

Report to Nature Conservancy Council

ANALYSIS OF CETACEAN SIGHTINGS IN THE
BRITISH ISLES, 1958-1985

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1.1 INTRODUCTION

In 1973, the Cetacean Group was formed within the Mammal Society to improve our knowledge of the status, distribution and ecology of cetaceans in British and Irish waters, primarily from sightings of live animals. A network of observers was set up and these were encouraged to report sightings of live sightings on a regular basis, facilitated by standardised recording forms and a guide to cetacean identification at sea (Evans 1976, 1981). Since 1973, the number of observers has grown to about 350 persons and they have reported about ten thousand sightings. Observers come from all walks of life and include marine and fisheries biologists, ornithologists, coastguards, lighthouse keepers, aircraft pilots, merchant seamen and members of the oil industry, as well as holiday makers particularly those owning yachts. Particularly in the last five years, there has been considerable public interest in cetaceans and the opportunities to report live sightings of them. This scheme is probably the largest of its kind in the world and certainly one of the longest running.

An analysis of the data was made for the years up to 1978 (primarily from 1973, but including regular coverage from some observers, for example weather ships and bird observatories, dating back in some cases to 1958), and published in Mammal Review (Evans 1980). A preliminary analysis of data collected for the period 1979-1984 was published in April 1986 as fulfilment of a Nature Conservancy Council contract (December 1985 - March 1986: Evans, Harding & Tyler 1986). At that time, records from 1985 were excluded because there were a number of returns from observers outstanding. Furthermore, data sets for earlier years were incomplete so that results presented in that report should be considered superseded by the present one. A second contract (from August - October 1986) from the Nature Conservancy Council was granted to put the remaining records (pre-1979 and any others not yet included) onto computer file. This allowed a better analysis of rarer British cetaceans, and examination for trends in numbers of sightings over a period of years for selected species (using those locations subject to long-term recording). This more comprehensive analysis forms the basis for this report. A third undertaking of the present contract was the abstraction of all reliable basking shark records since 1965 submitted opportunistically to the sightings scheme. These are summarised in Appendix 7.

1.2 METHODS

A major part of the work for both NCC contracts involved transcribing sightings from recording sheets, adding environmental data such as water depth, salinity and water temperature which usually necessitated reference to detailed oceanographic charts. Temperature and salinity were taken from monthly charts for the NE Atlantic and North Sea, using averages from fifty years. The values were checked where possible against precise measurements made during our 1980 NE Atlantic whale and seabird cruise, and very good agreement was obtained.

A standardised coding procedure (80 characters per line) was developed (see Appendices 1 & 2) and the next major stage was coding the records according to this format. Some slight changes to the codes were made since the preliminary analysis so as to improve the amount of information to be derived from the records. Transcription and coding of the data were carried out firstly by Glen Tyler and completed by Stephanie Hall.

The coding system developed was presented first to the other newly formed cetacean sightings schemes in Europe for discussion, modified where necessary, and circulated for general agreement. It is hoped that it will now be the standard format adopted by all sightings schemes in Western Europe, so facilitating friendly cooperation and ready transfer of information between groups. At an international cetacean meeting in Bremerhaven, West Germany in June 1986, the Northern European countries represented recommended adoption of this system, and for the UK Cetacean Group to serve as a central data base for the region (Kroger 1986).

Once all records had been coded together with environmental data in this standard format, they were typed onto computer file using the University of Oxford's computing centre. The third stage of the project was carried out by Stephan Harding and involved the writing and testing of several computer programs (in Fortran) to perform analyses of the data as directed by the Nature Conservancy Council. Finally four weeks were spent checking the entire computer data file for errors firstly by Aadya Martins-Pereira and then by Peter Evans, who supervised the project.

1.3 DATA INTERPRETATION

As noted during previous analyses, two considerations are important when interpreting cetacean sightings data of this nature. The first is the difficulty of identification. This resulted in many early records having to be assigned to very broad categories such as dolphin or small whale species, and still accounts for a proportion of records. However, the production of an identification guide directing observers to key features, and training experience (for example when forty persons participated in the Cetacean Group's 1980 NE Atlantic cruise) for a number of the regular observers has greatly increased the proportion of specific records. Except for those observers of known experience, specific identity of any record is only accepted if accompanied by a satisfactory description or photograph. In most of these cases, the sighting is assigned to the appropriate broader category (see Appendix 2). A breakdown of the number of records of each category logged for the entire period is given in Table 1. During the period 1981 to the present, 77% of sightings could be given specific identification compared with 65% for the period up to 1975). Despite these improvements, there is still scope for further improvement, which should concentrate primarily upon the large amateur element (for example yachtsmen, coastguards, lighthouse keepers and ferry boatmen) who provide mostly casual records. Although these do not provide the majority of the records their contribution is extremely important because of the much wider geographical coverage that they provide. Furthermore, public involvement is considered an integral part of

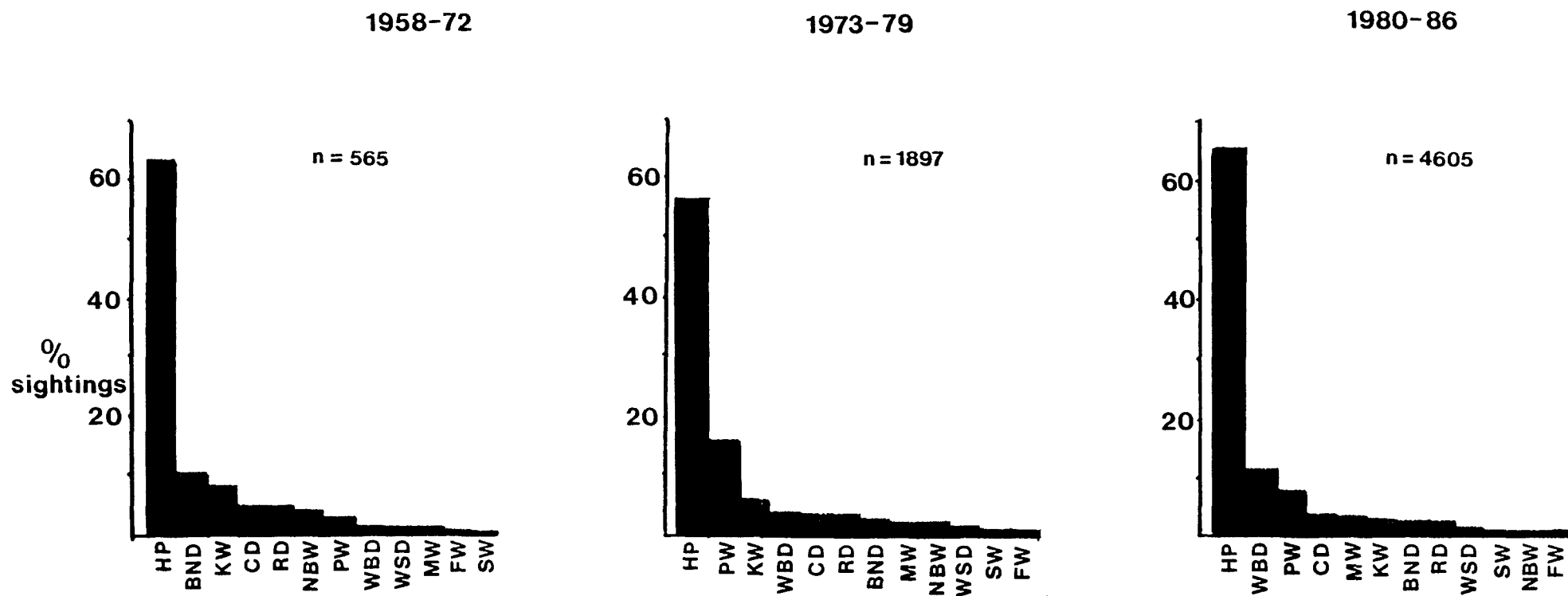


Fig. 1 Percentage of the total number of sightings for 12 most commonly recorded cetacean species in Britain & Ireland, for 3 time periods: 1958-72, 1973-79, and 1980-86

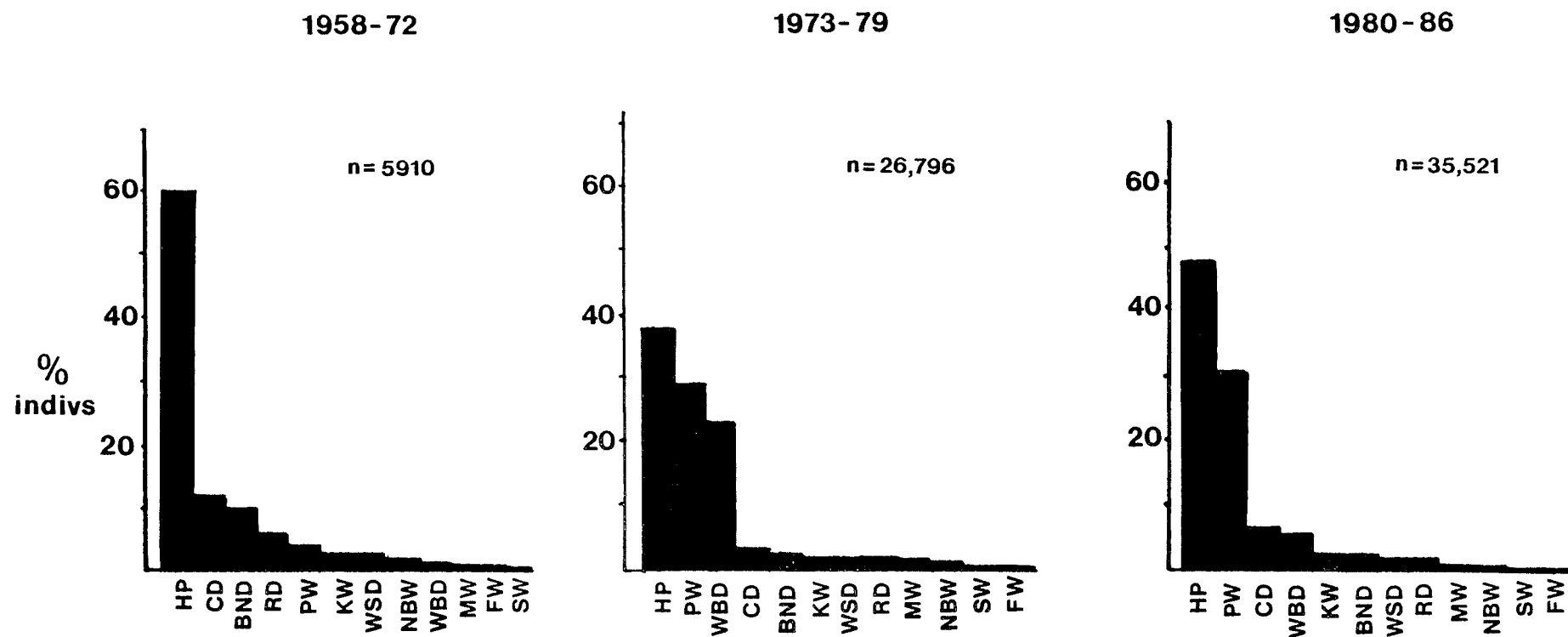


Fig 2 Percentage of the total number of individuals for 12 most commonly recorded cetacean species in Britain & Ireland, for 3 time periods: 1958-72, 1973-79, and 1980-86

conservation and public awareness of these creatures. An important next development should be to provide as many amateurs as possible with appropriate training. Many observers are already encouraged to submit photographs and these have proved invaluable for confirming specific identification.

The second bias is that of coverage. Some areas receive greater coverage than others whilst some periods of the year get more attention. There are two ways to overcome this problem and we have attempted both. Firstly the greater the number of observers and broader their geographical coverage, the smaller should be regional biases, so there is a need to recruit more observers. Secondly, those able to observe on a regular basis are being encouraged to record their effort so that it may be quantified. We now have twenty such observers/stations covering all the main sea areas (see Fig. 30), recording through most of the year and quantifying effort in one form or another. Although some of these have only recently started recording in this way, nine have been operating for 15 years (three for twenty years). Methods have been devised to quantify their effort over this period, primarily by recording the number of hours or days of seawatching. The results of preliminary analyses are presented in a later section of this report. With these two considerations in mind, the next major initiative of the UK Cetacean Group should be to expand and develop the observer network, particularly concentrating on gaps and encouraging greater quantification of effort.

2.1 RESULTS

Twenty-four species of cetacean have been recorded during the present century in British and Irish territorial waters. This represents one quarter of the total British mammal fauna and yet cetaceans have received lamentably little attention in the region. Twenty of those species have been recorded in the last ten years with at least half this number resident or at least annual visitors. Histograms of the twelve most frequently recorded species are presented in Figure 1 (no. of sightings) and in Figure 2 (no. of individuals) for the time periods 1958-72, 1973-79, and 1980-86

Before discussing the results in detail, the following points should be borne in mind. Since the analysis published in 1980, coverage has improved everywhere but particularly in the northern and central North Sea, and coastal waters of NE Scotland, Orkney and Shetland. Indeed, the North Sea has since 1980 received better coverage than much of the Atlantic seaboard. Despite those improvements, coverage is still uneven with the following areas least well recorded: west coast of Ireland particularly between Counties Kerry and Down; entire east coast of Ireland; Celtic Sea and Bristol Channel. The following areas receive the best coverage, in descending order: the North Sea (north of the Wash), North East and Northern Scotland, South West Ireland (Co. Cork), and the western English Channel (since 1984). Included in analyses are data provided by Meteorological Office weather ships operating daily watches through the year primarily in the region 57 degrees N, 20 degrees W. These allow comparison between offshore and coastal areas, and they identify those species which have a mainly pelagic distribution.

TABLE 1 LIST OF ALL ENTRIES FOR EACH CETACEAN CATEGORY
IN BRITISH AND IRISH WATERS FROM 1958-86

<u>Species</u>	<u>No records</u>
Minke whale	231
Sei whale	6
Fin whale	22
Blue whale	1
Humpback whale	5
Right whale	5
Sperm whale	28
Pygmy sperm whale	3
Northern bottlenose whale	72
Cuvier's whale	2
Sowerby's whale	1
White whale	2
Narwhal	1
Harbour porpoise	4423
Common dolphin	235
Euphrosyne dolphin	6
Bottle-nosed dolphin	229
White-sided dolphin	89
White-beaked dolphin	573
False killer whale	3
Killer whale	286
Long-finned pilot whale	675
Risso's dolphin	205
Cetacean spp.	81
Whale spp.	66
Dolphin spp.	496
Large whale	100
Blue/fin/sei whale	6
Sperm/humpback whale	3
Minke/N. bottlenose whale	25
N bottlenose/rorqual	17
Medium whale spp.	51
Small whale spp	28
Beaked whale spp.	4
Pilot/false killer whale	2
Large fin	9
Patterned dolphin	48
Lagenorhynchus spp.	118
Common/Euphrosyne dolphin	1

TABLE 2 SIGHTINGS RECORDS OF RARE CETACEAN SPECIES SINCE 1965

SPECIES	NO. INDIVS	LOCATION	DATE	DIST FROM LAND (km)
Sei whale	3	56 52'N 19 12'W	28 July 1975	640
	2	57 39'N 05 08'W	June 1980	2
	1	57 36'N 08 17'W	15 Aug 1980	24
	1-2	58 20'N 05 10'W	3-31 Aug 1980	1
	1	56 46'N 19 39'W	30 July 1981	640
	1	56 59'N 19 12'W	6 Nov 1985	700
Blue whale	1	55 36'N 08 26'W	31 May 1977	41
Humpback whale	1	51 25'N 09 30'W	12 June 1967	2
	1	c. 60 00'N 02 00'W	June 1972	
	1	57 00'N 20 50'W	7 Dec 1975	740
	3	56 51'N 20 33'W	12 July 1977	700
	2	56 53'N 20 43'W	15 July 1980	700
	1	57 50'N 07 30'W	undated	3
Right whale	1	51 26'N 09 30'W	18 Aug 1970	2
	1	52 18'N 19 54'W	10 Sept 1974	600
	1	52 43'N 19 34'W	14 Sept 1974	600
	2	54 03'N 04 56'W	7 May 1979	1
	1-2	57 53'N 08 14'W	16 Aug 1980	11
Pygmy sperm whale	1	54 06'N 00 03'W	Aug 1979	1
	1	56 44'N 00 30'W	25 June 1982	98
	1	55 44'N 01 21'W	26 June 1982	18
Cuvier's whale	1	59 36'N 00 09'W	27 Aug 1980	69
	1	51 25'N 09 30'W	24 Aug 1984	1
Sowerby's whale	1	58 03'N 05 43'W	22 Aug 1977	14
False killer whale	5-7	57 05'N 05 15'W	19 Nov 1976	5
	2	54 37'N 10 53'W	7 Aug 1980	50
	100-150	58 50'N 01 37'W	10 July 1981	54
Euphrosyne dolphin	25	49 43'N 07 44'W	14 Dec 1977	72
	30	49 38'N 05 01'W	4 Feb 1978	31
	1	47 29'N 06 38'W	16 July 1980	141
	20	48 22'N 09 54'W	10 July 1985	307
	5	48 12'N 09 20'W	17 Sept 1985	289
	6	41 00'N 02 30'W	8 Dec 1985	48

In the analyses that follow, the waters around Britain and Ireland have been divided into grid squares (one degree of longitude by half a degree latitude) using the standardised system developed by the International Council for the Exploration of the Sea (ICES). Previously the grid system adopted followed that of the Biological Records Centre, (Monks Wood, Huntingdon) and the data has been coded so that it can also be analysed using this system. The ICES grid has been preferred here because of a more appropriate cell size and the fact that it allows better comparability with fisheries data. For particular analyses, these squares have also been grouped into seven major sea areas. All maps are constructed with Mercator projection.

Each species is considered separately below, with a brief summary of status, use of coastal waters, group size, seasonal occurrence, and evidence for timing and location of breeding.

2.2 SYSTEMATIC LIST

Minke whale *Balaenoptera acutorostrata* (Fig. 3)

This species is recorded mainly from Northern Britain and the northern North Sea, but probably occurs throughout the western seaboard of Britain and Ireland where coverage is generally poor. In the North Sea it occurs as far south as the Yorkshire coast. Herd sizes are small, usually one or two individuals, and the species is often seen very close to land, particularly headlands or small islands (Table 4, Appendix 4). This is probably related to the upcurrents often created by such conditions which may lead to the formation of plankton frontal systems.

Most sightings occur in August (Appendix 3) and this is when most individuals are seen (Fig. 4). Only two individuals have been seen between November and March. There is probably an offshore movement at this time (Table 3) and it is then that the species is thought to breed (Evans 1980).

Fin whale *Balaenoptera physalus* (Fig. 5)

Although probably the commonest large whale species in the Northeast Atlantic, this species has clearly been greatly reduced by whaling. Between 1903-28, Scottish catches of Fin whales amounted to 4,356 (Shetland) and 1,492 (Outer Hebrides) with a further 46 caught in the latter region in 1950-51. Irish catches totalled 435 Fin whales between 1908-14 and 157 in 1920 and 1922.

Between 1913-48, 34 strandings were recorded on the British coasts, compared with only six between 1949 and 1985. It is likely that many sightings records designated as 'large whale species' or 'fin/sei whale' (particularly off the coast of Southern Ireland) are of this species. Of those sightings that can be attributed specifically to Fin whales, twelve out of sixteen occur in deep waters off the edge of the continental shelf, 700 km west of Scotland. The rest are from either Northern Scotland or Southwest Ireland. All but two sightings are of single individuals, between the months of April and November (Fig. 6, Appendix 3). There may be an offshore movement in the autumn since no

TABLE 3 MEAN DISTANCE FROM LAND (km) THAT
CETACEAN SPECIES WERE RECORDED

Cetacean species	Jan-Mar	Apr-June	July-Sept	Oct-Dec
Fin whale	-	604.6 *	275.6 *	670.0 *
Minke whale	1.0 *	86.6	23.1	14.7
Sperm whale	520.0 *	403.8 *	526.2	569.0 *
N. Bottlenose whale	715.0 *	250.0 *	49.0	1.1 *
Harbour porpoise	17.8	19.3	11.5	7.7
Common dolphin	84.2 *	66.8	80.5	75.8
Bottle-nosed dolphin	50.4	31.6	15.2	30.3
White-sided dolphin	34.1 *	52.6 *	51.7	164.0 *
White-beaked dolphin	57.6	49.0	26.3	41.6
Killer whale	136.5 *	150.7	42.0	37.1
Long-finned pilot whale	584.7	460.9	536.5	515.8
Risso's dolphin	141.0 *	22.6	3.5	6.8

* based on small sample sizes

TABLE 4

CETACEAN SIGHTINGS EXPRESSED AS % OF TOTAL
FOR THREE DIFFERENT DISTANCES FROM LAND (in miles)

SPECIES	% SIGHTINGS AT DISTANCES		
	1-3	4-12	13-200 miles
Minke whale	54.0	9.4	34.7
Fin whale	16.7	5.6	11.1
Sperm whale	7.4	7.4	7.4
N. Bottlenose whale	86.7	0.0	5.0
Harbour porpoise	79.3	8.0	12.2
Common dolphin	26.2	6.8	63.1
Euphrosyne dolphin	0.0	0.0	100.0
Bottle-nosed dolphin	89.6	3.1	4.1
White-sided dolphin	19.8	15.1	62.8
White-beaked dolphin	24.5	17.1	58.4
Killer whale	65.6	7.1	17.9
Long-finned Pilot whale	12.1	2.2	9.3
Risso's dolphin	86.3	9.4	3.1

TABLE 5

MONTHLY DISTRIBUTION (AS % OF TOTAL) OF
NUMBER OF SIGHTINGS WITH JUVENILES

SPECIES	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
Minke whale	-	-	0	0	0	5	0	1	0	0	-	0
Harbour porpoise	0	0	2	1	2	4	4	4	1	1	0	0
Common dolphin	0	0	0	0	10	0	8	12	0	0	-	-
Bottle-nosed dolphin	0	0	0	7	10	0	5	11	5	0	0	0
White-sided dolphin	-	0	0	0	0	0	9	21	4.5	0	0	0
White-beaked dolphin	0	8	0	0	2	1.5	5	0.5	5	6	8	0
Killer whale	0	0	0	5.5	9	6.5	15	7	7	7	0	0
Long-finned pilot whale	31	25	35	47	23	24	41	32	37	26	29	39
Risso's dolphin	-	-	0	0	0	5	0	1	0	0	-	0

NOTES Only those species for which there are sufficient records of juveniles are included. When sample sizes are very small, the percentage values have been bracketed.

The above table should be interpreted with some caution. Since certain species (particularly the whales) are distinctly below adult size for a protracted period, they will be designated juvenile status sometime after their birth. The results are probably best interpreted in terms of breeding seasons by a combination of peaks in proportion of sightings containing juveniles and the month when juveniles first appear in herds.

