suggestions of increase; ± probably stable, or no clear evidence of change; - suggestions of decline; -- strong evidence of decline in numbers and/or range.

**British range:** number of 10 x 10 km squares from which the species has been recorded since 1960, excluding the Channel Islands and the Isle of Man (Arnold 1993). + indicates that this species is under represented, because many records did not differentiate between this and a very similar species (there were 245 records of whiskered/Brandt's bat and 896 of 'long-eared bats' in addition to records that identified the actual species); <sup>1</sup> post-1975 records only; <sup>2</sup> all 10 x 10 km square records.

**European status:** approximate percentage of western European range that is contributed by the British range (or, \* where possible, the population similarly estimated).

**Population threats:** factors which are known or believed may currently affect population size, or which may affect population size in the future. C - competitors; Cl - climate changes and/or adverse weather conditions; D - disease; F - population fragmentation or isolation; H - habitat changes; I - interbreeding; K - deliberate killing by people, particularly hunting, gamekeepers, pest control, poaching; P - pesticides, pollution, poisoning or the use of other chemicals; Pr - predation; R - road casualties; - - no known threats; ? - unclear if that factor posed a serious threat.

Table 15. Status and protection of British mammals.

	Biogeographical status in Britain (see footnote)	Conservation status in Britain (see footnote)	Legal protection in Britain (see footnote)	EC Directive (Annex/es) (see footnote)	Bern Convention (Appendix) (see footnote)	CITES (Appendix) (see footnote)
<b>Marsupialia</b>						
Red-necked wallaby	I	V	Schedule 9	-	-	-
<b>Insectivora</b>						
Hedgehog	N	C	Schedule 6	-	III	-
Mole	N	C	-	-	-	-
Common shrew	N	C	Schedule 6	-	III	-
Pygmy shrew	N	C	Schedule 6	-	III	-
Water shrew	N	LC	Schedule 6	-	III	-
Lesser white-toothed shrew	I	LC	Schedule 6	-	III	-
<b>Chiroptera</b>						
Greater horseshoe bat	N	V	Schedule 5, 6	IIa, IVa	II	-
Lesser horseshoe bat	N	V	Schedule 5, 6	IIa, IVa	II	-
Whiskered bat	N	V?	Schedule 5, 6	IVa	II	-
Brandt's bat	N	V?	Schedule 5, 6	IVa	II	-
Natterer's bat	N	LC	Schedule 5, 6	IVa	II	-
Bechstein's bat	N	R	Schedule 5, 6	IIa, IVa	II	-
Greater mouse-eared bat	N	Ex	Schedule 5, 6	IIa, IVa	II	-
Daubenton's bat	N	LC	Schedule 5, 6	IVa	II	-
Particoloured bat	V	R	Schedule 5, 6	IVa	II	-
Serotine	N	V	Schedule 5, 6	IVa	II	-
Northern bat	V	R	Schedule 5, 6	IVa	II	-
Noctule	N	V?	Schedule 5, 6	IVa	II	-
Leisler's bat	N	V?	Schedule 5, 6	IVa	II	-
Pipistrelle	N	C	Schedule 5, 6	IVa	III	-
Nathusius' pipistrelle	M	R	Schedule 5, 6	IVa	II	-
Barbastelle	N	R	Schedule 5, 6	IIa, IVa	II	-
Brown long-eared bat	N	LC	Schedule 5, 6	IVa	II	-
Grey long-eared bat	N	E	Schedule 5, 6	IVa	II	-

Table 15 continued

	Biogeographical status in Britain (see footnote)	Conservation status in Britain (see footnote)	Legal protection in Britain (see footnote)	EC Directive (Annex/es) (see footnote)	Bern Convention (Appendix) (see footnote)	CITES (Appendix) (see footnote)
<b>Lagomorpha</b>						
Rabbit	I	C	- <sup>1,2</sup>	-	-	-
Brown hare	I	C	- <sup>1,3</sup>	-	-	-
Mountain hare	N	LC	- <sup>1,3</sup>	V	III	-
<b>Rodentia</b>						
Red squirrel	N	V	Schedule 5, 6	-	III	-
Grey squirrel	I	C	Schedule 9 <sup>4</sup>	-	-	-
Bank vole	N	C	-	-	-	-
Skomer vole	N	LC	-	-	-	-
Field vole	N	C	-	-	-	-
Orkney vole	I	LC	-	-	-	-
Water vole	N	V	-	-	-	-
Wood mouse	N	C	-	-	-	-
Yellow-necked mouse	N	LC	-	-	-	-
Harvest mouse	I (?)	LC	-	-	-	-
House mouse	I	C	-	-	-	-
Common rat	I	C	-	-	-	-
Ship rat	I	E	Schedule 9	-	-	-
Common dormouse	N	V	Schedule 5, 6	IVa	III	-
Fat dormouse	I	LC	Schedule 6, 9	-	III	-
Coypu	I	Ex	Schedule 9 <sup>5</sup>	-	-	-
<b>Carnivora</b>						
Red fox	N	C	-	-	-	-
Pine marten	N	LC	Schedule 5, 6	Va	III	-
Stoat	N	C	-	-	III	III <sup>11</sup>
Weasel	N	C	-	-	III	-
Polecat	N	LC	Schedule 6	Va	III	-
Feral ferret	I	R	-	-	-	-