Fig. 3 ICES grid map of distribution of minke whale

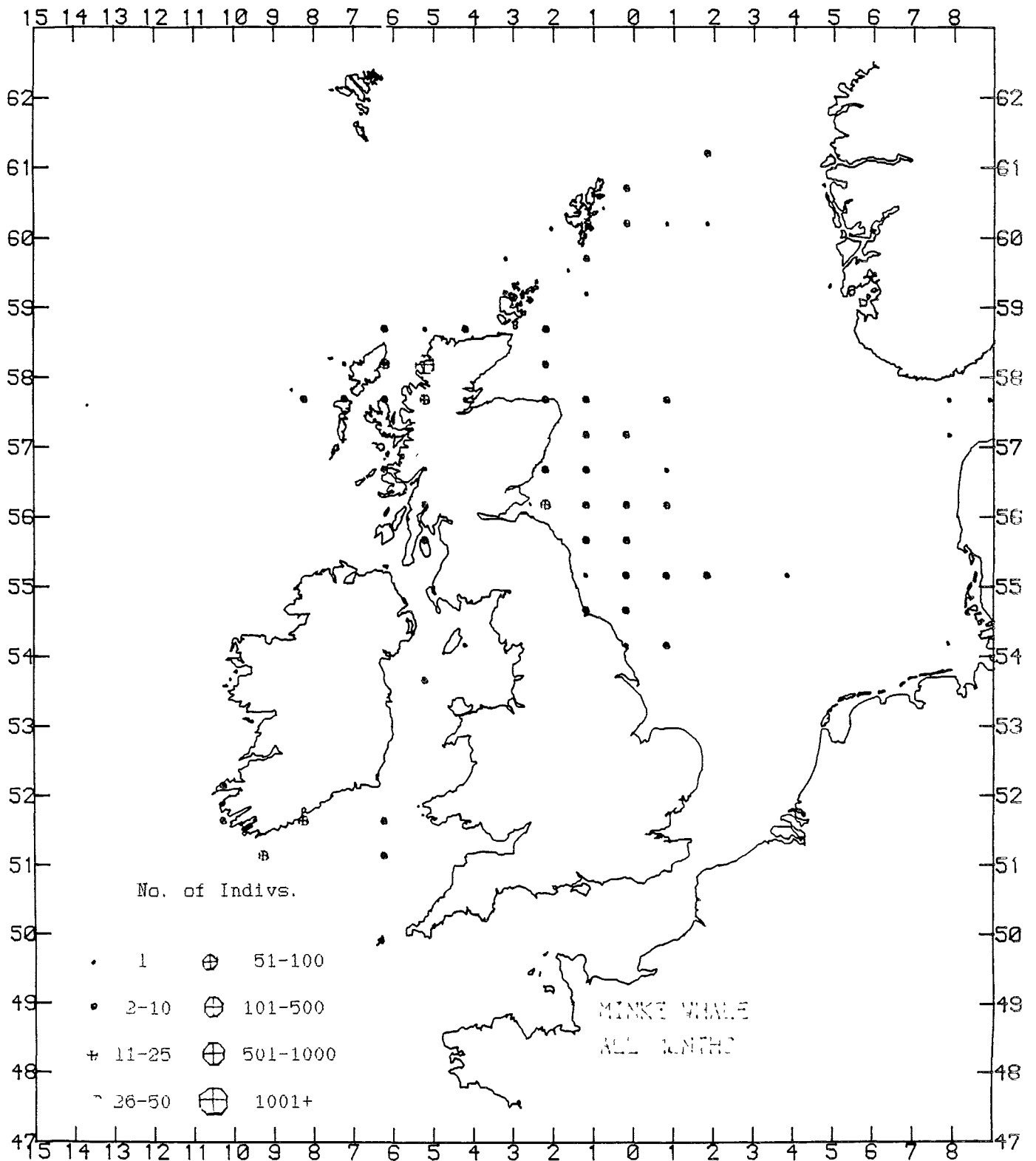
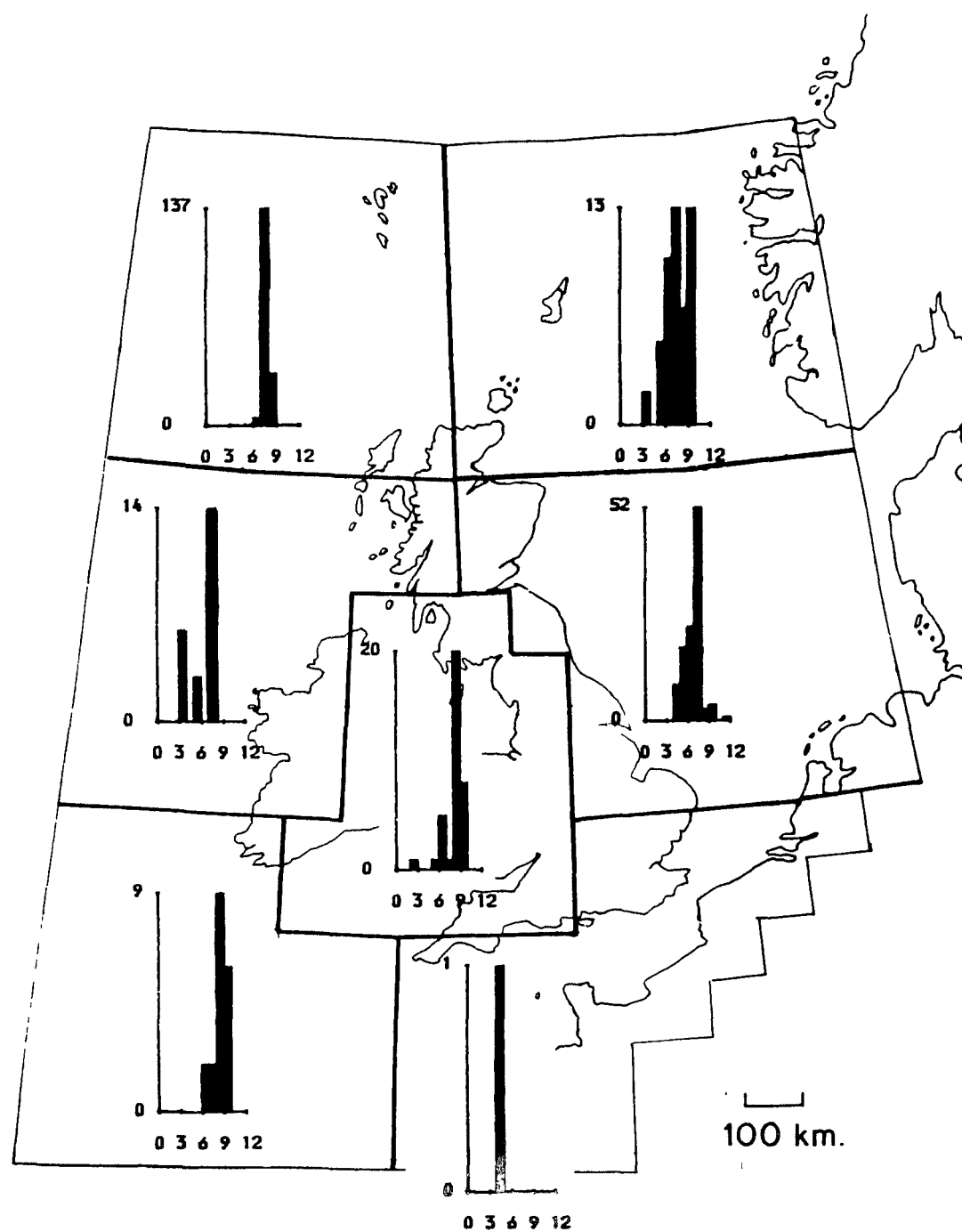


Fig. 4 Seasonal distribution of minke whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan....12 = Dec)



MINKE WHALE

sightings have occurred in coastal waters (within 500 km) during the winter period. It is thought that breeding occurs in the North Atlantic possibly south of the British Isles and west of the continental shelf. Breeding is between October and February (based mainly upon strandings data of females with foetuses).

Sei whale *Balaenoptera borealis*

Rarely seen in coastal waters of Britain and Ireland, although probably under-recorded because of difficulties of specific identification. Some of the records of large whales and Fin/Sei whales may have been of this species (Fig. 7). Catches in Scottish and Irish waters earlier this century suggest that the species was never as abundant as the Fin whale, however. Scottish catches of Sei whales amounted to 1,839 (Shetland) and 375 (Outer Hebrides) between 1903-28, and 3 in 1950-51 (Outer Hebrides). In Western Ireland, two whaling stations (Iniskea and neighbouring Blacksod on the Mullet Peninsula, Co. Mayo) caught 88 Sei whales between 1908-14, whilst in the years 1920 & 1922, the station at Blacksod caught a further 3 whales. These and other whale catch figures in this report are uncorrected for effort, so are best used only for cross-species comparisons.

There have been six specific sightings since the Cetacean Survey started in 1973, three of these occurring 700 km west of Scotland (57 degrees N, 20 degrees W). They are detailed in Table 2. All sightings occur off the coast of West Scotland & Outer Hebrides, mainly involving single individuals between June and August. Some sightings of large whales from Southwest Ireland very probably also apply to this species. There have only been nine strandings between 1913 and 1985, four of these between 1913 and 1948 and five between 1949 and 1985.

Blue whale *Balaenoptera musculus*

Although now probably the rarest of all rorqual whales in the North Atlantic, the blue whale was present in small numbers earlier this century. The Scottish whale fishery took 85 between 1903-28 from Shetland and 310 from the Outer Hebrides. In 1950-51, a further six were captured in Outer Hebridean waters. The Irish whale fishery captured 98 Blue whales between 1908-14, and 27 in 1920 and 1922.

There have been four strandings on British coasts between 1913-23 but none since then. The only well documented sighting was made in May 1977 off the northwest coast of Ireland (Table 2). There has been another sighting in August 1983, 700 km west of Scotland that may be of this species, and a few of the records designated as 'large whale species' could also be blue whales (Fig. 7). Notwithstanding these possible records, the species must be extremely rare in British and Irish waters.

Humpback whale *Megaptera novaeangliae*

This is another species that is rare in the Northeast Atlantic, with only small numbers taken earlier this century. Catches in the Scottish whale fishery amounted to 51 (Shetland) and 19 (Outer Hebrides) between 1903-28, and none in the Outer Hebrides between 1950-51. In Western

Fig. 5 Direct plots of distribution of fin whale sightings

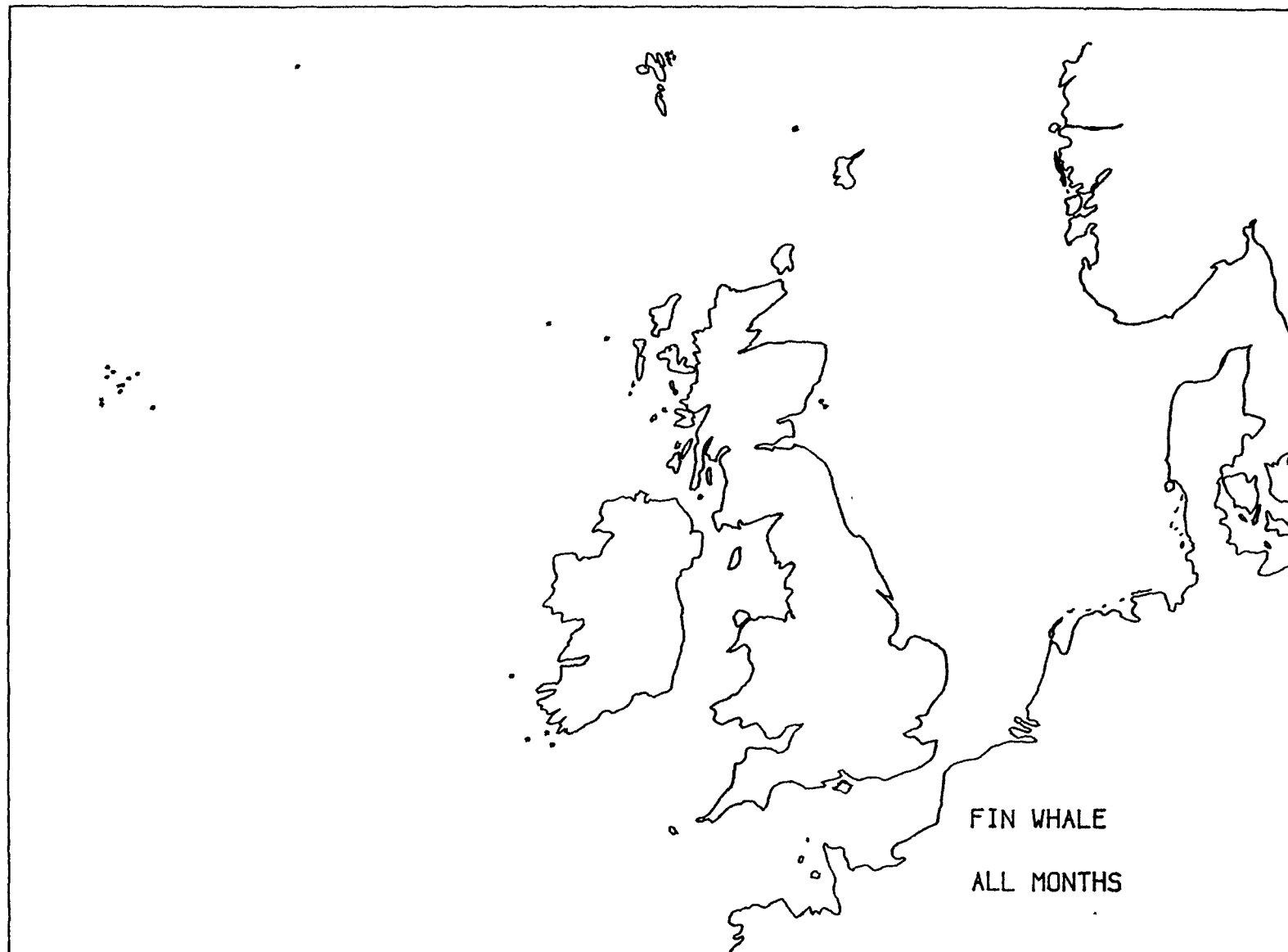


Fig. 6 Seasonal distribution of fin whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan.. .12 = Dec)

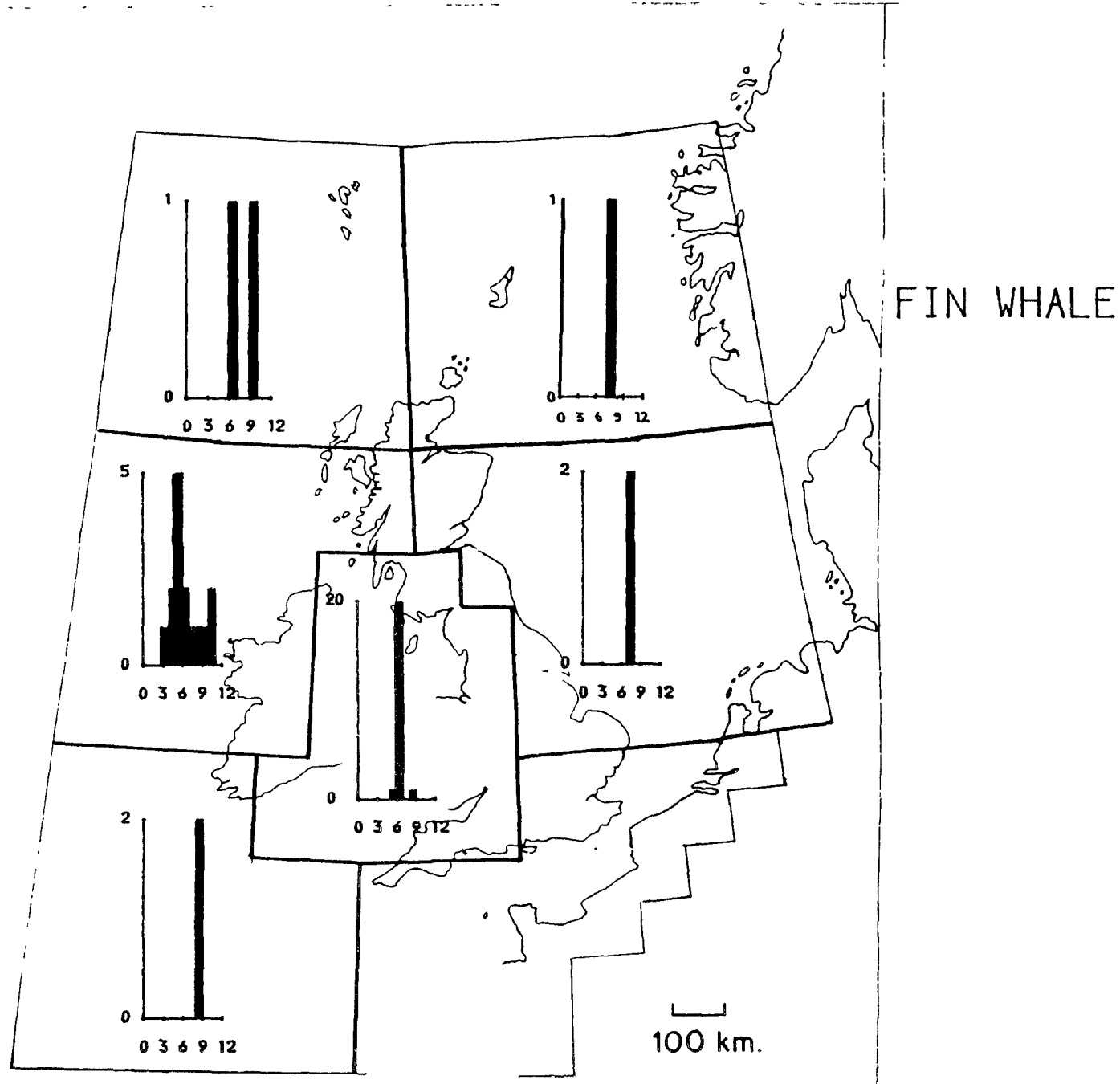
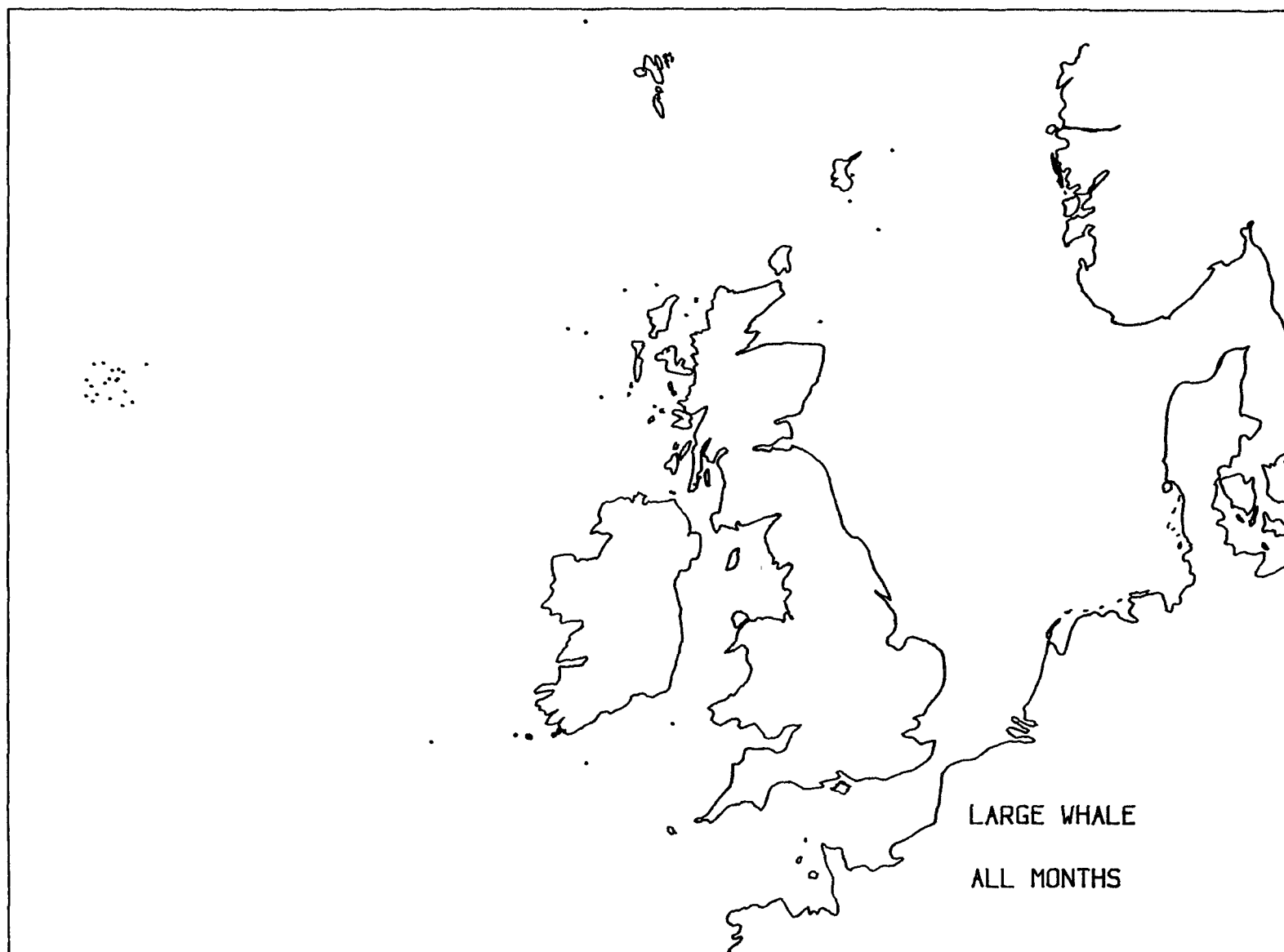


Fig. 7 Direct plots of distribution of "large whale sp." sightings



Ireland six Humpbacks were taken between 1908 and 1914, but with none in 1920 and 1922.

There are two strandings from British coasts, both since 1966 (none between 1913 and 1966). Further indication of a possible slight recovery in the Northeast Atlantic comes from the six sightings made since 1967 (Table 2). Three of these were made off the continental shelf, 700 km west of Scotland, the remainder coming from coastal waters in the Outer Hebrides, Shetland and Southwest Ireland. Sightings are mainly of single individuals and five of those are in the months of June or July. There are a number of records with few supporting details that may be of this species. These include a school of four whales (including one young) identified as Humpbacks at the entrance to a sea loch on the west coast of Scotland in August 1985; and there are reports from fishermen of large whales breaching and showing their tail fin within 5km of the Flannan Isles west of Harris in the Outer Hebrides in an area where one of the documented sightings was made. Despite any possible increase in numbers, the species must still be regarded as very rare in British and Irish waters.

Right whale *Balaena glacialis*

Almost certainly the rarest of all large whales in the Northeast Atlantic, this species was probably reduced to very small numbers by whaling in the Middle Ages. The Outer Hebrides appears to have been a centre of concentration with 94 animals taken in the region between 1903-28 compared with six in Shetland during the same period. None was obtained during 1950-51. In Western Ireland, eighteen were caught between 1908-14 but none in 1920 and 1922.

There have been no strandings on British and Irish coasts during this century, but five well documented sightings almost certainly of this species (describing forward blow and lack of dorsal fin, and in some cases the head shape) (Table 2). Two of these occur off the edge of the continental shelf about 600 km west of Scotland, and the remainder are from coastal waters in the Outer Hebrides (from the same area that most of the Scottish catches occurred), Northern Irish Sea and Southern Irish coast. There is another probable sighting in August 1970 also from the Southern Irish coast. All sightings are of single individuals between June and September.

Pygmy sperm whale *Kogia breviceps*

This medium sized toothed whale is a deepwater species, apparently more common on the western side of the North Atlantic. There have been two strandings on the Atlantic coasts of UK, both since 1966. There have also been three sightings probably of this species, one in August 1979 off the northeast coast of England and the other two on successive days in June 1982 off the northwest coast of Ireland (Table 2).

Sperm whale *Physeter macrocephalus* (Fig. 8)

Another deepwater species, apparently mainly occurring off the edge of the continental shelf. The Scottish whale fishery took 19 Sperm whales

Fig 8 Direct plots of distribution of sperm whale sightings

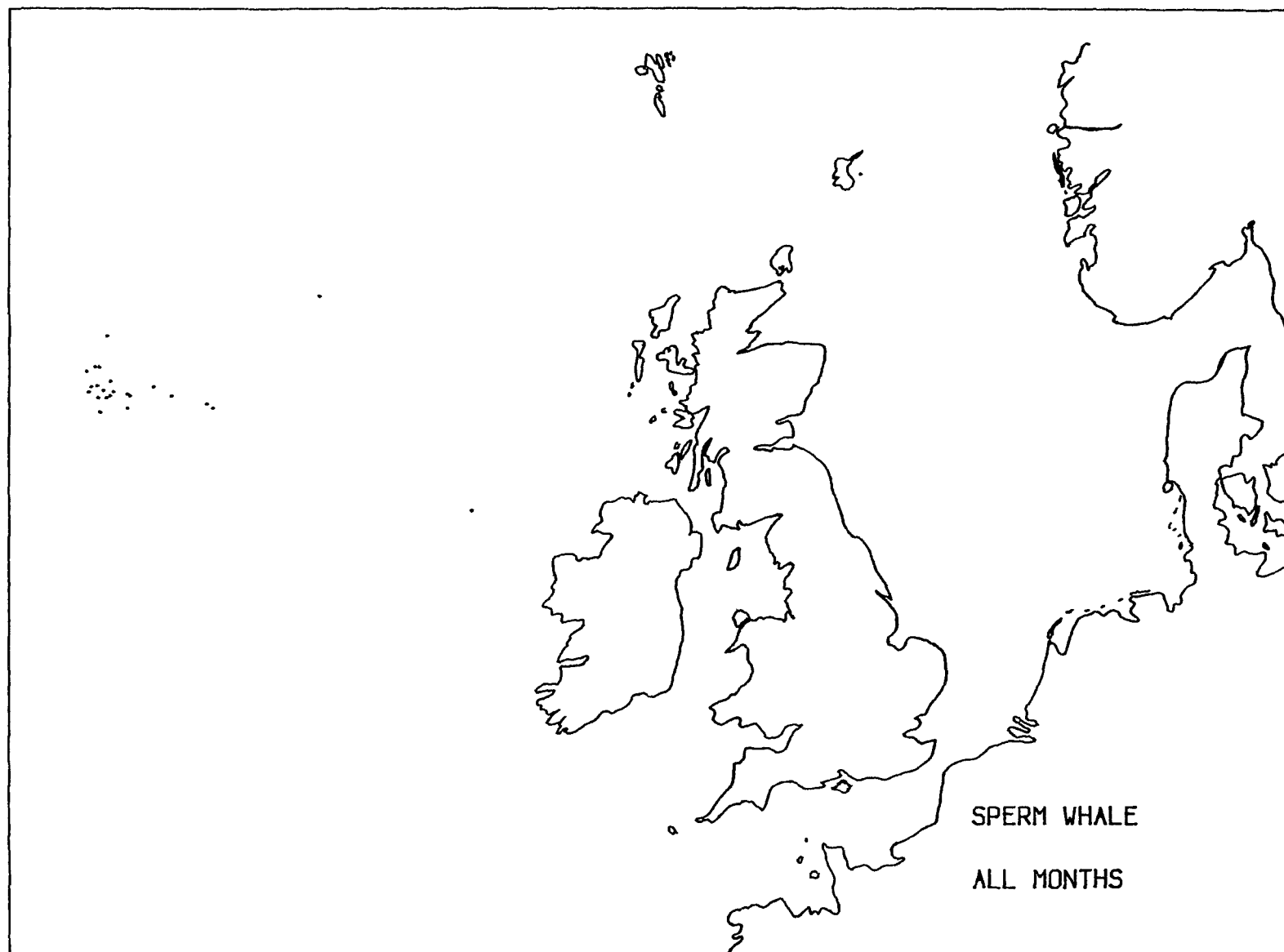
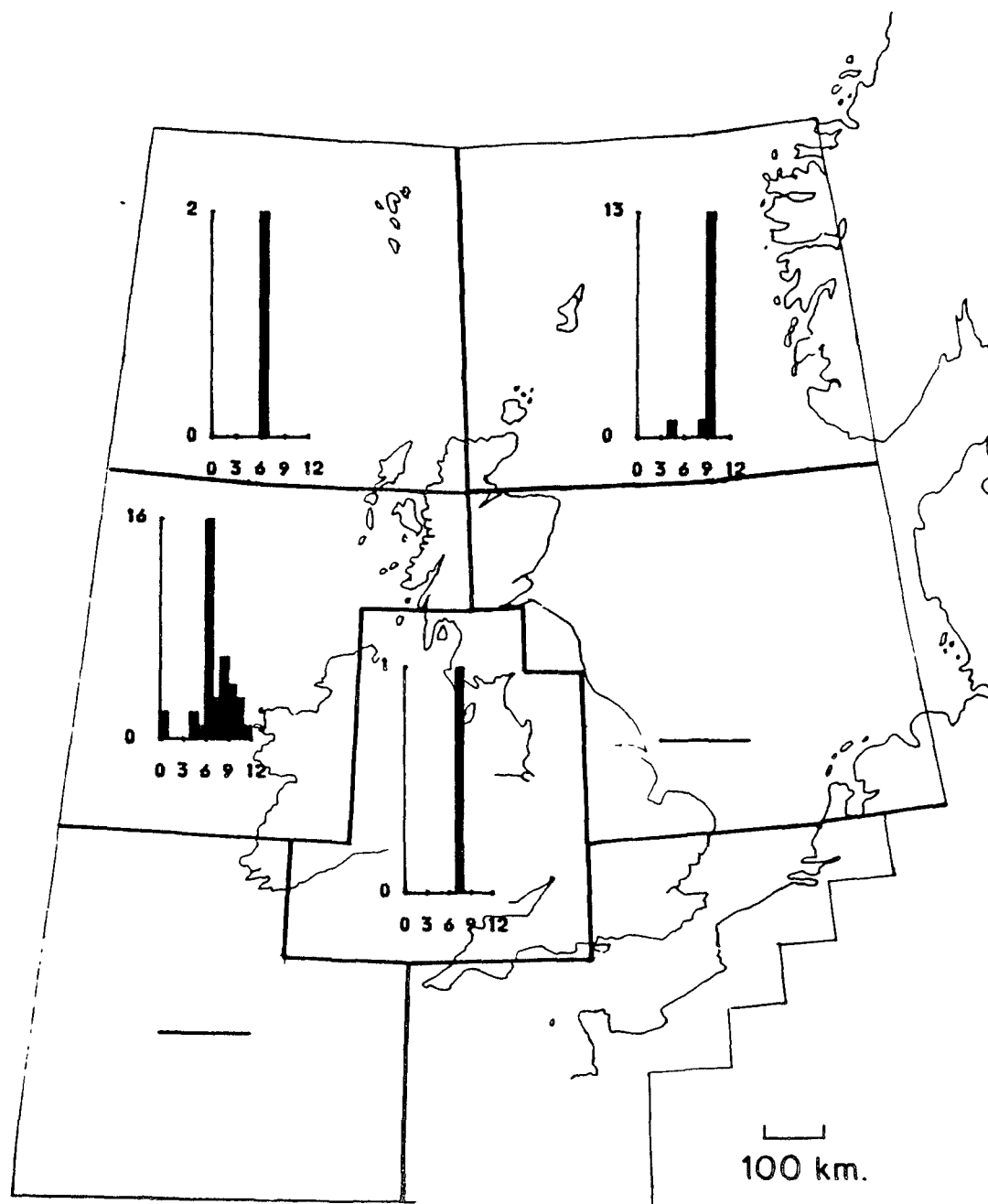


Fig. 9. Seasonal distribution of sperm whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan...12 = Dec)



SPERM WHALE

in Shetland and 76 in the Outer Hebrides between 1903-29. One individual was taken in the latter region in 1950-51. In Western Ireland, 48 Sperm whales were taken between 1908-14 and a further 15 in 1920 and 1922. Most catches occurred in deep waters just off the edge of the continental shelf.

There has been a clear increase in the number of strandings on British and Irish coasts this century with nine between 1913-48, and 28 between 1949-85 (twenty since 1973). Together with sightings data they suggest that an increasing number of females and young as well as lone males are moving into high latitudes.

Only four of the twenty five sightings recorded since 1965 occur in continental shelf waters, the rest being at least 300 km west of the British Isles. Although most sightings are of single individuals, groups numbering three to six have occurred not infrequently. There is no obvious seasonal pattern of occurrence although unlike most other species, there are a number of sightings between October and December (Fig. 9, Appendix 3).

Narwhal *Monodon monoceros*

A vagrant from the arctic, this species has only been recorded five times in British waters. All of these were strandings of single animals, in 1648, 1800, 1808, and in 1949 (2). There was also a sighting of two individuals off Orkney in late June 1949 suggesting that the two strandings (in Essex and Kent) may have been part of a larger group. There have been no sightings or strandings since then.

White whale *Delphinapterus leucas*

Also a vagrant from the arctic. The only record of a stranding on the British coast was in October 1932 near Stirling. There are five acceptable sightings, all but one occurring in Scotland. The exception was seen in September 1948 off Clare Island, Co. Mayo. Of the others, one was seen off the island of Soay, near Skye in 1950, one between Orkney and Burray in October 1960, and one at Arrochar, Loch Long in November 1965. This latter record could have been the same individual reported by many observers in Gourock Bay during late summer of 1964. There are no records in British and Irish waters since then, but single white whales (descriptions indicate at least two individuals involved) have been observed on the Dutch coast in January 1981, November 1983, and March 1984 (sightings on successive days).

Northern Bottlenose whale *Hyperoodon ampullatus* (Fig. 11)

There is some indication that this species has declined in the Northeast Atlantic in recent years. Small numbers were taken in the Scottish whale fishery with 25 captured in Shetland and one in the Outer Hebrides between 1903-28 (none in 1950-51). None was taken off Western Ireland. However, it should be remembered that whalers would have concentrated upon the larger commercially more profitable species available to them. Between 1939-69 more than five thousand northern bottlenose whales were

Fig. 10 Direct plots of distribution of "medium whale sp." sightings

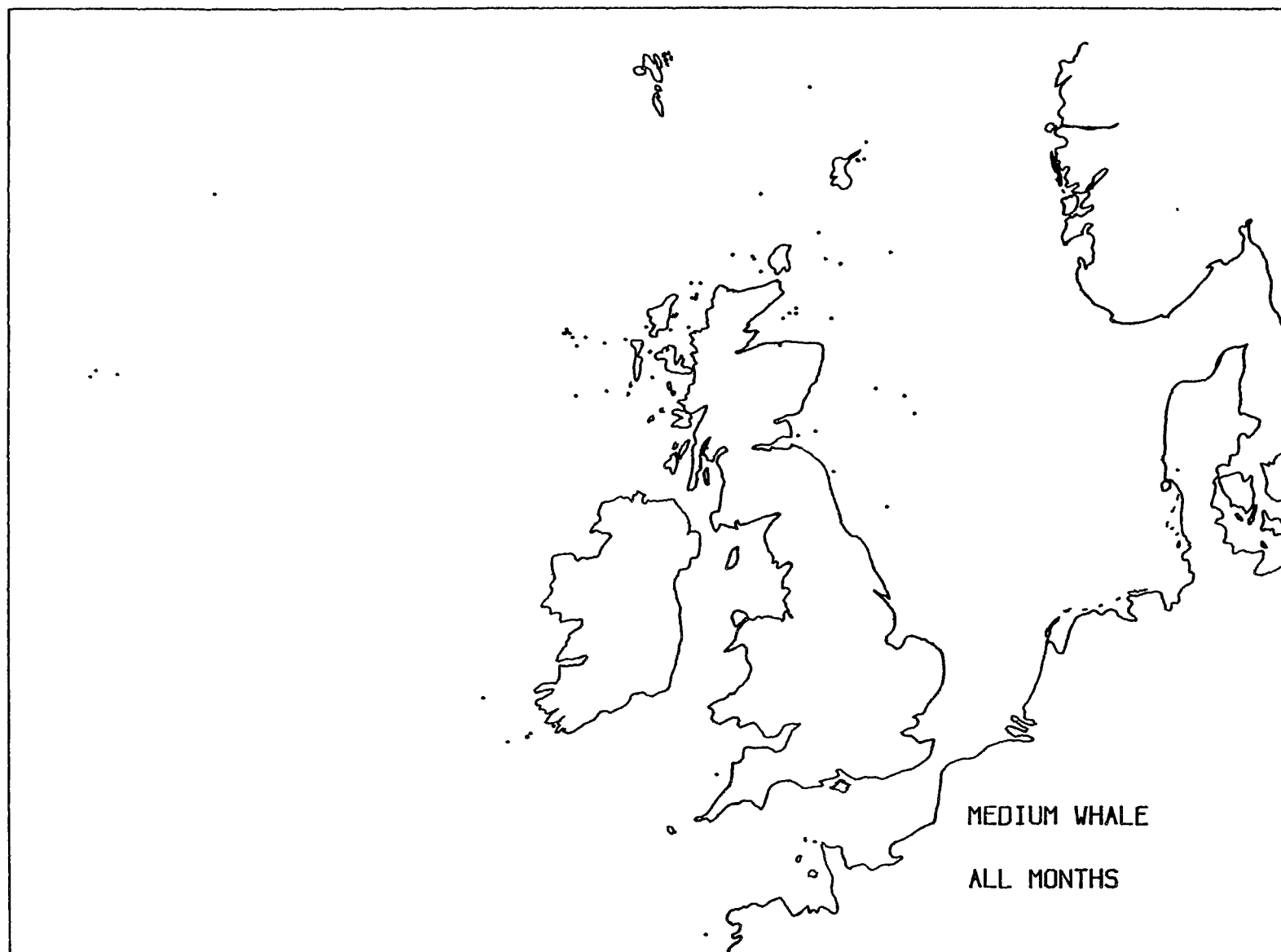


Fig. 11 Direct plots of distribution of northern bottlenose whale sightings

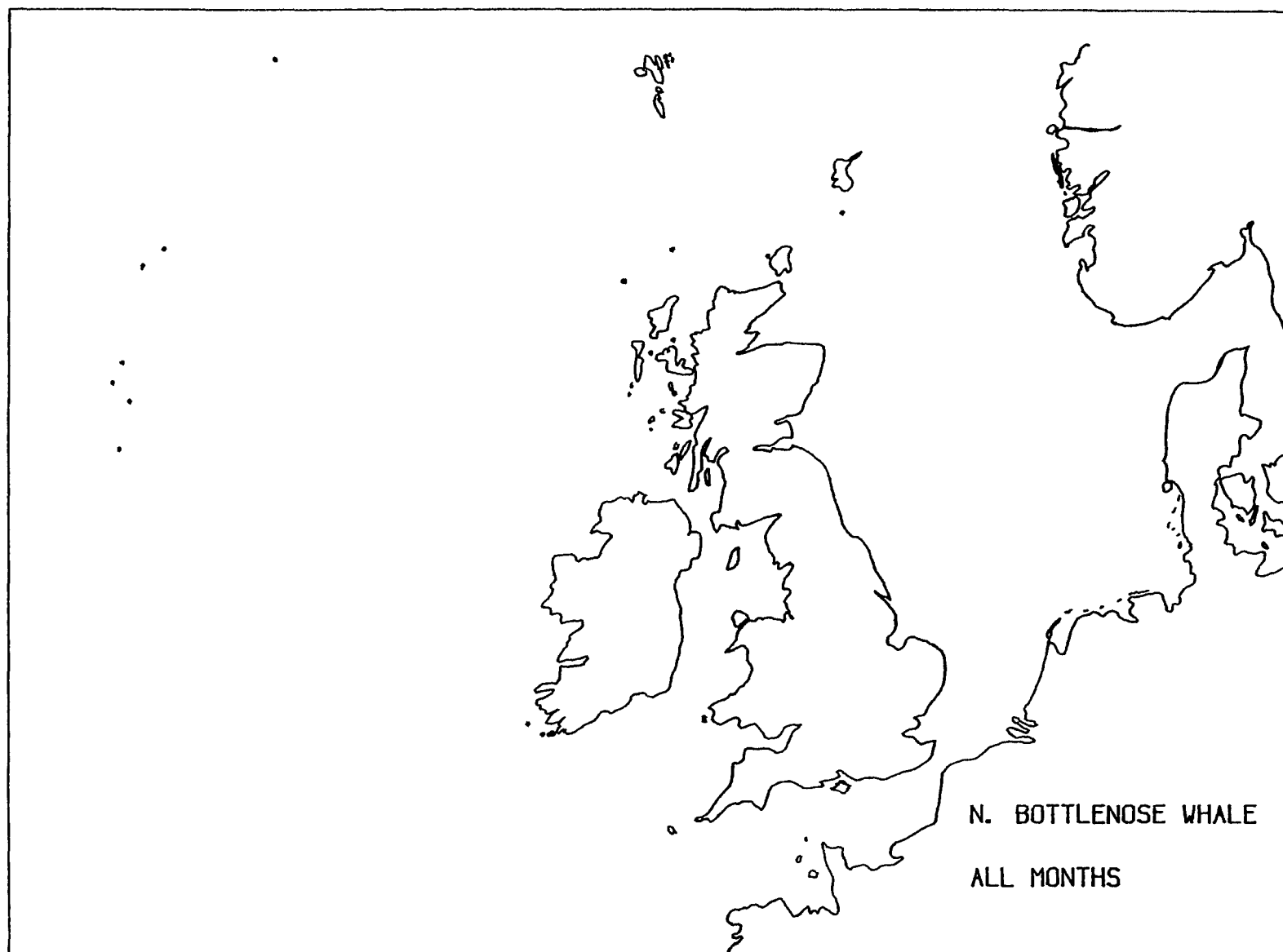
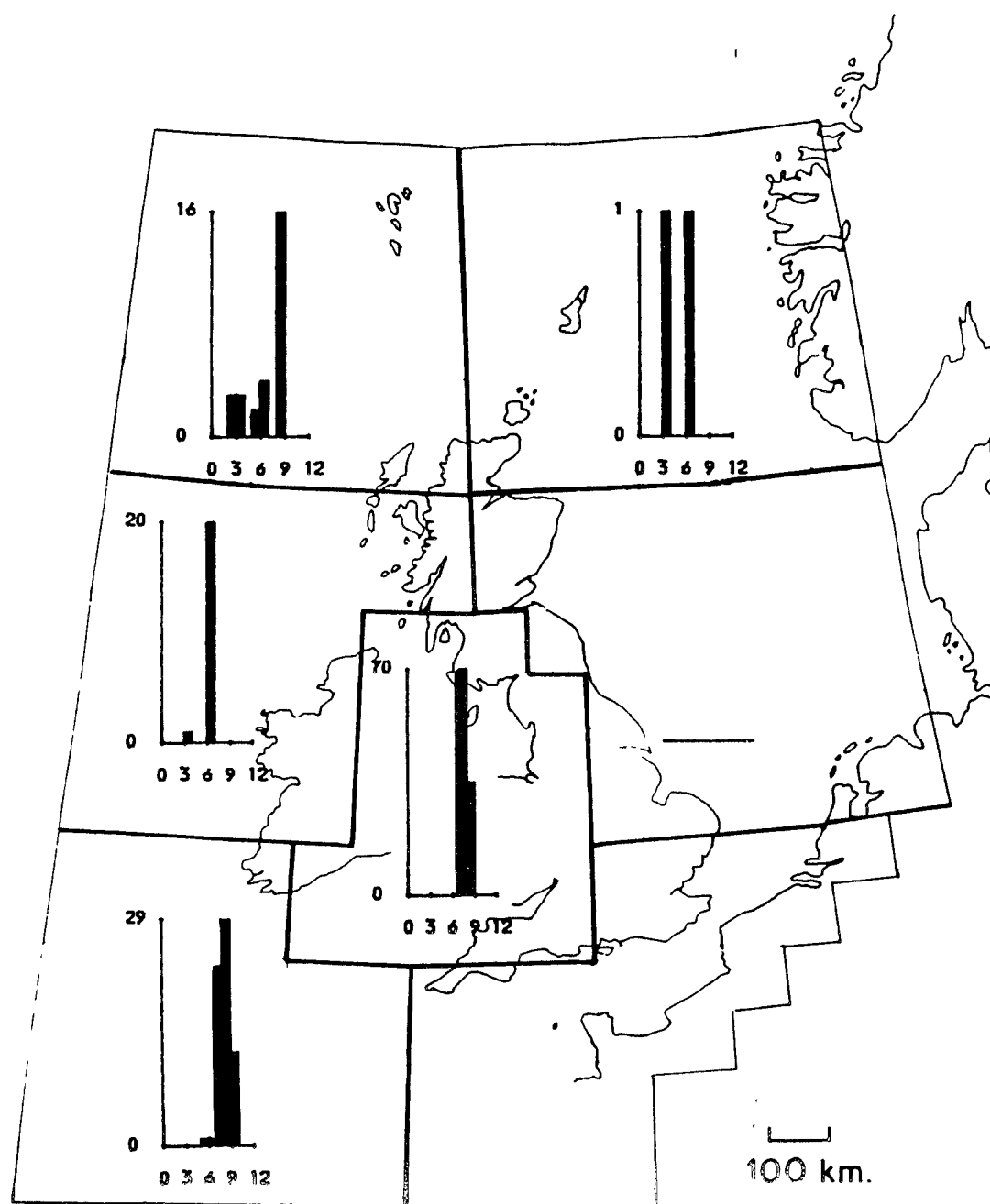


Fig. 12 Seasonal distribution of N. bottlenose whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan....12 = Dec)



N. BOTTLENOSE WHALE

taken off the west and north coasts of Norway, around Spitzbergen, Bear Island, Jan Mayen and Iceland.

The number of strandings on British and Irish coasts has declined from 55 between 1913-48 to 44 between 1949-85. Sightings records also show a decline with 149 individuals observed between 1960-72 compared with 66 individuals between 1973-85, despite better coverage in the latter period. Most records are from deep waters in the North Atlantic, 5-700 km west of Britain and Ireland. Those in coastal waters are concentrated in the southwest approaches to the British Isles and around the Outer Hebrides in Northwest Scotland. These results further suggest that the species may travel mainly outside the continental shelf. Most sightings occur in July - September (Fig. 12, Appendix 3), when there appears to be an onshore movement (Table 3, Appendix 5). Most records involve single individuals although there are four sightings of groups comprising 15-35 individuals.

Cuvier's whale *Ziphius cavirostris*

Another deepwater species, the Cuvier's whale is probably more common than sightings indicate and it is possible that some of the records assigned to the 'medium whale' category (Fig. 10) are of this species. There have been only two well documented sightings, one in 1980 and the other in 1984. Both were single individuals and occurred in the month of August. One of these comes from the northern North Sea east of Orkney and the other from the coast of Co. Cork, Southern Ireland (Table 2).

There have been 39 strandings since 1913, with 15 of these since 1963. Most of these come from north and west Scotland and western Ireland and further suggest an essentially Atlantic distribution. They have been recorded in every month but with most occurring between January and March or June - July.

Sowerby's beaked whale *Mesoplodon bidens*

Judged by strandings, the distribution of the Sowerby's beaked whale is centred upon the North Sea rather than the Atlantic, although there are records in that region. There have been 43 strandings between 1913-85, with 23 of these since 1963. These have occurred mainly in the Northern Isles and along the coast of Eastern Britain, but there are a number of records in the English Channel as well as the west coast of Ireland. There are also strandings records from most European countries bordering the North Sea.

Strandings are of single individuals and occur in most months but particularly July - September. The only documented sighting was made by PGHE in the Minches west of Scotland in August 1977. Later that month two individuals came ashore separately on the isle of Skye and neighbouring Raasay.

[Gervais' beaked whale *Mesoplodon europaeus*]

The type specimen of this species was found floating in the western approaches to the English Channel in the 1840s. Since then the species

has been recorded elsewhere in the Atlantic, mainly along the east coast of North America. However, there has been no further records from Britain and Ireland (or indeed any part of Europe).

True's beaked whale *Mesoplodon mirus*

The species is known worldwide only from a handful of strandings, all but one of which are from the temperate North Atlantic. Most of these come from Britain and Ireland with a stranding from the Outer Hebrides and five from the west coast of Ireland from Galway Bay to Ballinskelligs, Co. Kerry. Three strandings occurred between 1913-37, and the other three since 1973.

[Gray's beaked whale *Mesoplodon grayi*]

This species apparently has a circumpolar distribution in the southern hemisphere. Surprisingly, however, there is one record of a stranding from the Dutch coast in 1927. This remains the sole known instance of the species in the northern hemisphere, and probably represents an exceptional occurrence.

Harbour porpoise *Phocaena phocaena* (Fig. 13)

Although the commonest species in British and Irish waters both in terms of sightings and individuals, the Harbour porpoise appears to have declined in many areas. Although the precise timing of any decline is unknown and requires archival study, possible status changes from sightings data in the last 10-20 years are examined in the second section. Strandings records fluctuate greatly between 1913-85 with half as many (34 strandings) between 1968-72 as in the five-year periods on either side of it (73 before and 57 after). Although there is little indication of an overall decline in the last ten years, the numbers recorded stranded on the south coasts are greatly reduced (129 between 1913-47 compared with 66 between 1948-85) and declines during the 1950s to early 1960s in southern Britain and the North Sea are indicated from analyses of quantified effort data (see section 3).

The species is essentially coastal with by far the bulk of sightings being within 10 km of land (Table 4, Appendix 4). Distribution is concentrated on Southwest Ireland and Northeast Scotland. This undoubtedly partly reflects the distribution of effort, although it does indicate where the main centres of distribution lie. It is probable that with better effort the remainder of western Ireland and the west coast of Ireland and the west coast of Scotland would be included. The North Sea has received particular attention in recent years and this should be borne in mind when interpreting the data. Bearing in mind variations in coverage, it is nevertheless clear that numbers in the southern North Sea, English Channel and Irish Sea are now relatively low.