Table 15 continued

	Biogeographical status in Britain (see footnote)	Conservation status in Britain (see footnote)	Legal protection in Britain (see footnote)	EC Directive (Annex/es) (see footnote)	Bern Convention (Appendix) (see footnote)	CITES (Appendix) (see footnote)
American mink	I	C	Schedule 9 <sup>6</sup>	-	-	-
Badger	N	C	Schedule 6 <sup>7</sup>	-	III	-
Otter	N	LC	Schedule 5, 6	IIa, IVa	II	I
Wildcat	N	LC	Schedule 5, 6	IVa	II	II
Feral cat	I	C	-	-	-	-
<b>Pinnipedia</b>						
Common seal	N	LC	Seals Act, 1970 <sup>8</sup>	IIa	III	-
Grey seal	N	LC	Seals Act, 1970 <sup>8</sup>	IIa	III	-
Ringed seal	V	R	-	Va	III	-
Harp seal	V	R	-	Va	III	-
Bearded seal	V	R	-	Va	III	-
Hooded seal	V	R	-	Va	III	-
Walrus	V	R	Schedule 5	-	II	III
<b>Artiodactyla</b>						
Red deer	N	LC	Deer Act, 1991 <sup>10</sup>	-	III	-
Sika deer	I	LC	Deer Act, 1991 <sup>10</sup>	-	III	-
Fallow deer	I	LC	Deer Act, 1991 <sup>10</sup>	-	III	-
Roe deer	N	C	Deer Act, 1991 <sup>10</sup>	-	III	-
Chinese muntjac	I	LC	Deer Act, 1991 <sup>10</sup>	-	III	-
Chinese water deer	I	R	Deer Act, 1991 <sup>10</sup>	-	III	-
Reindeer	I	R	Deer Act, 1991 <sup>10</sup>	-	III	-
Park cattle	N	R	-	-	-	-
Feral goat	I	R	-	-	II	-
Feral sheep	I	V	-	-	-	-

**Biogeographical status:** this assessment refers to the species as a whole, although there may have been substantial restocking of some native species with animals from abroad. I = introduced (22 species); M = migrant (one species); N = native (41 species and one subspecies); V = vagrant (seven species).

Table 15 continued

**Conservation status in Britain:** these are subjective assessments based on the data presented in this review. C = common (20 species); E = endangered, species threatened with extinction (two species); Ex = believed to be extinct in the wild (two species); LC = locally common, species with relatively large populations but a limited distribution (20 species and one subspecies), R = rare (15 species); V = vulnerable, species whose populations are either small or threatened (12 species).

**Legal protection in Britain:** Schedules refer to the Wildlife and Countryside Act 1981 and its subsequent amendments. Those species protected under Schedule 5 cannot be intentionally killed, injured or taken. Species covered by Schedule 6 of the Act are not fully protected, but there are prohibitions of certain methods of killing and taking. Schedule 9 lists established species for which further releases to the wild are prohibited without a licence. Other relevant British legislation is listed as follows: <sup>1</sup> except for the provisions of the Ground Game Act 1880; <sup>2</sup> an amendment to the Pests Act 1954 makes it an offence to release a rabbit with signs of myxomatosis where other rabbits may become infected; <sup>3</sup> except for the limitations on periods when they can be sold, as laid out in the Hare Preservation Act 1892; <sup>4</sup> the Grey Squirrel (Prohibition of Importation and Keeping) Order 1937 makes it an offence to keep this species in captivity without a licence from the Ministry of Agriculture, Fisheries and Food; <sup>5</sup> the keeping of coypu is banned under the Coypu (Prohibition on Keeping) Order 1987; <sup>6</sup> the keeping of American mink requires a licence under the Mink (Keeping) Order 1987; <sup>7</sup> badgers are protected by a series of legislation - the Badgers Act 1973 (plus amendments in the Wildlife and Countryside Act 1981 and the Wildlife and Countryside (Amendment) Act 1985), and the Protection of Badgers Act 1992; <sup>8</sup> the Conservation of Seals Act 1970 provides separate close seasons for both common and grey seals during their pupping periods, and section 3 orders can be used to extend these close seasons as necessary e.g. as was done during the recent phocine distemper virus epizootic; <sup>9</sup> no statutory close seasons; <sup>10</sup> The Deer Act 1991 only applies to England and Wales; for Scotland the main legislation is the Deer (Scotland) Act 1959, the Deer (Amendment) (Scotland) Act 1982 and the Deer (Close Seasons) (Scotland) Order 1984. For a fuller account of the legal status of British mammals, see Harris & Jefferies (1991).