Porpoises are seen in all months but there is a distinct seasonal peak between July and September (Fig. 14, Appendix 3). There is also a clear indication of an offshore movement in winter (Table 3, Appendix 5) which supports the suggestion that the paucity of sightings in coastal areas in winter months is reflecting a definite movement away from the coast

Fig. 13 ICES grid map of distribution of harbour porpoise

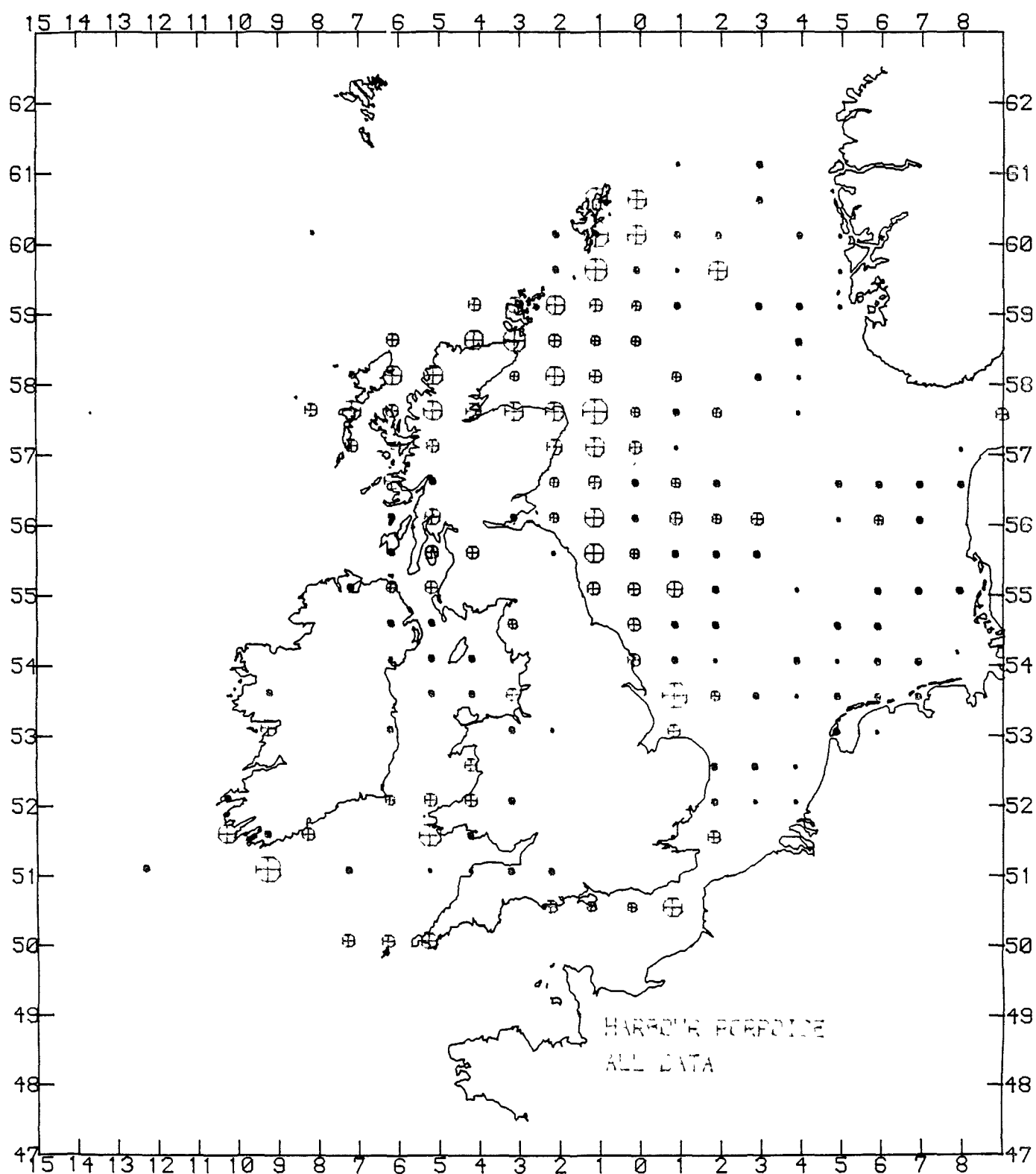
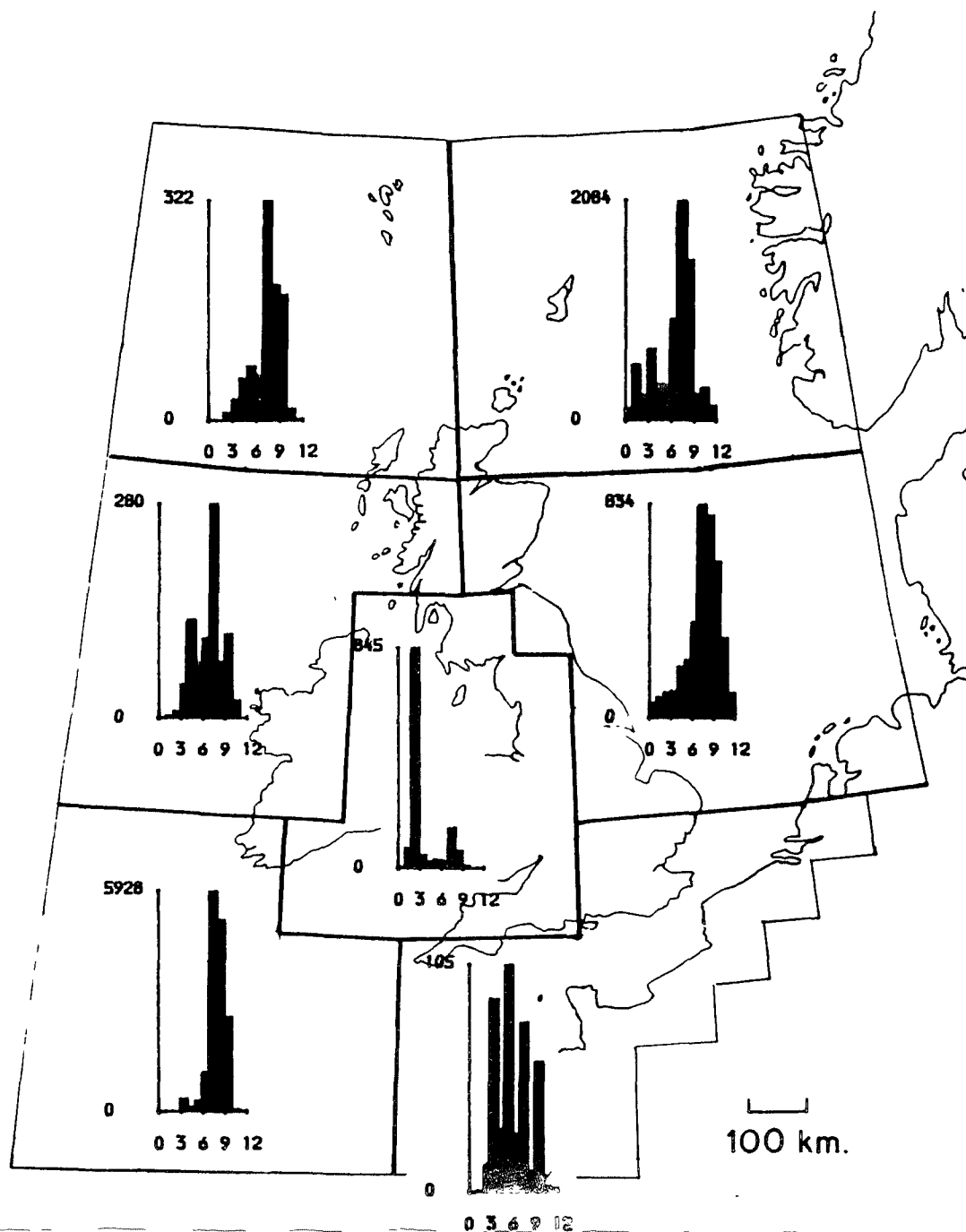


Fig. 14 Seasonal distribution of harbour porpoise by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan....12 = Dec)



HARBOUR PORPOISE

(though possibly not to any great distance) rather than solely poorer coverage or viewing conditions. Despite this pattern, some individuals at least do remain in coastal waters during the winter.

Most young animals have been seen between May and August, suggesting that births are mainly during early summer although young have been sighted as early as March (Table 5, Appendix 6). An analysis of sightings of juveniles at different distances from land and according to period of the year indicates that breeding before a spring onshore movement, but that most births probably occur in coastal waters during the summer.

Most sightings of porpoises comprise one or two individuals, although large aggregations have been observed usually associated with feeding.

Common dolphin *Delphinus delphis* (Fig. 16)

Widely distributed in British and Irish waters but with a primarily western and southern component. Unlike the previous species, and most other dolphins, many sightings were greater than 100 km from the coast (Table 4, Appendix 4). There is some indication of an offshore movement with animals seen further from the coast in late summer and during the winter months (Table 3, Appendix 5). Most common dolphins were seen in British and Irish waters between July and October (Fig 17, Appendix 3). Although most records from mid Atlantic had to be assigned to the category 'dolphin sp.' (see Fig. 15), some documented sightings were definitely of this species and it is clear that it regularly occurs offshore at least to 57 degrees N.

There is little information on timing or location of breeding but the evidence suggests births are mainly in early to mid summer (Table 5, Appendix 6). The breeding season may be associated with a slight onshore movement (Table 3, Appendix 5). Group sizes are commonly between 10 and 20 individuals but may number in the hundreds.

Population trends are difficult to discern as yet from the sightings data, although the strandings records suggest that after a period of relatively few strandings (46) between 1938-68, there has been a substantial increase (109 strandings) since then.

Striped or Euphrosyne dolphin *Stenella coeruleoalba*

This species occurs mainly in warm temperate and tropical waters. All recent documented records come from the southwest sector of the British Isles south towards the Bay of Biscay. The most northerly record occurs in the southern Irish Sea although there are some sightings made 700 km west of Scotland which were assigned to this species but do not have sufficient documentation for confirmation. Between 1913-62 there had been only two strandings on British and Irish coasts, but since then a further eight have been added, all from Atlantic or Irish Sea coasts. These suggest that the species may be occurring further north than previously.

Fig. 15 Direct plots of distribution of "dolphin sp." sightings

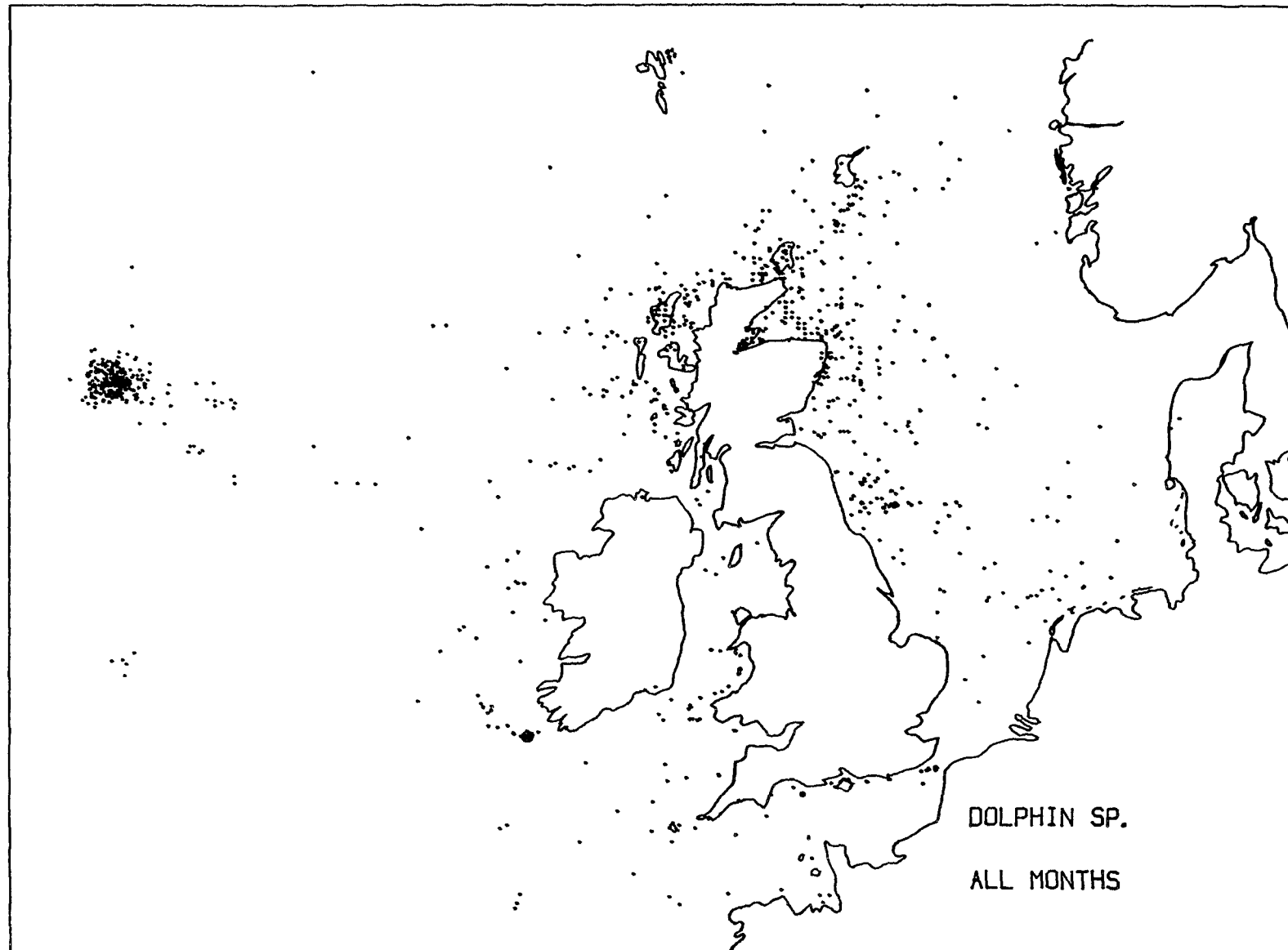


Fig. 16 ICES grid map of distribution of common dolphin

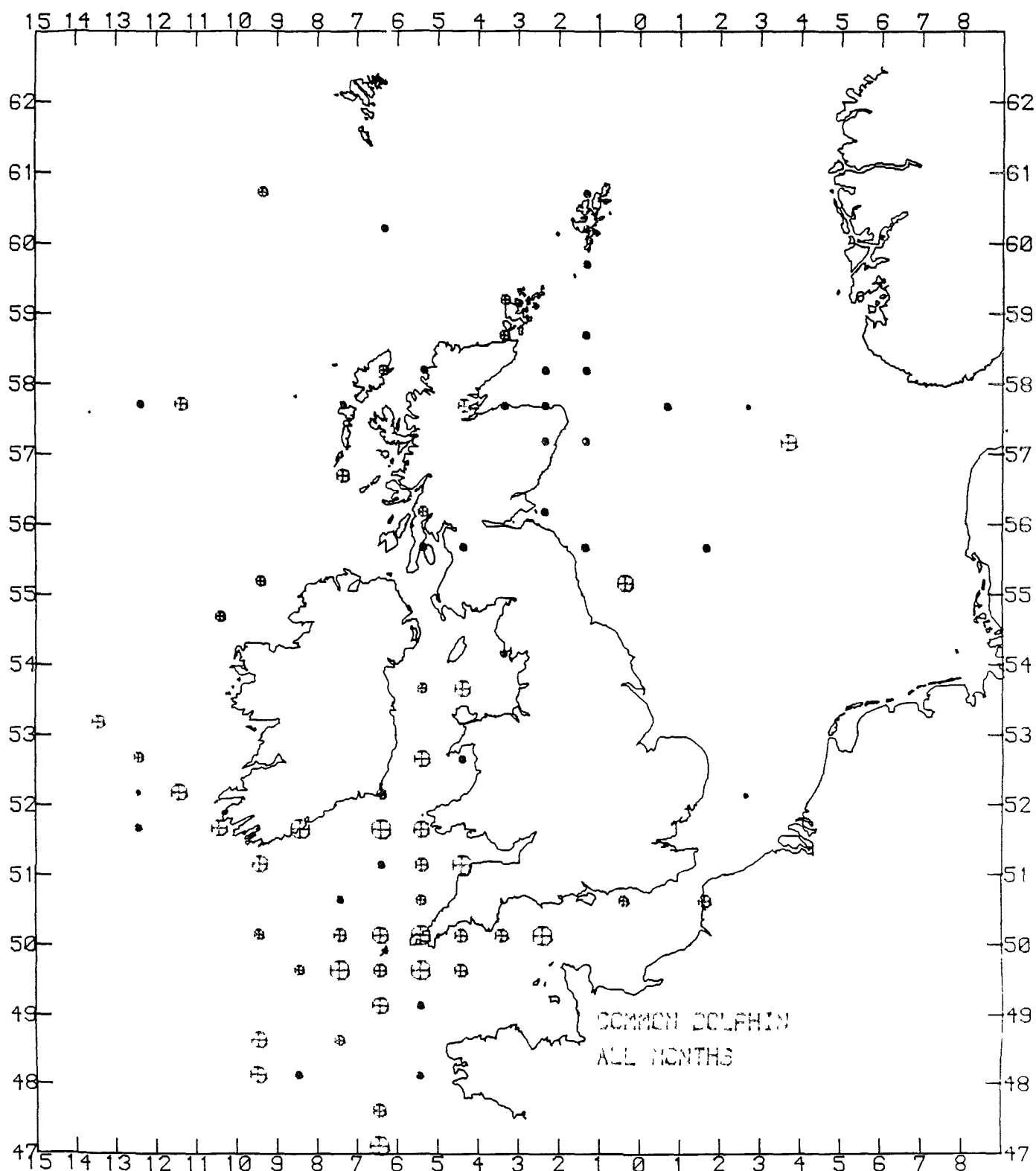
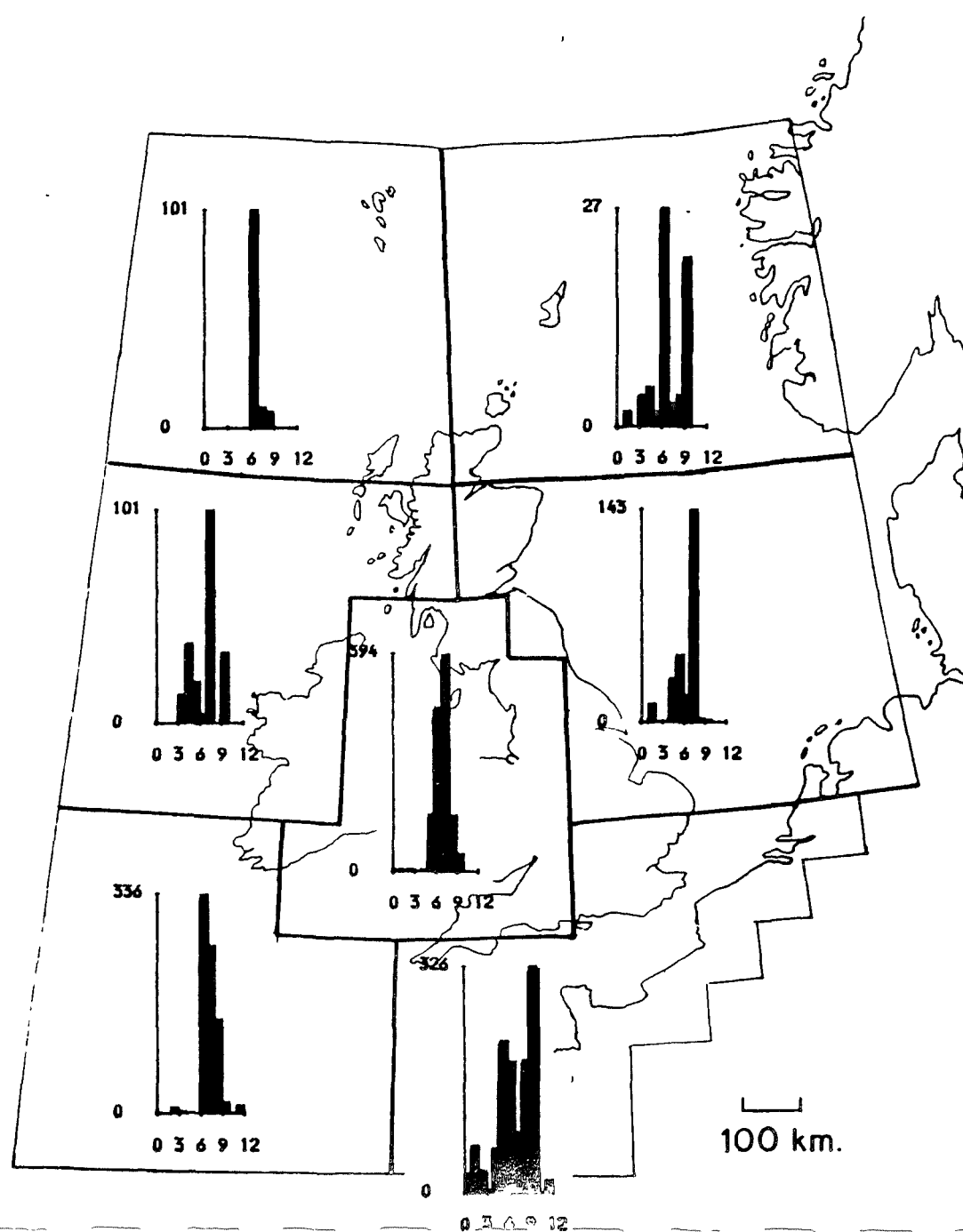


Fig. 17 Seasonal distribution of common dolphin by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan ..12 = Dec)



COMMON DOLPHIN

There is no particular seasonal pattern to sightings with some occurring between July and September and others in December and February. It is in autumn (September possibly extending to January) that the species is thought to breed. Sightings involve either single individuals (sometimes in mixed herds with common dolphin) or groups up to thirty individuals.

Bottle-nosed dolphin *Tursiops truncatus* (Fig. 18)

Once amongst the commonest cetacean species in British and Irish coastal waters, this species has certainly declined during the last fifty years, though like the harbour porpoise the timing of this decline is not yet clear. An examination of recent trends in the numbers of sightings and of individuals is made in the second section. Strandings records fluctuate greatly between 1913-85 and show little overall trend over this period, although there is an indication of a decline along the southern coasts of UK in recent years.

Sightings records indicate that the species has a wide distribution around Britain and Ireland although apparently very rare in the southern North Sea and English Channel. It is essentially an inshore species with most sightings coming from within 10 km of land (Table 4, Appendix 4). Most sightings occur in July to September although the species has been seen in most months (Fig. 19, Appendix 3). There are few records between December and February. There may be an offshore movement at this time (Table 3, Appendix 5) and this could be associated with breeding since most young are seen from early spring (Table 5, Appendix 6). Groups are closest to land in mid and late summer when most sightings are occurring, but this finding should be treated cautiously due to the paucity of sightings in winter months on which to make the analysis.

White-sided dolphin *Lagenorhynchus acutus* (Fig. 20)

The centre of distribution of this species appears to be the North Atlantic and most northerly parts of the North Sea. Although concentrated in North Scottish waters it extends down the western seaboard to Southwest Britain. The species is relatively abundant though almost certainly less common than its relative the White-beaked Dolphin.

White-sided Dolphins are not particularly coastal although they do occur within 10 km of land (Table 4, Appendix 4). Numbers are greatest between August and October and there are very few records between November and April (Fig. 21, Appendix 3). There is evidence for an onshore-offshore movement in the autumn although this is based on rather small data sets for the winter period (Table 3, Appendix 5). Sightings of individuals suggest that breeding may take place in the northern North Sea in late spring and early summer (Table 5, Appendix 6). There are probably other breeding areas to the north and west.

As with the previous species, most group sizes comprise less than ten individuals but some herds may number 50-100 (mainly 30-50) individuals. Generally herd sizes are larger when further offshore.

White-beaked Dolphin *Lagenorhynchus albirostris* (Fig. 22)

Fig. 18 ICES grid map of distribution of bottle-nosed dolphin

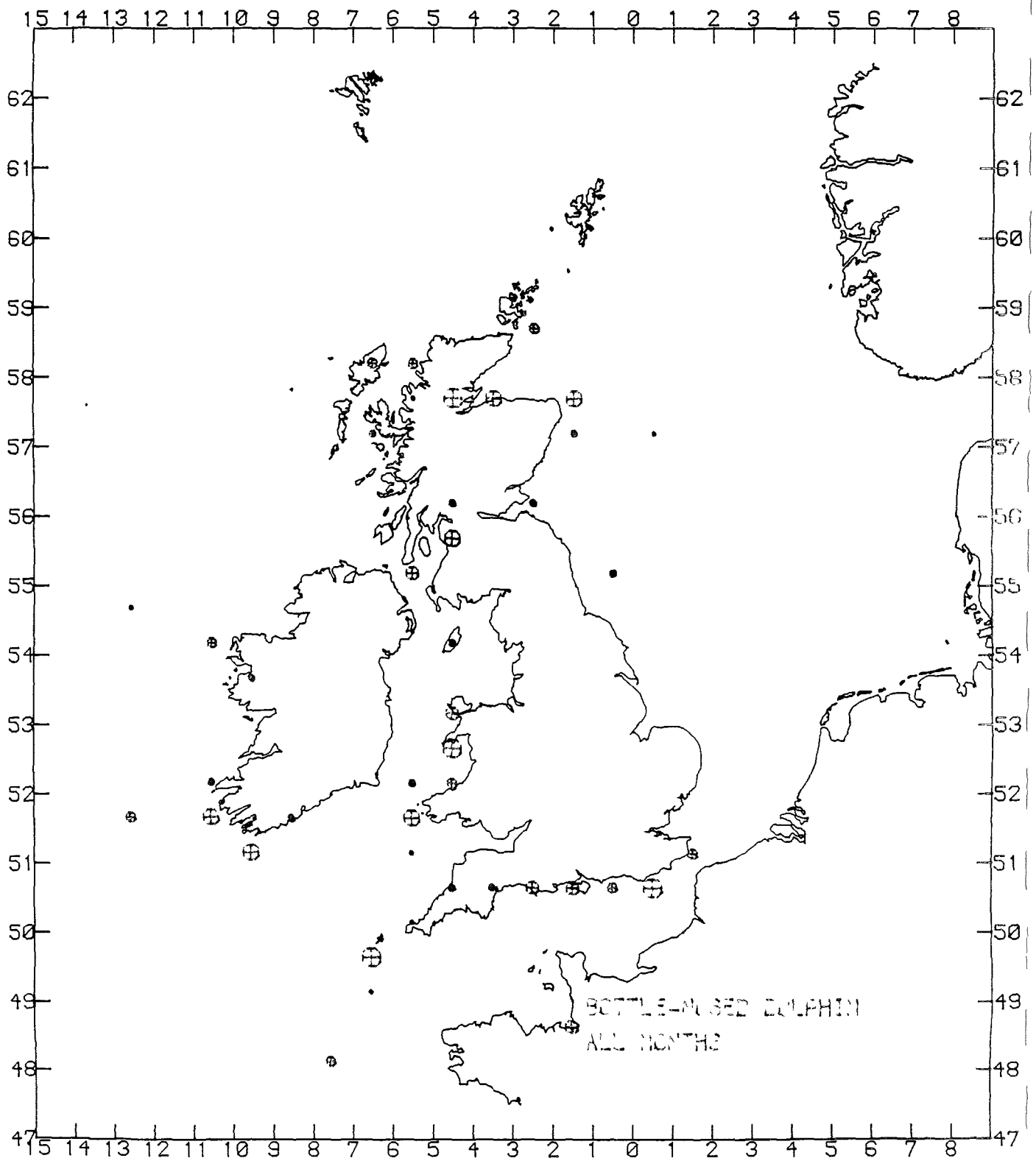
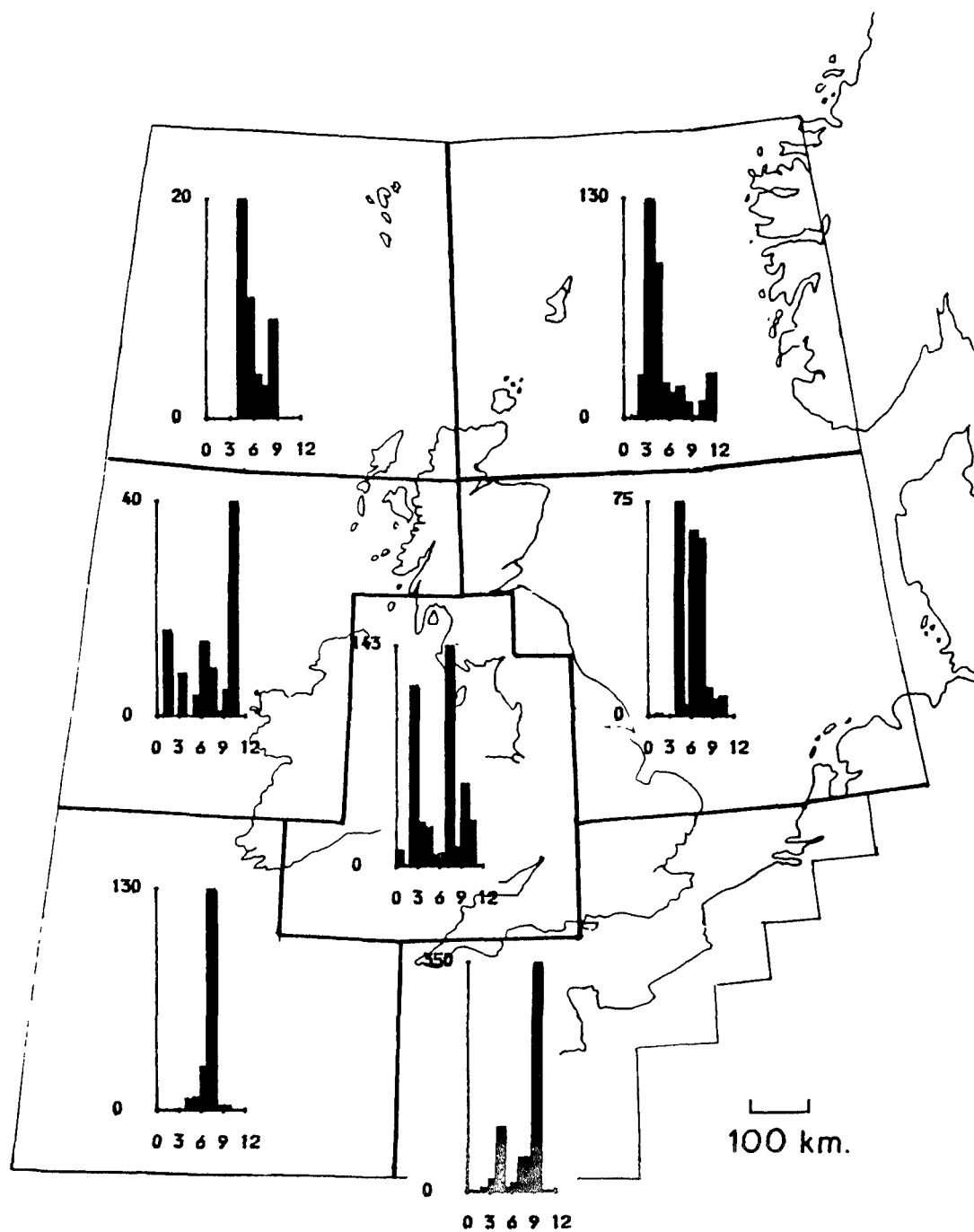


Fig. 19 Seasonal distribution of bottle-nosed dolphin by major sea area
(vertical axis is number of individuals; horizontal axis is month where 1 = Jan....12 = Dec)



BOTTLE-NOSED DOLPHIN

Fig. 20 ICES grid map of distribution of white-sided dolphin

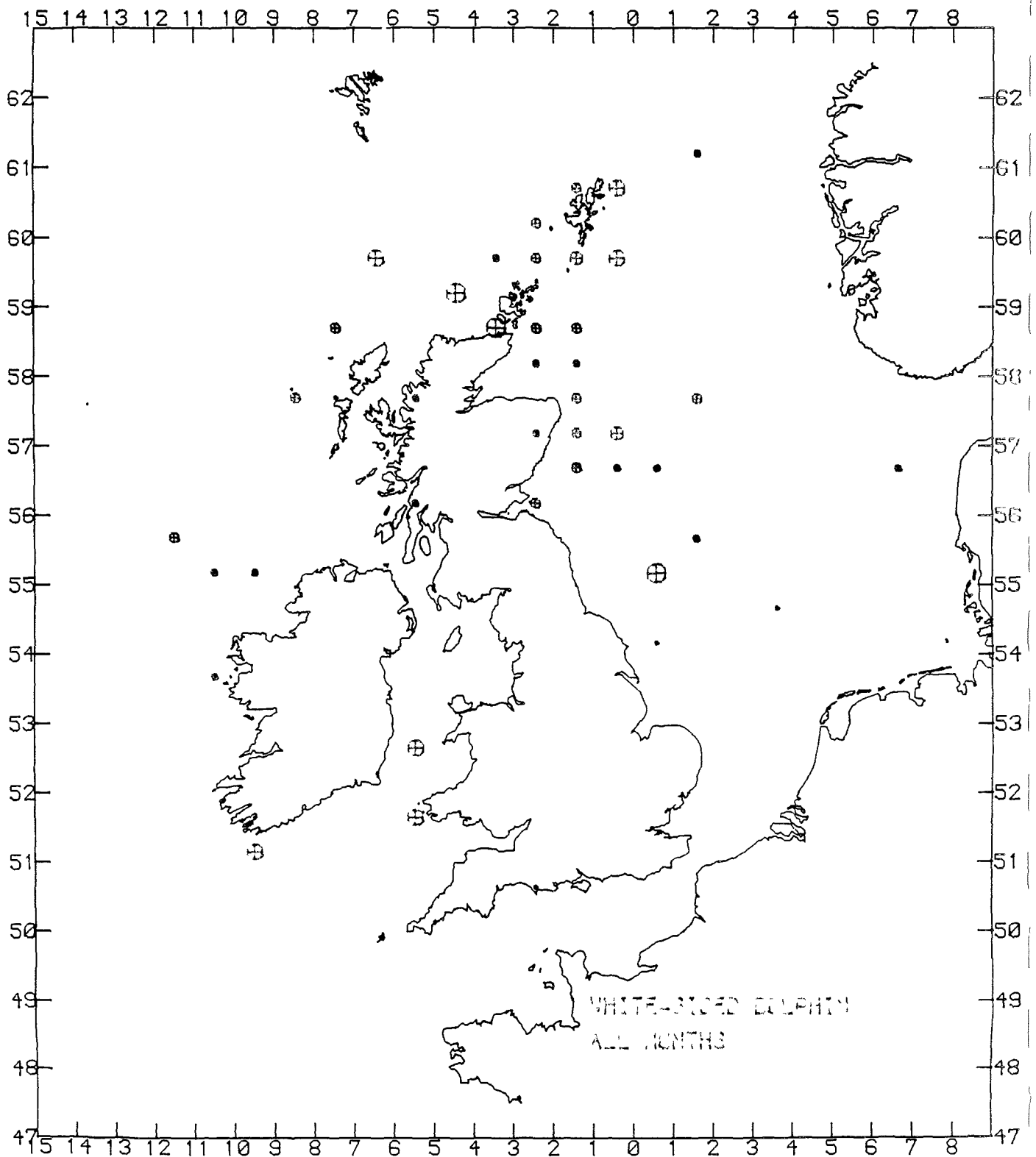
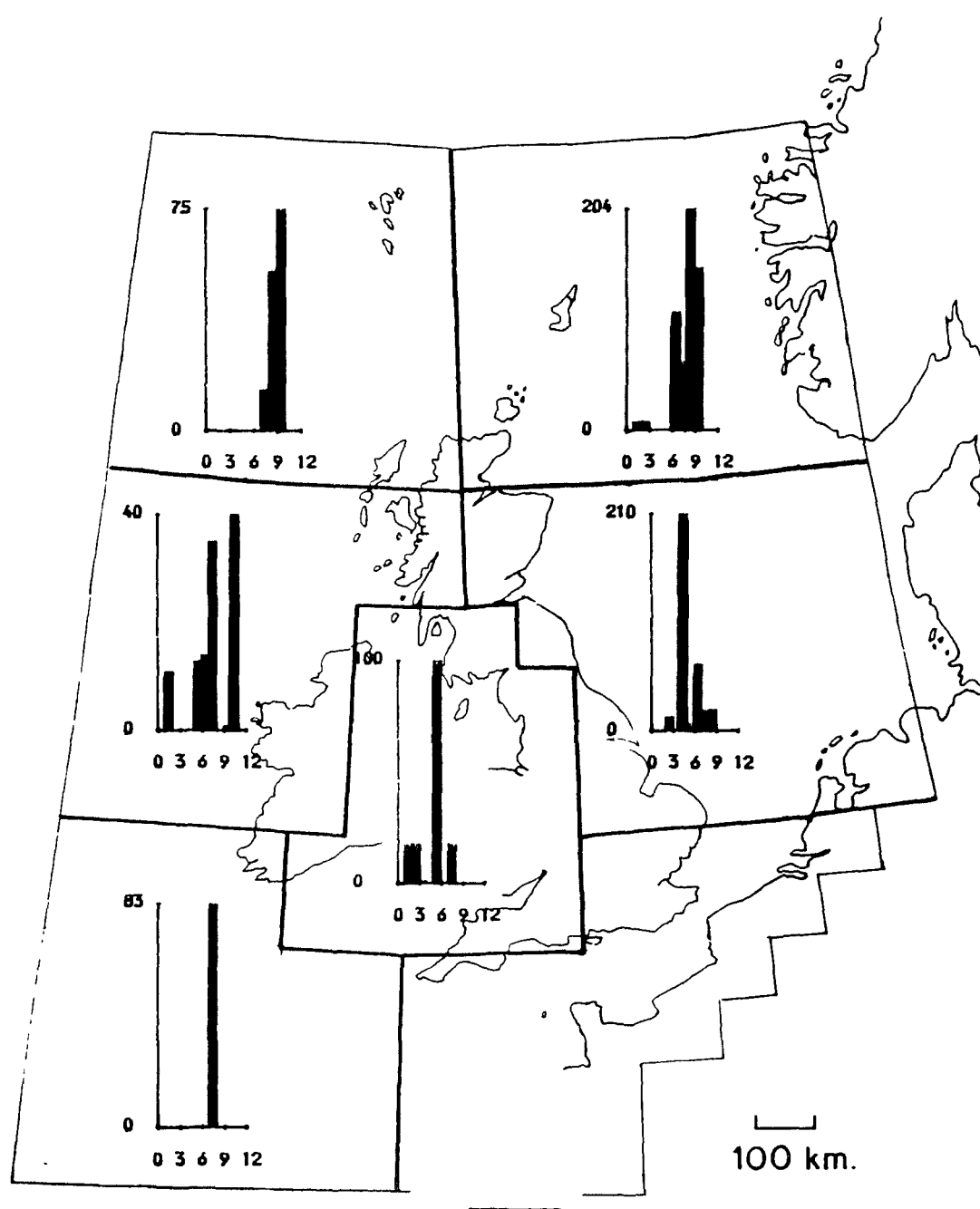


Fig. 21 Seasonal distribution of white-sided dolphin by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan. 12 = Dec)



WHITE-SIDED DOLPHIN

Fig. 22 ICES grid map of distribution of white-beaked dolphin

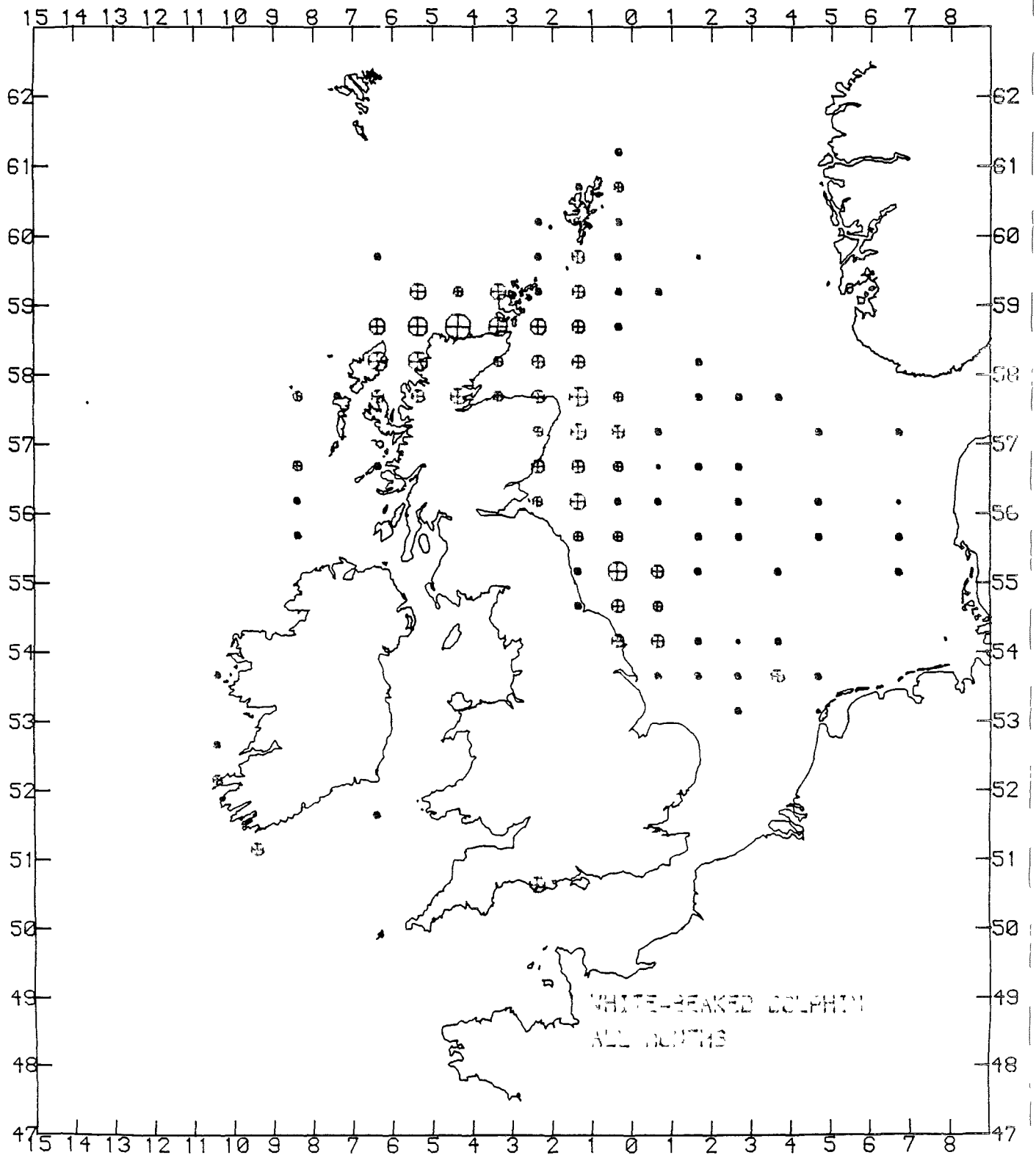
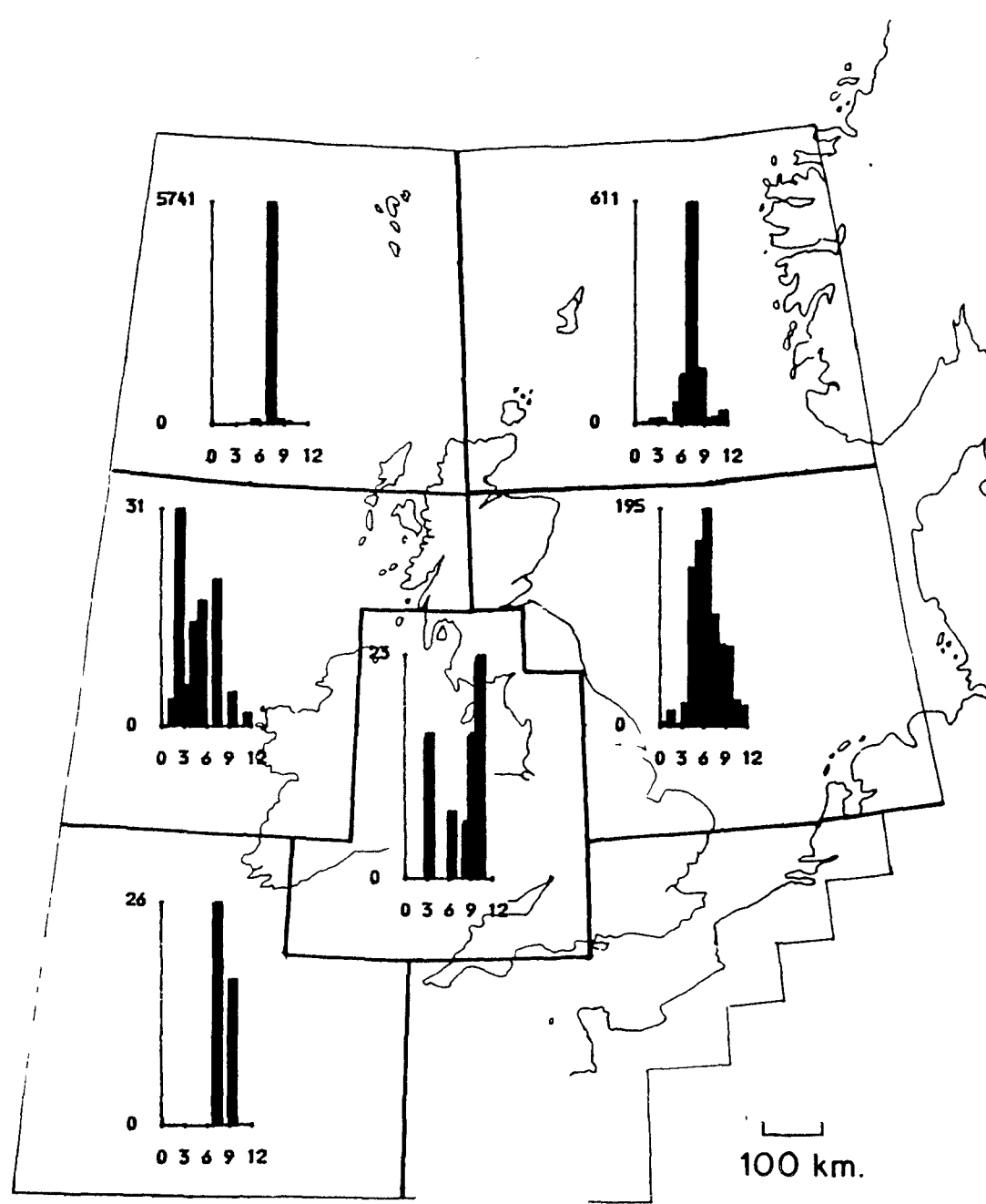


Fig. 23 Seasonal distribution of white-beaked dolphin by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan. .12 = Dec)



WHITE-BEAKED DOLPHIN

This species has a very similar distribution to its relative. It is the third most frequently recorded species overall in British and Irish waters, centred mainly upon the North Sea (except the southern third), north and north-west Scotland and extending southwards towards Southwest Britain.

Although recorded in all months, most sightings are in August (Fig. 23, Appendix 3). There appears to be an inshore movement at this time (Table 3, Appendix 5) and this is probably associated with concentrations of food fishes in those areas. Most group sizes are less than ten individuals but herds of 30-50 are not uncommon and there are a few records of 1-500 individuals off the north-west coast of Scotland. Most of those sightings are associated with feeding, and we are currently carrying out studies on herd structure and cooperative food herding by this species in that region.

The breeding grounds of this species are unknown but judging by the distribution of sightings with young juveniles (Table 5, Appendix 6), will be in a similar area to the previous species with births primarily in late spring to early summer prior to an inshore movement.

False killer whale *Pseudorca crassidens*

With a pelagic distribution, this species is probably quite rare in British and Irish coastal waters. There have been no strandings since 1935 (when there were eleven strandings, the largest number being of 21 animals in Llanmadoc Bay, Glamorgan). There are three well documented sightings (Table 2), one of which involved a herd of between 100 and 150 animals off North-east Scotland in July 1981. The other two sightings were much smaller groups on the west coast, one off Western Scotland in November 1976 and the other off the edge of the continental shelf west of Brittany, France in July 1980. A sightings record has been received recently from Outer Hebridean waters but requires checking further for confirmation.

Killer whale *Orcinus orca* (Fig. 24)

This species has a wide distribution in British and Irish waters including the central and northern North Sea. Most sightings occur off North-west and Northern Scotland and in the northern North Sea. However, the poorer coverage for western Ireland probably means this species is under represented there.

Sightings occur in all months but particularly between April and October (Fig. 25, Appendix 3). Most sightings are from August although June is also well represented. There may not be any particular peak of occurrence during the summer period. There is some evidence that the species undergoes an inshore movement in summer, moving offshore again at the end of the year (Table 3, Appendix 5).

Breeding probably occurs in late autumn or winter since sightings of young animals occur soon afterwards (Table 5, Appendix 6), and this may be associated with the offshore movement just prior to that time.