**EC Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora:** Annex II - designation of protected areas for that species, although there are no designated priority species in Britain; Annex IV - special protection for the species; Annex V - exploitation of that species to be subject to management.

**Bern Convention on the Conservation of European Wildlife and Natural Habitats:** Appendix II - strict protection for that species; Appendix III - exploitation of that species to be subject to regulation.

**CITES (Convention on international trade in endangered species):** Appendix I - trade only in exceptional circumstances; Appendix II - trade subject to licensing; Appendix III - trade subject to limited licensing. <sup>11</sup> UK reservation.

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## Appendix: vagrant species recorded since 1900

### Order: Chiroptera

#### Particoloured bat *Vespertilio murinus*

**Status:** Vagrant; very rare.

**Distribution:** There are occasional records throughout Britain from south coast of England to Shetland and the North Sea.

**Records:** There are only seven records this century (Brighton, East Sussex, March 1986; Cambridge, Cambridgeshire, November 1985; North Sea 270 km east of Berwick, June 1965; Shetland, March 1927, November 1981, November 1984) (Racey 1991), and Chadwell Heath, Essex, October 1994 (J. Dobson pers. comm.).

#### Northern bat *Eptesicus nilssonii*

**Status:** Vagrant; very rare.

**Records:** There is only one record, of a single specimen found in a hibernaculum at Betchworth, Surrey, in January 1987 (Greenaway & Hill 1987).

### Order: Pinnipedia

#### Ringed seal *Phoca hispida*

**Status:** Occasional sightings in British waters; very rare.

**Records:** There are very few records from British waters this century (Aberdeen 1901; Shetland, occasional animals taken by common seal hunters in 1960s; Northumberland, 1991; Orkney, 1992) (Sea Mammal Research Unit pers. comm.).

#### Harp seal *Phoca groenlandica*

**Status:** Occasional sightings in British waters, especially when the species extends its range further south into the northern part of the North Sea. Very rare.

**Records:** There are thirty-one records from United Kingdom waters since about 1800; there are records this century from Teignmouth, Devon, 1902; Firth of Forth, 1903; Shetland, two in 1987; River Humber, 1987; Boston, Lincolnshire, 1988; Medway, Kent, 1988; Flamborough Head, Yorkshire, 1988 (Sea Mammal Research Unit pers. comm.).

#### Bearded seal *Erignathus barbatus*

**Status:** Occasional sightings in British waters; very rare.

**Records:** There are very few records from British waters: recent records include Shetland, two records in 1977; Mid Yell, Shetland, 1981; Ronas Voe, Shetland, 1986; Shetland, two records in 1987 and a sighting from Orkney could be the same animal as seen in Shetland two days earlier; Orkney, 1988; Shetland - two in 1988 (Sea Mammal Research Unit pers. comm.).

#### Hooded seal *Cystophora cristata*

**Status:** Occasional sightings in British waters; very rare.

**Records:** There are very few records from the British Isles, and many seem to be of young animals: records this century from Elgin, 1903; Haaf Gruney, Shetland, 1980; Felixstowe, Suffolk, 1989; Shetland, 1993 (Sea Mammal Research Unit pers. comm.).

#### Walrus *Odobenus rosmarus*

**Status:** Occasional sightings in British waters; very rare.

**Records:** Between 1815 and 1954, there were 26 records in British waters; all records were from off the Scottish coasts, except one in the Severn in 1839. Since 1954 there have been the following reports: the Isle of Arran, 1981; Shetland, 1981; the Wash, 1981; Pentland Firth, 1984; Orkney, 1986; Shetland, two in 1986 (Sea Mammal Research Unit pers. comm.).