Fig 24 ICES grid map of distribution of killer whale

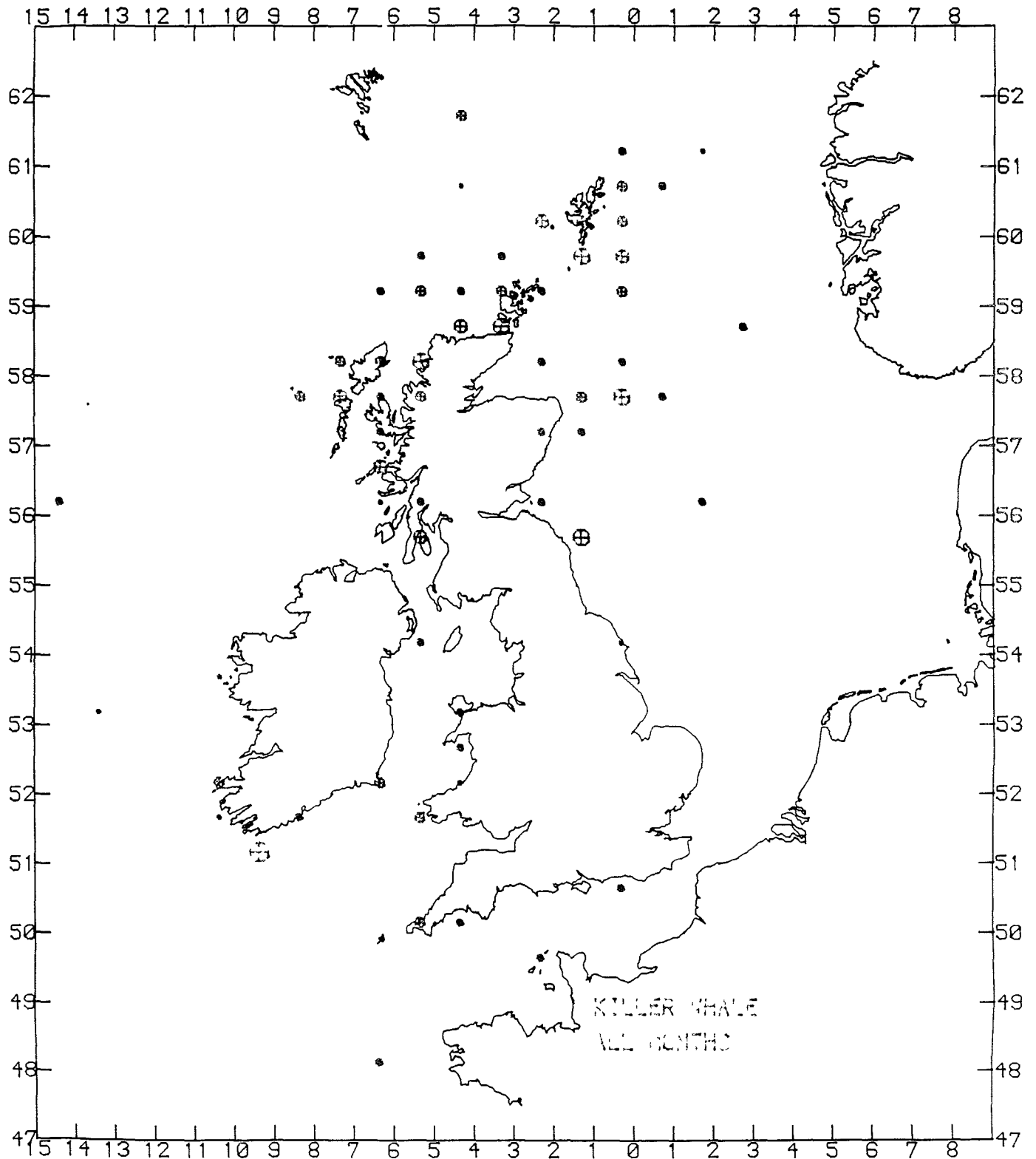
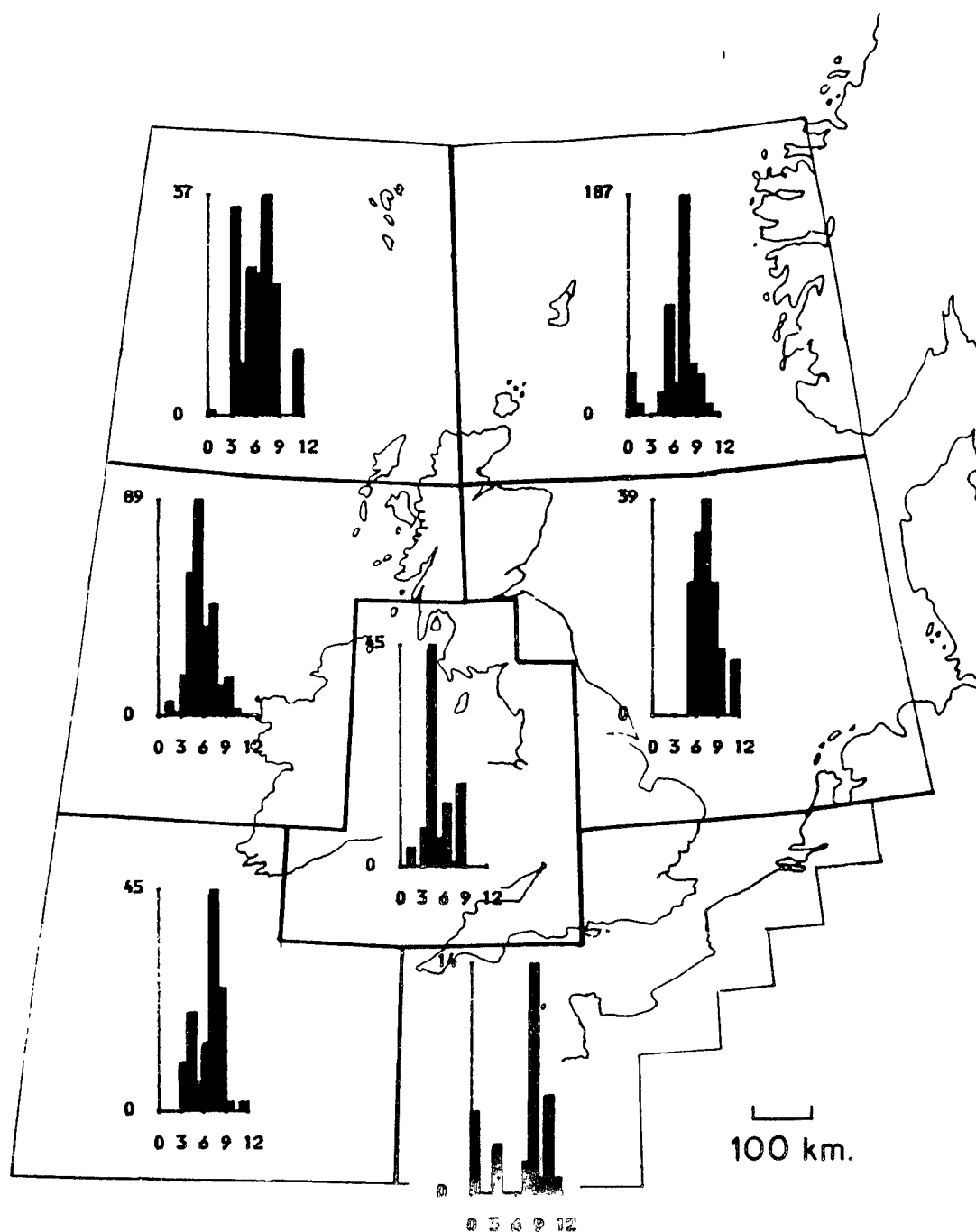


Fig. 25 Seasonal distribution of killer whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan....12 = Dec)



KILLER WHALE

The killer whale is a polygynous species with males holding harems of females and bachelor males often forming separate herds. Studies in the North-west Atlantic and North-east Pacific indicate that the species may form two distinct populations, an inshore and an offshore one. There is no clear suggestion that this is happening in British and Irish waters but a more detailed analysis of the data is really required to test this. Most sightings are of herds of ten individuals or less although groups of ten to twenty individuals are not uncommon and there is one record of a herd of 80-100 individuals in the North Sea in August.

Long-finned Pilot Whale *Globicephala melaena* (Fig. 26)

This species is now the second most frequently observed cetacean in British and Irish waters (Table 2). This is partly due to the number of reports provided regularly by the weather ships that operate off the continental shelf, 700 km west of Scotland. However, it also probably reflects a real population increase (see section 3) in recent years at least in coastal waters. The number of strandings recorded has also increased, with 23 between 1913-37, 37 between 1938-62, and well over 75 (exact number still to be confirmed) between 1963-85. These increases have occurred on all coasts, though particularly on the west coast.

Pilot whales are widely distributed in British and Irish waters occurring in all areas except the eastern English Channel and the southernmost part of the North Sea. They have a primarily pelagic distribution (Table 4, Appendix 4). The coastal populations are greatest in northern Britain, in northwest and northern Scotland. The species is recorded well into the North Sea.

Sightings occur in all months although this is mainly due to records from weather ships west of Scotland. Numbers are highest between June and December, for sightings from coastal waters (Fig. 27, Appendix 3). Since data from weather ships in the western sector contribute quite significantly to the total data set, seasonal trends are best examined for these separately (see also section 3). Besides a peak in April (caused in part by a sighting of over one thousand individuals), sightings from the weather ships are greatest between June and September (and lowest between November and February). In coastal waters, peak numbers occur later in the year, between September and January (see Fig. 27). These results suggest that there may be an onshore movement in autumn, perhaps associated with seasonal movements of their prey (see also Table 3, Appendix 5).

There appear to be peaks in the proportion of sightings with juveniles during the months of March and April (Table 5, Appendix 6). This suggests that breeding occurs primarily in late winter to early spring (when there is a paucity of sightings in coastal waters but occasional records often of quite large numbers offshore); other evidence from strandings tend to support this. Young animals have been recorded within herds in all months of the year and it is possible that the species has a protracted breeding season in the region. However, a problem with data from larger cetacean species such as these is that young take several months to attain anything approaching adult size, and so will be assigned to the juvenile category for many months after their birth.

Fig 26 ICES grid map of distribution of long-finned pilot whale

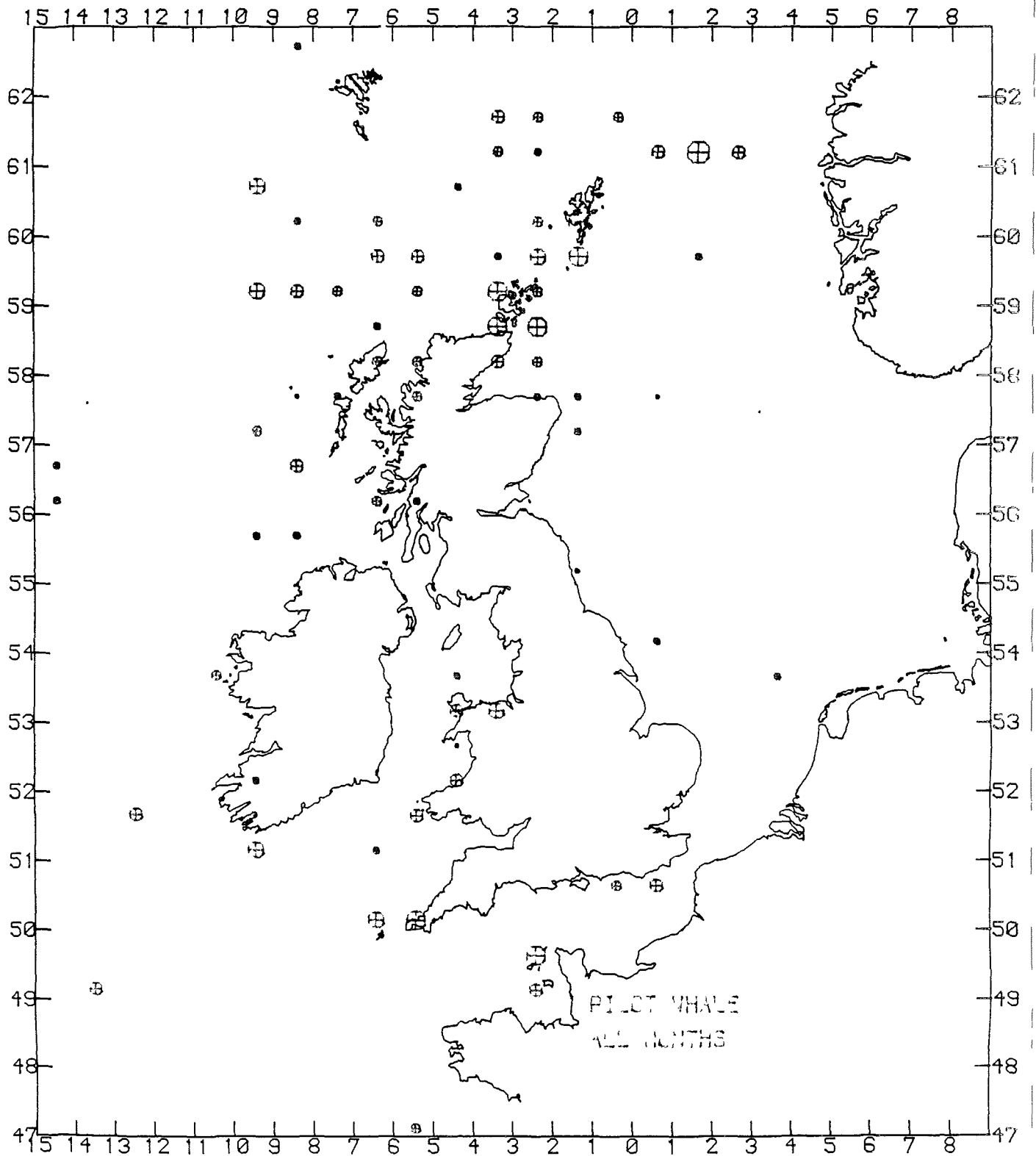
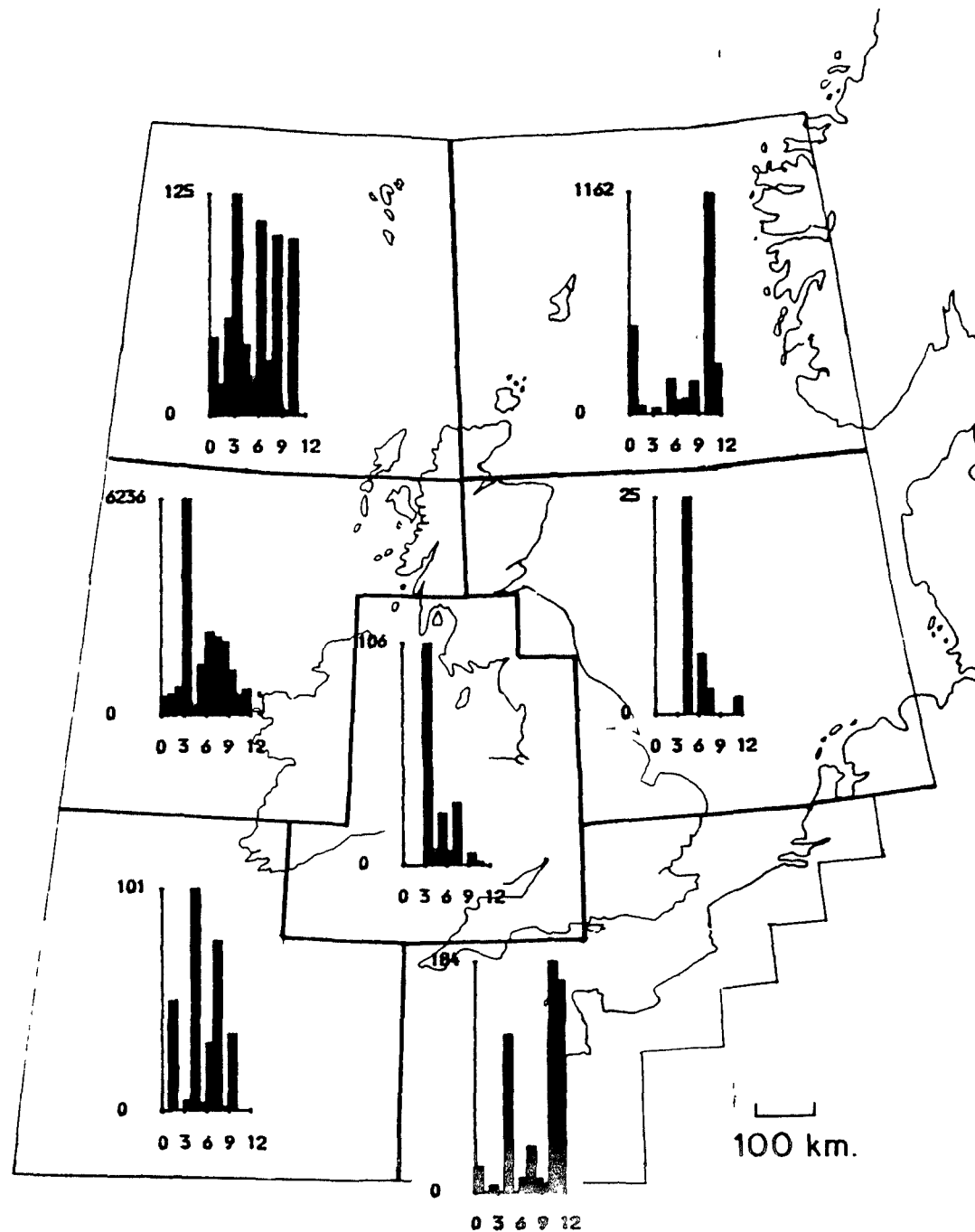


Fig. 27 Seasonal distribution of pilot whale by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan....12 = Dec)



PILOT WHALE

Although many sightings are of less than ten individuals, larger herds numbering 20-40 are commonly recorded and occasionally herds number in the hundreds or even low thousands. These latter instances are probably associated either with breeding or feeding.

Risso's dolphin *Grampus griseus* (Fig. 28)

This species also has a wide distribution in coastal waters of Britain and Ireland. It is particularly a coastal species, with most records within 10 km of the coast (Table 4, Appendix 4).

Risso's dolphins have been seen in most months of the year but with a definite peak of occurrence in August and September (Fig. 29, Appendix 3). It is at this time of the year that sightings are closest to the coast suggesting an onshore movement during this summer period (Table 3, Appendix 5).

Sightings with juveniles start in April suggesting that breeding may take place shortly before this in late winter or early spring (Table 5, Appendix 6), at a time when animals appear to be some distance offshore. This also accords with information from stranded mothers with fetuses at this time.

Most sightings are of less than ten individuals although herds of between ten and thirty individuals are not uncommon and one herd of fifty animals was recorded in June. We are currently investigating herd structure of the Risso's dolphin in some detail, in Northwest Scotland. The species appears to be polygynous with stable groups (at least over three years) comprising a mature male, a group of females, and subadults at least occasionally.

2.3 DISCUSSION

The results presented here probably give a reasonably accurate picture of the relative status and distribution of most cetacean species occurring in British and Irish waters, at least the more common ones. However, there are still major biases caused by uneven coverage. This applies particularly to Western Ireland and parts of the Irish Sea. The northern North Sea is now particularly well covered compared with areas such as the Northern Isles and North-west Scotland which are certainly under-represented despite holding important cetacean populations. Possible population trends and seasonal abundance adjusted for effort are examined in more detail in the next section, using data only from quantified effort sites.

The expansion of the observer network with particular attention to present gaps would clearly provide more comprehensive and probably more even coverage. This requires active soliciting of potential recorders which would include not only ones that could operate regularly but the more casual visitors of the sea. An important way to maintain interest in the scheme after initial publicity would be a newsletter providing regular feedback, and there is also a need for some training of observers.

Fig. 28 ICES grid map of distribution of Risso's dolphin

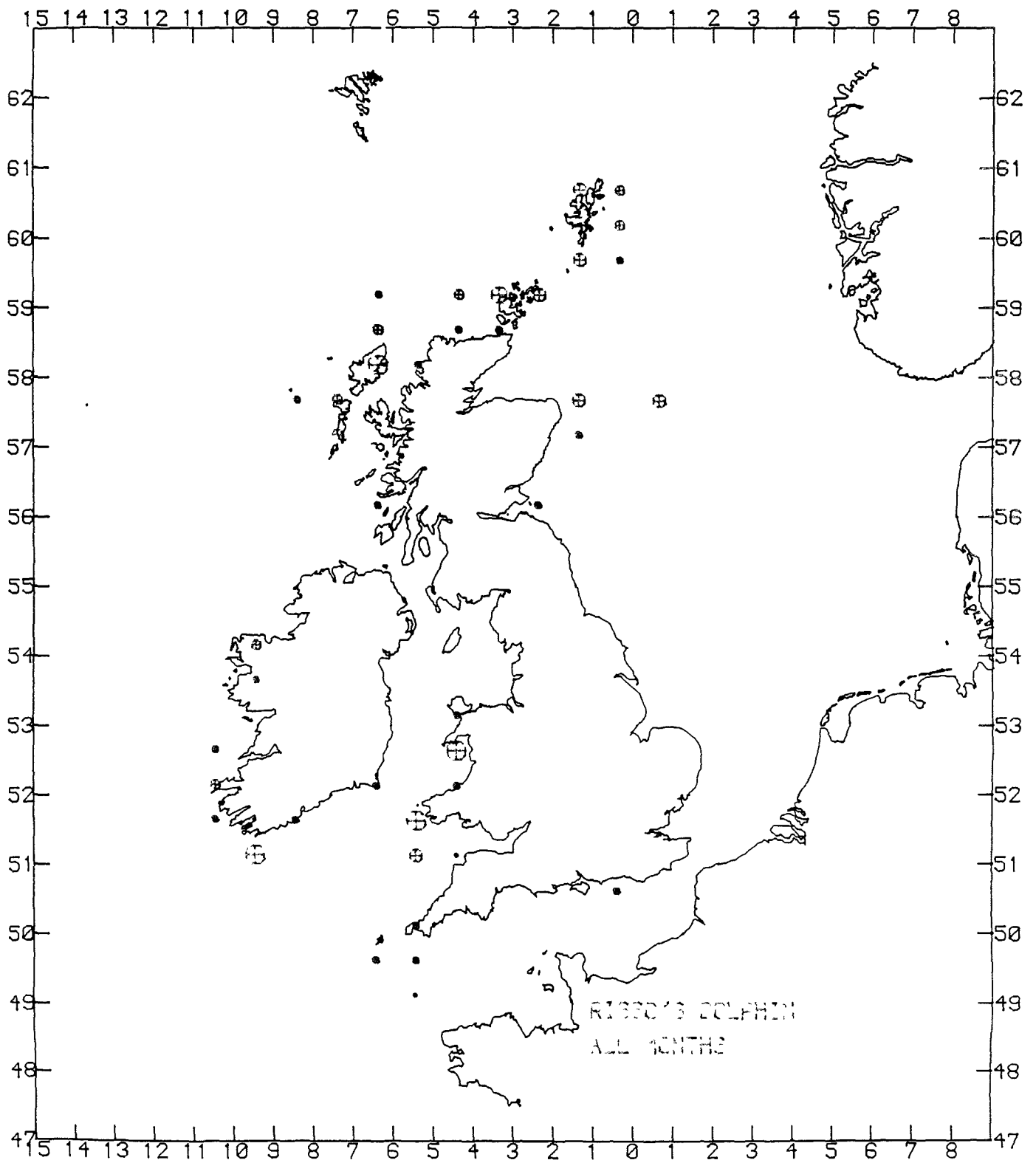
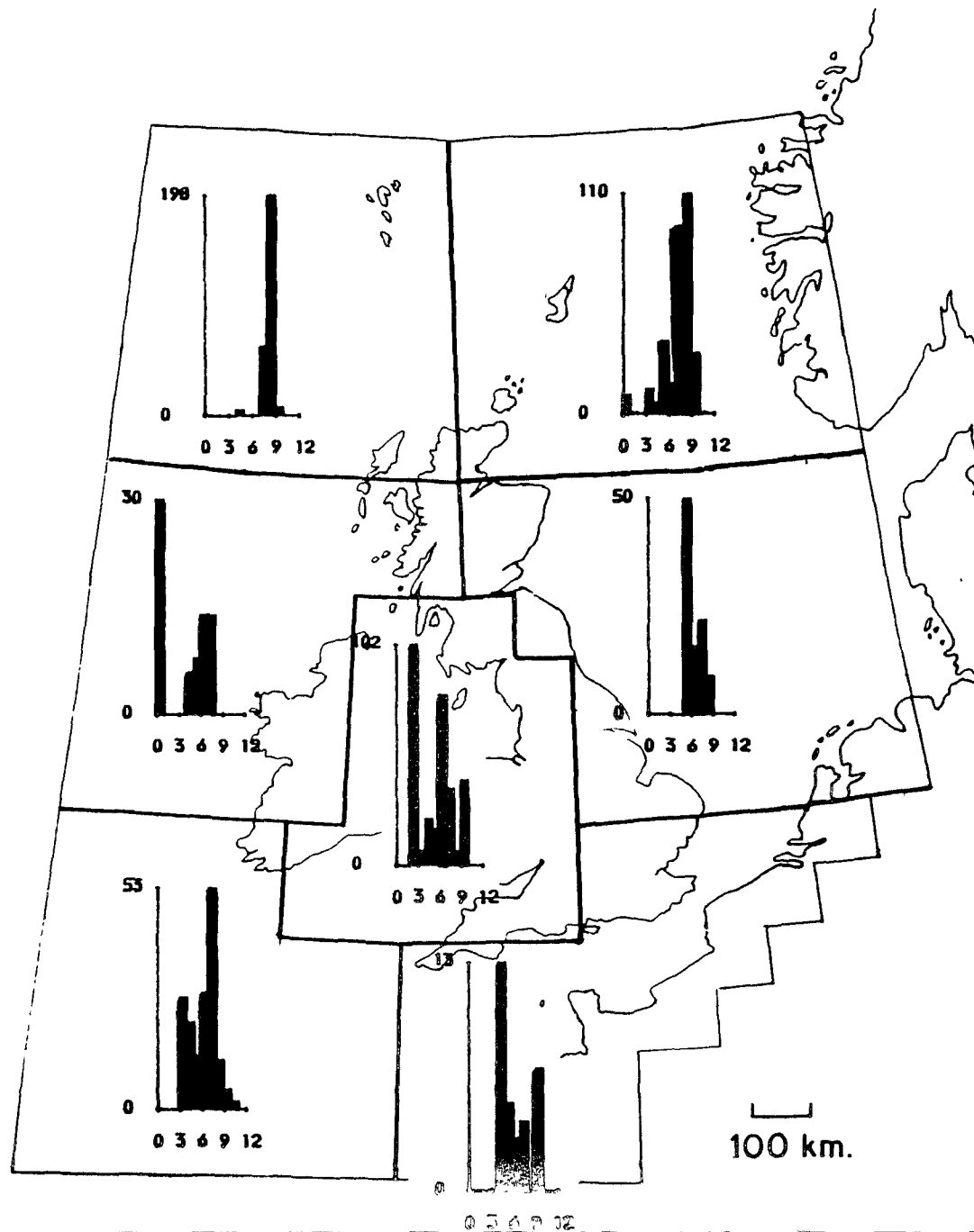


Fig. 29 Seasonal distribution of Risso's dolphin by major sea area
(vertical axis is number of individuals; horizontal axis is
month where 1 = Jan . 12 = Dec)



RISSO'S DOLPHIN

With nearly ten thousand records now on computer file, it is possible to carry out a number of further analyses examining the ecological distribution of different cetacean species in relation to oceanographic factors (for example water temperature, salinity, water depth) and variations in group size during the annual cycle. These should throw new light on important aspects of the biology and ecology of these species in the North-east Atlantic.

3.1 CETACEAN ANALYSES FOR QUANTIFIED EFFORT SITES

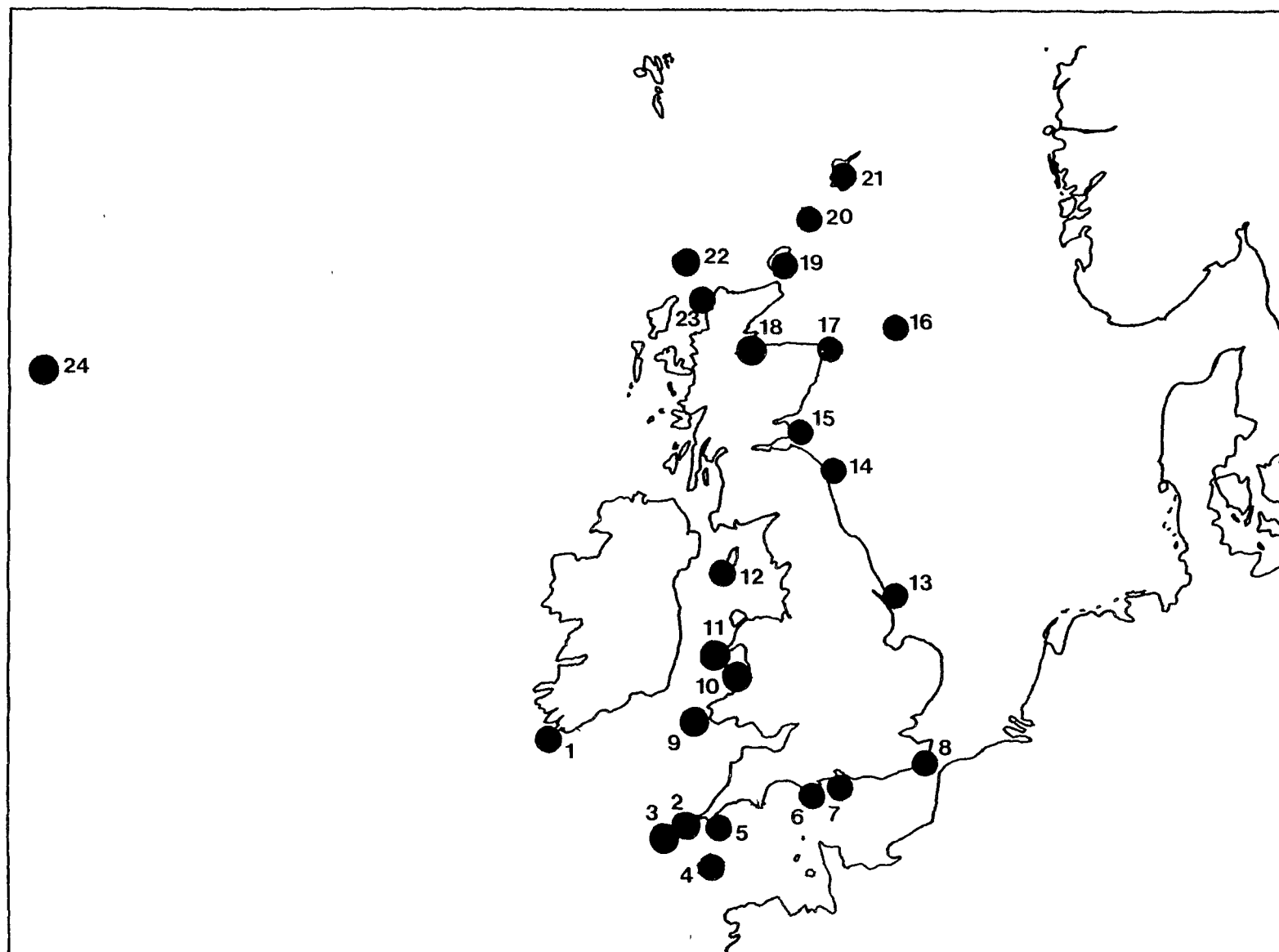
As noted above, the problem with drawing detailed conclusions on the status and distribution of cetacean species in British and Irish waters is the effect caused by uneven effort both geographically and seasonally. The best way to overcome this is to have a network of observers operating regularly and quantifying the periods of time for which they are observing. We now have twenty sites/observers who are recording in this manner. The distribution of the sites/areas covered is shown in Fig. 30, and these are listed in Table 6 along with the periods for which they have operated. It can be seen from this Table that a few sites have been in operation for up to twenty years although most have started up much more recently. The results presented here therefore are necessarily preliminary. They probably are most useful for comparisons of the relative abundance of different species between regions, and for examining seasonal trends of occurrence. However, they do also give an indication of population trends for a few sites for the more commonly recorded species, and results for long-finned pilot whale and harbour porpoise are presented here.

Comparisons between sites around Britain and Ireland (Table 7) tend to support the more comprehensive records from the general observer network. Observations in the southern North Sea and eastern sector of the English Channel comprise few species, notably the bottle-nosed dolphin. Three species, the long-finned pilot whale, common and Risso's dolphins, become more prominent in the western English Channel and the Irish Sea. Further west and north, the white-beaked dolphin joins the common dolphin (eventually more or less replacing it), and killer whales, fin whales and other whale species occur at least occasionally. Those regions are amongst the most important for the harbour porpoise and minke whale. Far offshore, observations from the weather ships emphasise the pelagic distribution for species such as sperm whale, long-finned pilot whale, fin whale and other large rorquals. Moving to the northern North Sea, observations are primarily of harbour porpoise (coastal), long-finned pilot whale (offshore), and white-beaked dolphin (both coastal and offshore), but with other species such as minke whale, killer whale and Risso's dolphin well represented. Bottle-nosed dolphins appear to be comparatively rare although important inshore sites (such as the inner Moray Firth) exist that are not included in the observer network with quantified effort.

For a more detailed examination of seasonal trends and changes in abundance over the last 10-20 years, I have concentrated upon two species, the long-finned pilot whale and the harbour porpoise. All results presented are adjusted for effort (although no attempt has been made to correct for variations in weather conditions). For the former

Fig. 30

MAP OF QUANTIFIED EFFORT SITES



Numbers correspond with those in Table 6

TABLE 6 LIST OF QUANTIFIED EFFORT SITES

NO	LOCATION	PERIOD OF OBSERVATION
1	Cape Clear, Co. Cork	1963 - present
2	Wolf Rock, Cornwall	1984 - 1985
3	Bishop Rock, English Channel	1985 - present
4	English Channel (Air Coastguard)	1984 - present
5	Porthgwarra, Cornwall	1974 - 1982
6	Portland Bill, Dorset	1974 - present
7	Selsey Bill, Sussex	1965 - 1970
8	Dungeness, Kent	1957 - present
9	Skokholm Is., Dyfed	1964 - 1974
10	[Ynyslas/Borth, Dyfed	1980 - present]
11	Bardsey Is., Gwynedd	1968 - present
12	Calf of Man, Isle of Man	1965 - present
13	Spurn Hd, Yorks	1974 - present
14	Farne Islands, Northumberland	1977 - present
15	[Isle of May, Berwickshire	1979 - present]
16	Northern North Sea (SAST of NCC)	1980 - present
17	Peterhead, Aberdeenshire	1979 - present
18	Nigg - Cromarty ferry	1985 - present
19	[Orkney Islands (NCC)	1980 - present]
20	Fair Isle, Shetland	1973 - present
21	[Shetland Islands (NCC)	1980 - present]
22	[Northern Scottish waters (DAFS)	1974 - present]
23	Handa Island, Sutherland	1978 - present
24	Mid North Atlantic (Met. Office)	1974 - present

NOTES The numbers correspond with those on Figure 30

Effort for those sites in square brackets can only be quantified very approximately

TABLE 7 RELATIVE ABUNDANCE OF VARIOUS CETACEAN SPECIES
FOR FIXED QUANTIFIED EFFORT SITES

SITE	CETACEAN SPECIES													
	FW	SW	MW	HW	SPW	NBW	HP	BND	WBD	WSD	CD	PW	KW	RD
Cape Clear	1	0	2	1	0	1	4	2	2	0	3	3	2	3
Wolf Rock	0	0	0	0	0	0	0	0	0	0	2	0	0	1
Bishop Rock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porthgwarra	0	0	0	0	0	0	0	0	0	0	2	2	1	1
Portland Bill	0	0	0	0	0	0	1	1	1	0	0	0	0	0
Selsey Bill	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Dungeness	0	0	0	0	0	0	1	1	0	0	0	1	1	0
Skokholm Is.	0	0	0	0	0	0	1	2	0	0	0	1	1	1
Bardsey Is.	0	0	0	0	0	0	1	2	0	0	0	1	1	1
Calf of Man	0	0	1	0	0	0	1	2	0	0	0	1	0	1
Spurn Hd.	0	0	0	0	0	0	3	0	1	0	0	0	0	0
Farne Is.	0	0	0	0	0	0	2	0	1	0	0	0	2	0
Isle of May	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Peterhead	0	0	1	0	0	0	3	1	2	0	0	0	1	1
Handa Is.	0	1	2	0	0	0	3	0	2	0	1	0	1	0
Weather ship	2	1	1	1	2	2	1	2	2	2	3	4	2	1

Relative abundance : 0 = 0; 1 = 1-10; 2 = 11-50; 3 = 51-100; 4 = 101+
indices (calculated on basis of no. indivs seen/unit effort)

species, analyses have concentrated upon the weather ships because there are too few records from the other sites. The results indicate peaks both in numbers of records and of individuals between June and September (Fig. 31). There is a further peak of individuals in April, caused by a few sightings of very large herds (including one estimated as comprising at least one thousand animals), and it is postulated that they may relate to aggregations for breeding. If it does prove to be the case that pilot whale herds come together during breeding (or at least at the time of mating), this would argue against herds being genetically discrete.

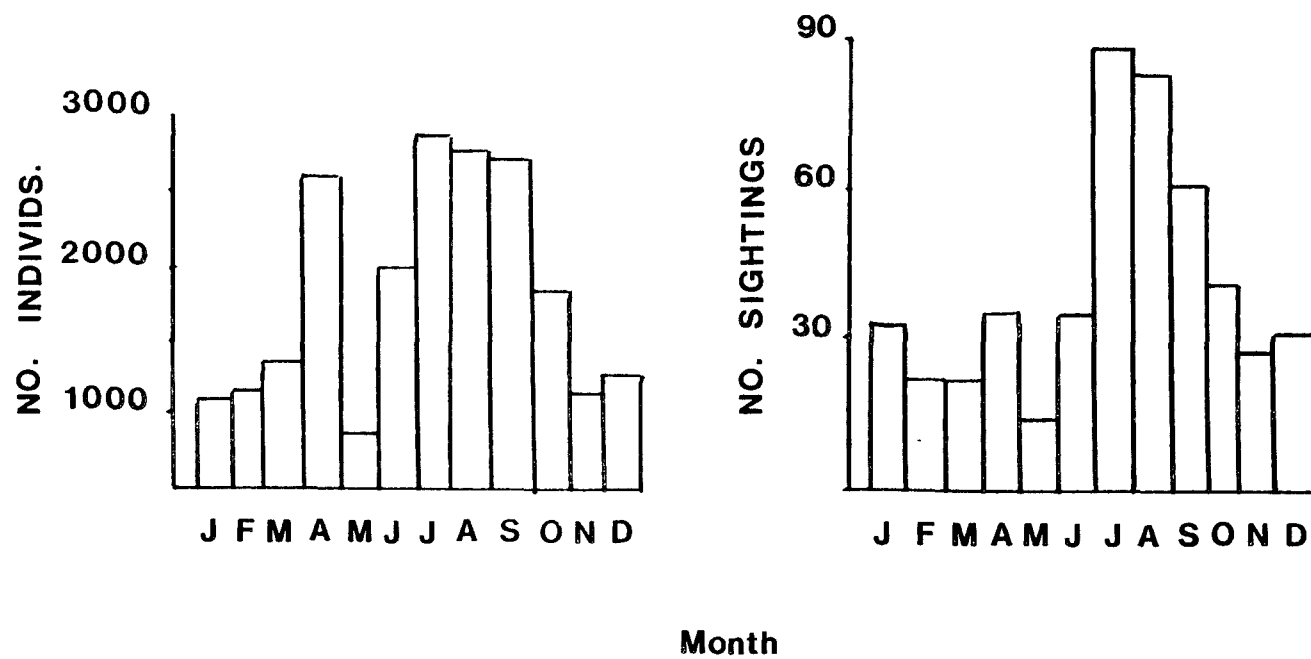
Comparisons of the numbers of pilot whale sightings and individuals for the time periods 1952-59 and 1974-85, show a substantial increase in recent years (Fig. 32). This is mirrored by a large increase in the number of strandings (and of individuals stranded) over the same time period (see earlier section on this species), whilst in the Faroe Islands, an analysis of pilot whale catches by Kjartan Hoydal (1985) also show much larger numbers caught in recent years without substantially increased effort. Causes for this apparent population increase in the Northeast Atlantic are not yet known, but there is some indication of a relationship with changes in squid numbers induced by longer term climatic changes. Although numbers of pilot whales appear to have increased over the last two decades, there is some indication that this trend has reversed in the last four years. Clearly this needs further investigation, and a comparison with the most recent strandings data would be very useful.

The best data sets for quantified effort sites apply to the harbour porpoise. Analyses presented here are nevertheless preliminary since some earlier data on effort is still required. However, they do show some important trends. Firstly, once corrected for effort, the seasonal peaks of occurrence no longer take place in August but are rather later in September - October (Fig. 33). Small numbers at least are present throughout the year but there are consistent declines in late winter - early spring which would conform with other evidence for an offshore movement associated with breeding at that time.

For an analysis of possible population trends, most data inevitably apply to the period since 1973 when the Cetacean Group set up its sightings scheme. This makes it difficult to examine for earlier status changes. However, recording has been taking place since 1962 at a few sites in Southern Britain, and these indicate much larger numbers in the early 1960s than since then (Figs. 34 & 35). Otherwise there have been few changes in the southern North Sea, English Channel and Irish Sea over the last twenty years, though numbers have consistently been very low. Elsewhere, off Southwest Ireland, Northwest Scotland and in the northern North Sea, the species is much more abundant, although in the last 4-8 years there appears to have been an important decline in the northern North Sea. If these recent trends are real, we should look for possible factors to account for them. Two major negative influences have in fact occurred in the region: (1) the industrial fishery for sandeel and sprats (both important prey for the harbour porpoise) has increased dramatically around the Shetland islands, where the bulk of the northern North Sea population occurs; (2) there has been a substantial mortality

Fig. 31

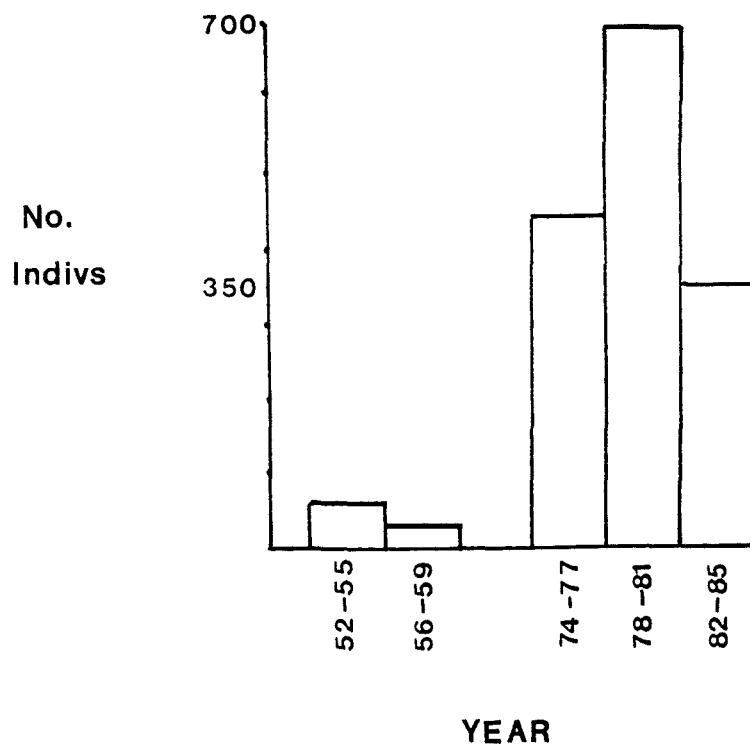
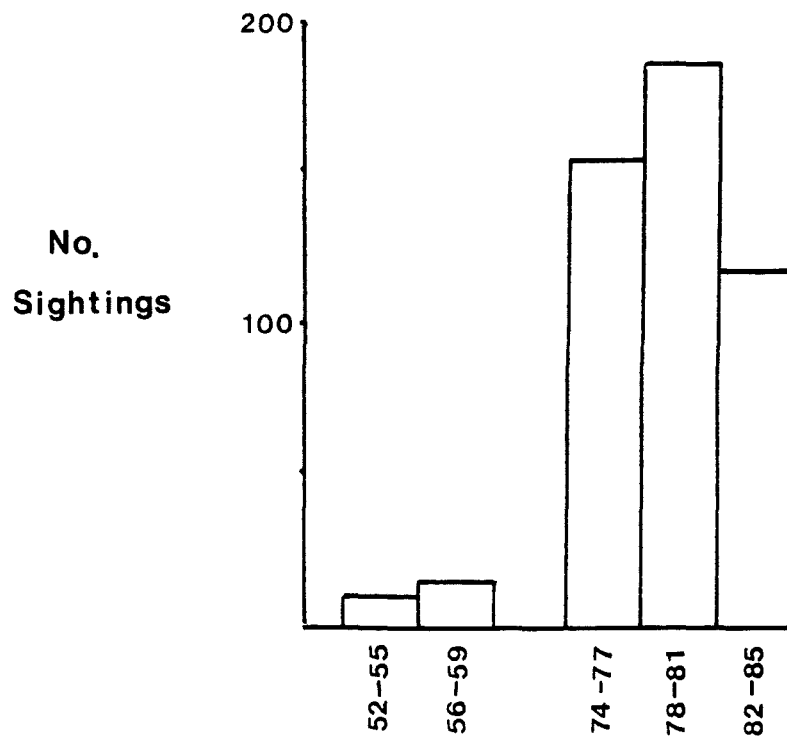
SEASONAL VARIATION IN PILOT WHALES



Data derived from weather ships (57 deg. N, 20 deg. W)
where effort quantified

Fig. 32

STATUS CHANGES OF PILOT WHALES



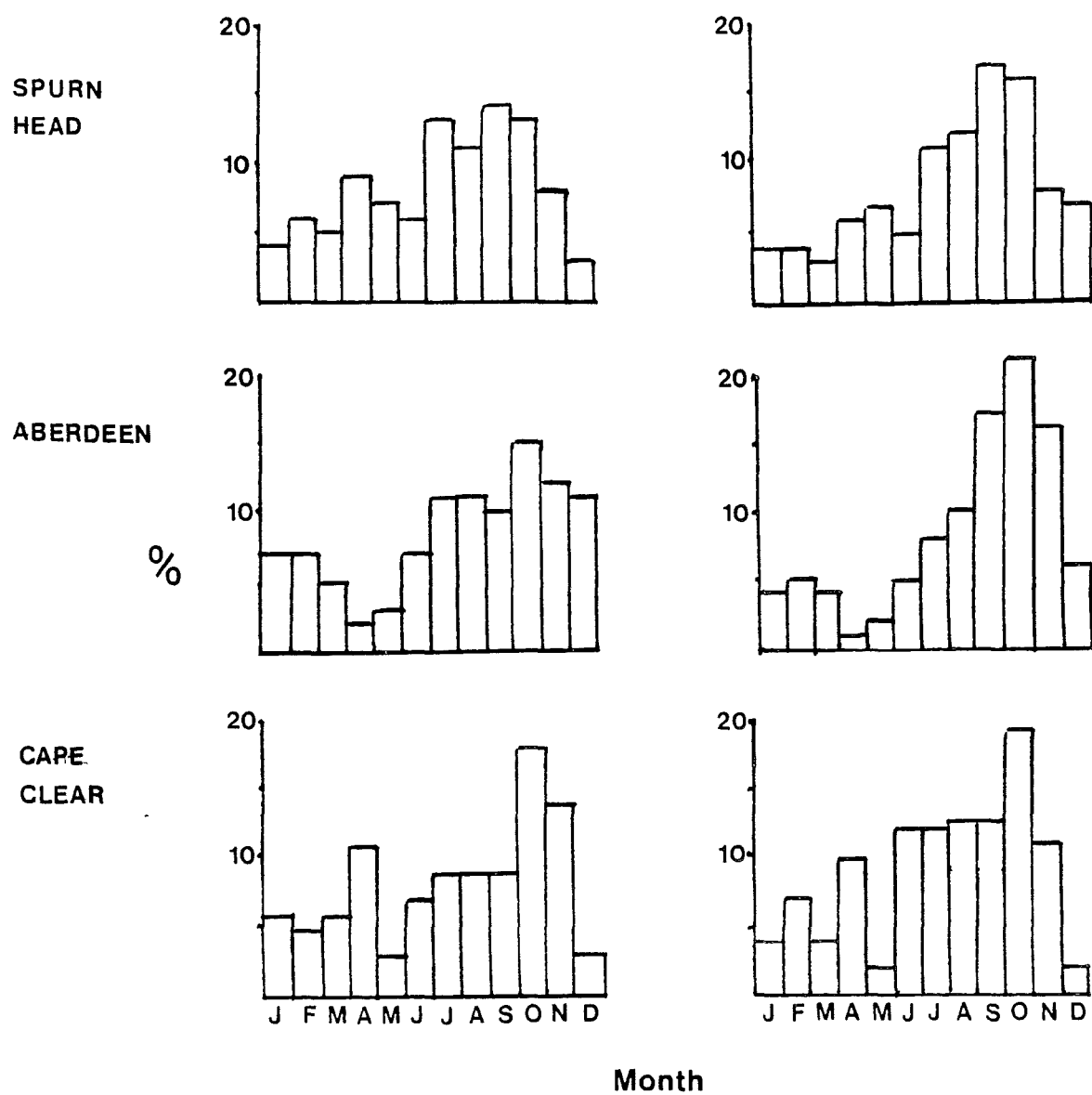
Data derived from weather ships (57 deg. N, 20 deg. W)
where effort quantified

Fig. 33

SEASONAL VARIATION IN HARBOUR PORPOISES

Sightings

Indivs



Data derived from sites where effort quantified

Fig. 34 Status changes in the harbour porpoise at longterm quantified effort sites, expressed as index of no. of sightings

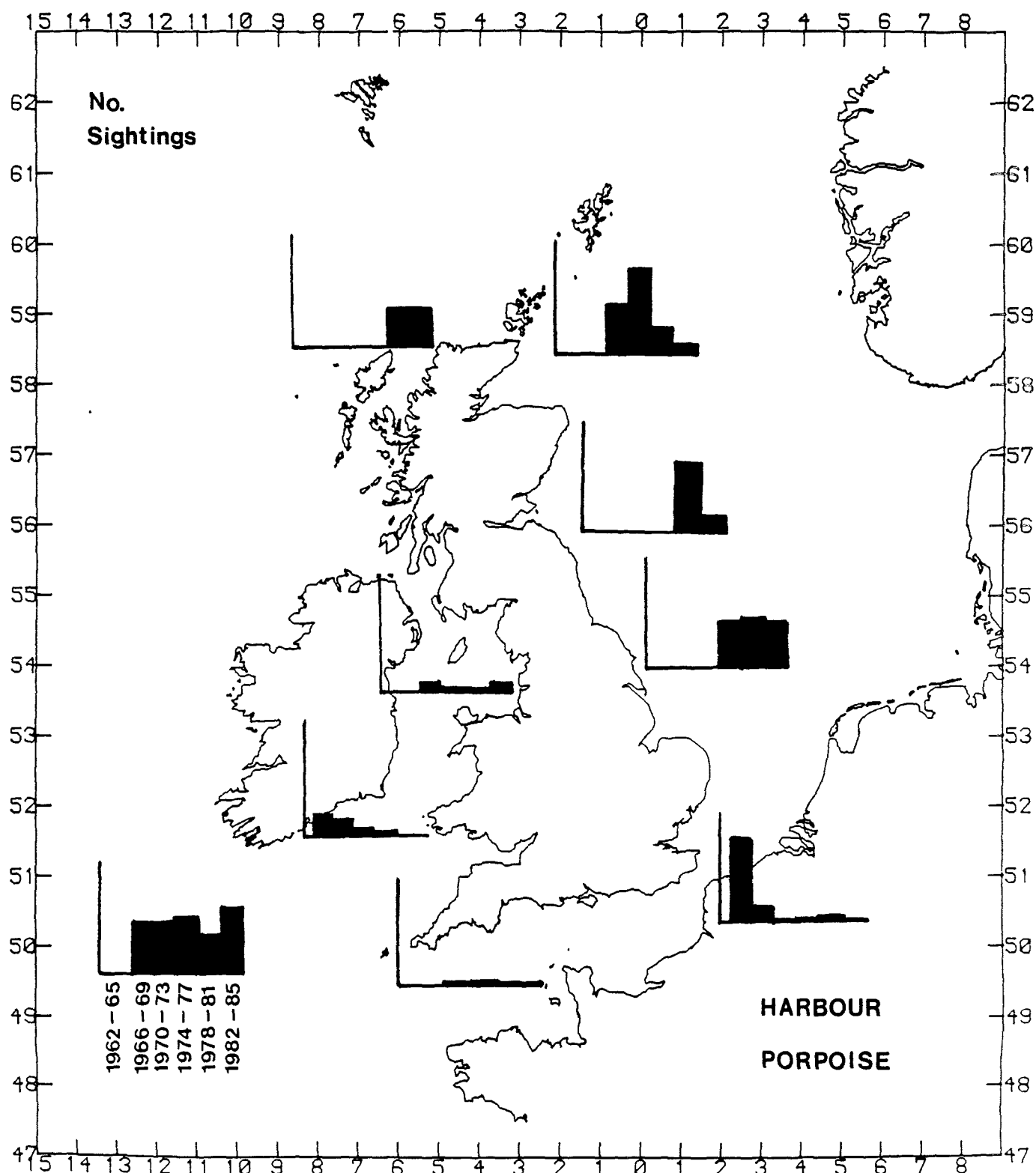
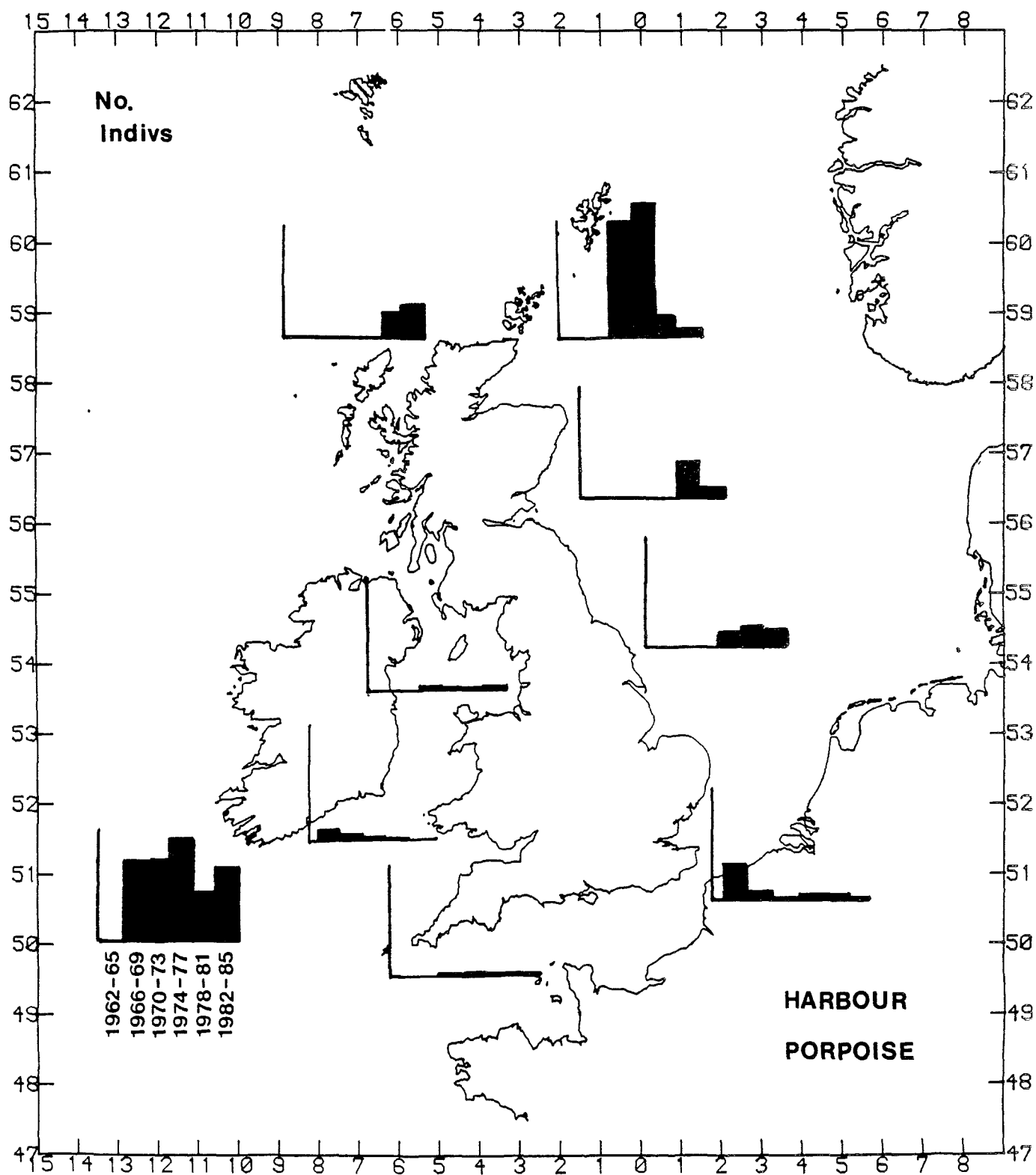


Fig. 35 Status changes in the harbour porpoise at longterm quantified effort sites expressed as index of no. of individuals



(estimated at 3,000 per year - see Andersen in Kayes 1985) in fishing nets in Danish waters during recent years, and although the origins of these are not known, it is quite possible that they involve animals from Northern Britain. It seems unlikely on present estimates that the Danish porpoise population alone would be able to sustain such a heavy mortality without noticeable population changes.

4.1 SUMMARY AND CONCLUSIONS

Twenty species of cetaceans have been recorded in British and Irish territorial waters in the last ten years. At least ten of those species are resident or at least annual visitors to coastal waters. The most commonly recorded species is the harbour porpoise, followed by the long-finned pilot whale, white-beaked dolphin and common dolphin. Changes in relative abundance have occurred for several species since 1958. The bottle-nosed dolphin was second in order of relative abundance during the period 1958-72 but has declined to seventh place between 1980-86; between the same two periods, the northern bottlenose whale has declined from sixth to eleventh place. On the other hand, the long-finned pilot whale increased from seventh place to second and is presently the third most frequently recorded species; the sperm whale has increased from twelfth to tenth place. Most of these apparent changes in status cannot obviously be related to variations in observer coverage and they are generally mirrored by changes in the numbers of strandings. We can therefore probably use them as a first approximation in evaluating status changes over time within species.

Since there are geographical differences in observer coverage, some cetacean species are more pelagic than others, and some are more readily observed and/or identified, we cannot so easily compare relative abundance across species. Nevertheless within circumscribed limits (e.g. coastal waters considered separately from offshore areas), a fairly evenly distributed network of observers should provide a reasonably accurate picture of the relative abundance of different species. Quantification of effort will further improve the quality of the data. Already they have clarified population changes in the harbour porpoise and long-finned pilot whale, and if coverage can be improved, this could be extended geographically, and to other species. We therefore identify the following aspects as needing greatest development:

- (1) expansion of the observer network to give more even geographical coverage, with concentration both on the small professional and the much larger amateur elements;
- (2) substantial increase in the number of observers recording regularly and quantifying their effort;
- (3) some training of observers in recording and identification with emphasis upon photographic documentation. This not only helps to confirm specific identification, but also provides additional information on variation in markings, sizes of subadults, etc;
- (4) regular feedback to observers through a newsletter so that their interest and involvement are maintained.

The United Kingdom has the potential for a most comprehensive sightings network involving both professionals and amateurs. Important assets are

its relatively evenly populated coastline, large number of groups interested in natural history and conservation, and broad network of people visiting coastal waters either for work (fishermen, merchant seamen, ferry operators, coastguards, lighthouse keepers, professional biologists) or for pleasure (yachtsmen, sub aqua divers). Such a network could not only provide useful information on the distribution and status of cetacean species, but also additional data bearing on their biology and ecology, and conservation threats. The data set presently on computer file can be used for many further ecological analyses: the broad distribution of different species in relation to oceanographic features (for example sea surface temperature, salinity, water depth); finer ecological relationships with undersea contours, plankton fronts, and tidal rhythms; variations in group size during the annual cycle; and diurnal activity patterns. With further data we should be able to more clearly identify breeding areas and timing of breeding, and to relate movements of particular species to features of their annual cycle. Finally, a substantial amateur participation increases public awareness of cetaceans and the conservation problems they face; and it enables one to carry out various related surveys (for example a census of small motor boats in coastal resorts as part of an examination of the effects of human disturbance, and local reporting of incidental catches in fishing nets).

The recent formation of the European Cetacean Society provides the opportunity for international cooperation and integration of sightings and strandings schemes involving all Western European countries. We hope that the UK government and relevant non-governmental bodies will provide the funding support needed for satisfactory development of the above proposals. For too long, the study and conservation of cetaceans in Europe have received lamentably little support.

ACKNOWLEDGEMENTS

We thank the three hundred and fifty observers who have contributed these data so generously, and particularly those operating on a regular basis. These include the Meteorological Office weather ships; the bird observatories (notably Cape Clear, Spurn Head, Dungeness, Fair Isle, Bardsey, the Calf of Man and Portland Bill); the Seabirds at Sea team of the Nature Conservancy Council (Mark Tasker, Peter Hope Jones and others) and many NCC assistant regional officers; John Hislop and colleagues (Marine Labs, Aberdeen) operating from DAFS vessels; Greg Mudge and colleagues of the Royal Society for the Protection of Birds; Alan Morley and other members of the oil industry on oilrigs and supply vessels; Pete Kinnear, Martin Heubeck and Peter Ewins in Shetland; Peter Reynolds, Roger Booth, and colleagues in Orkney, the wardens of Handa bird reserve (NW Scotland), the Farnes and Coquet Island (Northumberland); and particular individuals notably Mike Innes, Matthew Bain, David Barker, Brian Burnett, Peter Cheesman, Tony Elvers, Ian Kendall, Mike Hill, Iain Hill, and H.P.K. Robinson. Special thanks also go to colleagues in Ireland, particularly Jim Fitzharris and Richard Landsdown, Ken Preston, Shay Pennelly and members of the Dublin University's Trinity College Zoological Society.

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Finally, we are very grateful to Frances Haynes, Aadya Martins-Pereira, Gina Scanlan and Juliet Vickery for their kind help with data coding and assembling the figures.

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APPENDIX 1

CETACEAN CODING PROCEDURES

NB 0 = Not recorded

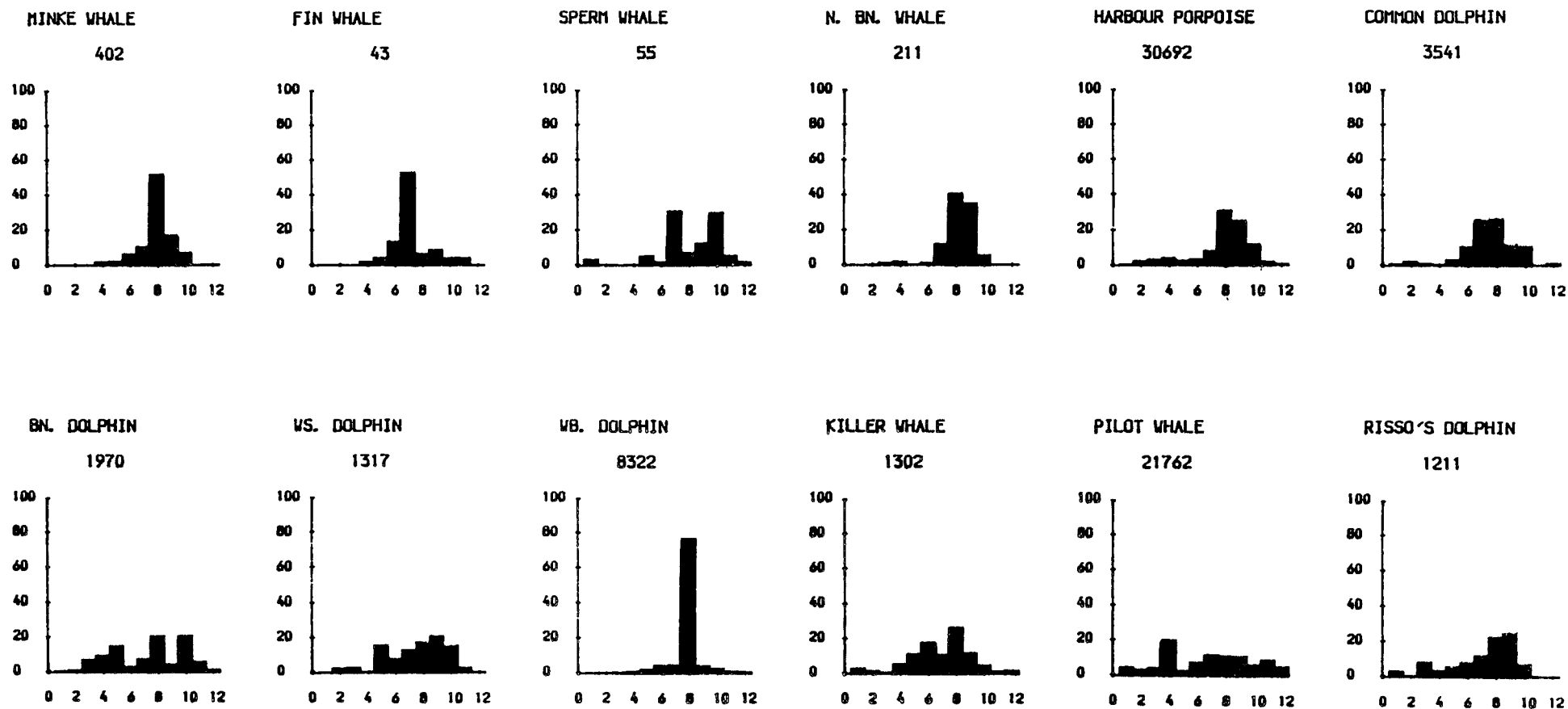
Boxes 1-4	Cetacean/Seal species (see Appendix 2)
5-8	Best estim. no. indivs. unaged (0-9999)
9-10	Best estim. no. indivs. full grown (0-99)
11-12	Best estim. no. indivs. juvenile (0-99)
13-16	Max. estim. no. indivs. (0-9999)
17-20	Min. estim. no. indivs. (0-9999)
21-22	Estim. max. length of indivs. (0-99)
23-24	Estim. min. length of indivs. (0-99)
25-28	Time of day (24 hour clock - GMT)
29-30	Day
31-32	Month
33-34	Year
35-38	Latitude
39-42	Longitude
43	Meridian (East or West of Greenwich)
44-45	Area code
46	Direction of movement (0 None, 1 NW, 2 N, 3 NE, 4 E, 5 SE, 6 S, 7 SW, 8 W, 0 Not recorded)
47	Most common behaviour observed (0 None, 1 Normal swimming, 2 Fast swimming, 3 Porpoising, 4 Forward breaching, 5 Side-breaching, 6 Sky-pointing, 7 Tail smacking, 8 Response to platform, 0 Not recorded)
48	Second most common behaviour (coded as above)
49	Associated seabirds (0 None, 1 Shearwaters/Petrels, 2 Gannets/Boobies, 3 Cormorants/Shags, 4 Skuas, 5 Gulls, 6 Terns, 7 Auks, 8 Combination of seabird families, 0 Not recorded)
50	Description/Photo/Drawing available (0 None, 1 Description, 2 Photo, 3 Drawing, 0 Not recorded)

- 51-54 Observer name code (0-999)
- 55 Recording group code
- Environmental data
- 56 Platform (1 Headland, 2 Ferry, 3 Yacht, 4 Fishing vessel, 9 Aircraft, 0 Not recorded)
- 57-58 Speed of vessel (in case of boat/ship)
- 59 Course of vessel (coded as for direction of cetacean movement)
- 60-61 Wind direction (coded as for direction of cetacean movement)
- 62 Wind force (Beaufort scale)
- 63 Cloud cover (in Oktas, i.e. 9 0/8, 1 1/8 8 8/8, 0 Not recorded)
- 64 Precipitation: type (9 None, 1 Rain, 2 Snow, 3 Fog, 0 Not recorded)
- 65 Precipitation: intensity (1 Contin. light, 2 contin. heavy, 3 Intermittent light, 4 Intermittent heavy, 9 None, 0 Not recorded)
- 66 Visibility (1 less than 1km, 2 1-10km, 3 more than 10km)
- 67 Sea state (using international sea state codes)
- 68 Swell height (9 None, 1 light, 2 moderate, 3 heavy, 0 Not recorded)
- 69-71 Sea surface temperature
- 72-73 Salinity (to one decimal place with first digit '3' not coded, i.e. (3)5.5 is coded as '55'; measured in parts per 1000)
- 74 Water depth (1 1-10, 2 11-20, 3 21-30, 4 31-50, 5 51-100, 7 201-300, 8 301-500, 9 501+; measured in metres)
- 75-77 Distance in km. from land of any description (999 = 1000km+)
- 78-80 Distance in km. from land over 30km in one dimension (999 = 1000km+)

APPENDIX 2 CODES FOR NE ATLANTIC MARINE MAMMALS (Columns 1-4)

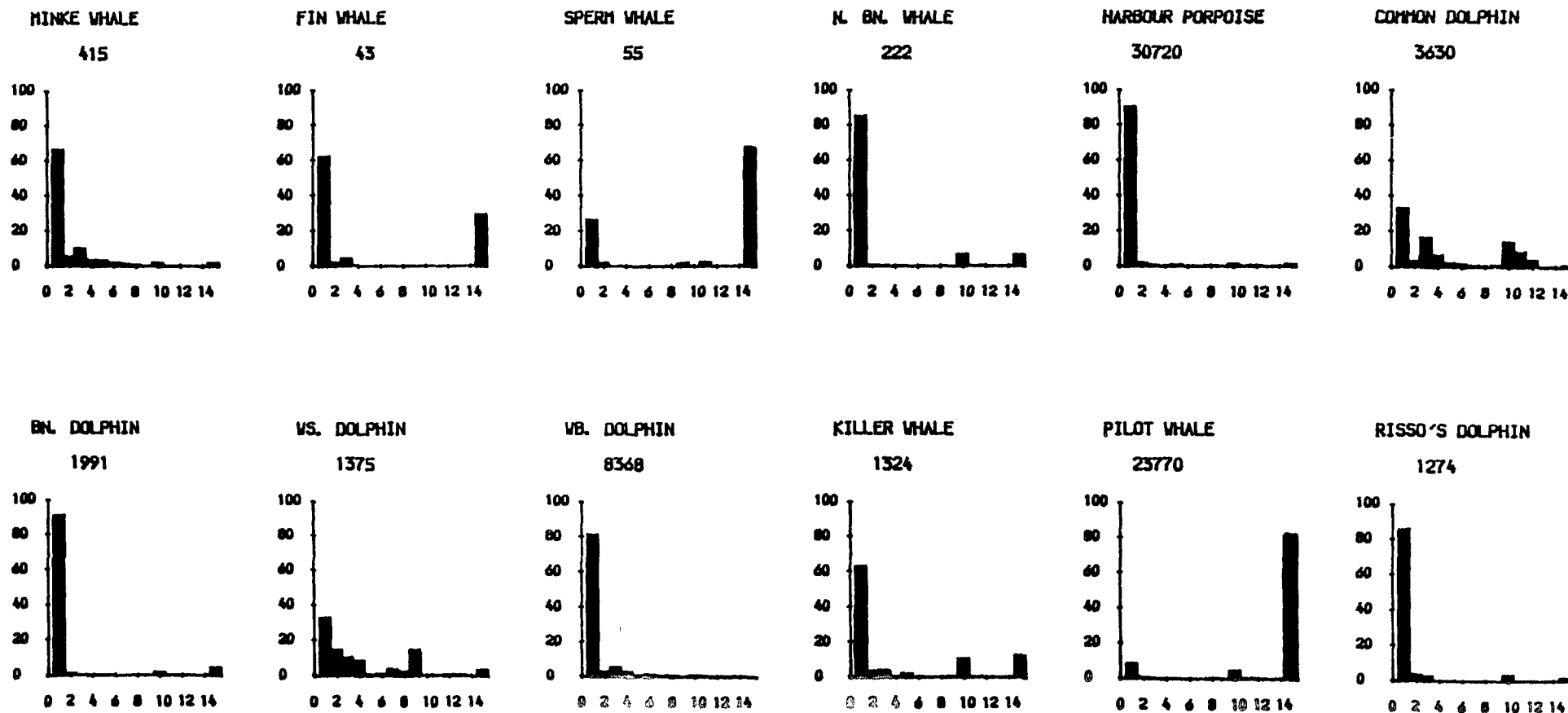
Grey Seal	1001				
Common Seal	1002	Seal sp.	1000		
Walrus	1003				
		Bearded Seal	1004		
Right Whale	2101				
Sperm Whale	2111	Indistinct dorsal	2011		
Humpback Whale	2103				
Blue Whale	2106			Large whale	2010
Fin Whale	2104	Blue/Fin/Sei	2013		
Sei Whale	2107				
Minke Whale	2105	Distinct dorsal	2012		
N. Bottlenose Whale	2113	Minke/B-n	2014		
Cuvier's Whale	2114			"whale"	sp. 2100
Sowerby's Whale	2115	Beaked	2021		
True's beaked Whale	2116			Medium whale	2020
Narwhal	2117	White whale	2118	"cetacean"	sp. 2000
Pilot Whale	2119	Pilot/Fa K	2022		
False Killer Whale	2123				
Killer Whale	2122	Large fin	2023		
Risso's Dolphin	2251				
Pygmy Sperm Whale	2112				
Bottle-nosed Dolphin	2251				
White-beaked Dolphin	2252	Lagen.	2033	Small whale	2030
White-sided Dolphin	2253			"dolphin"	sp. 2200
Common Dolphin	2254	Patterned D.	2032		
Euphrosyne Dolphin	2255	Com/Euph.	2034		
Harbour Porpoise	2241				

APPENDIX 3 Seasonal distribution in no. of individuals for twelve common cetacean species (vertical axis is percentage of total no. indivs for all areas combined; horizontal axis is month where 1 = Jan...12 = Dec). The numbers above each figure represent the total number of individuals recorded for the corresponding species



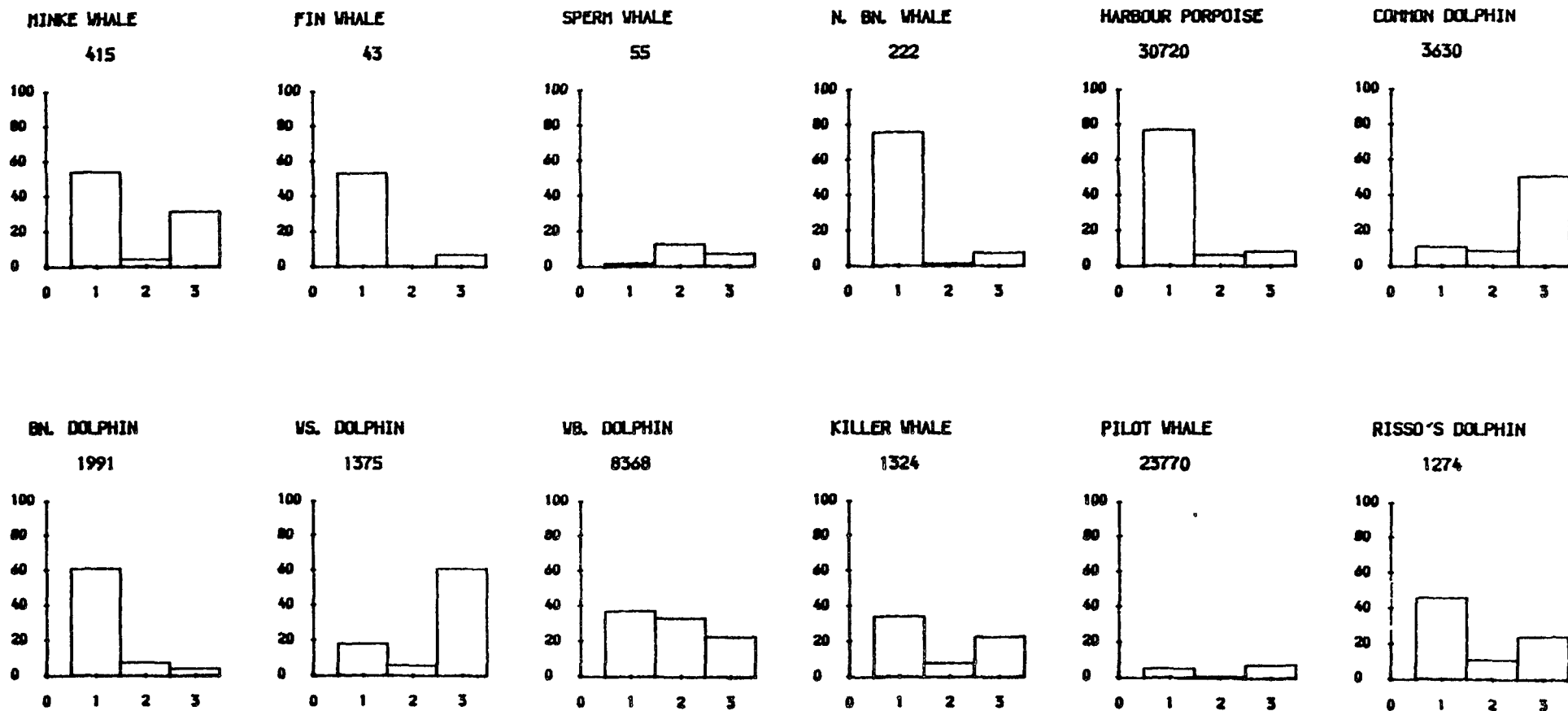
APPENDIX 4(a) Percent of the total number of individuals recorded at different distances from land for twelve commoner cetacean species. Numbers above each figure represent the total number of individuals for which distances from land were recorded

The distance categories are as follows: 1 = 1-5km 2 = 6-10km 3 = 11-20km 4 = 21-30km 5 = 31-40km 6 = 41-50km 7 = 51-75km 8 = 76-100km 9 = 101-150km 10 = 151-200km 11 = 201-300km 12 = 301-400km 13 = 401-500km 14 = 501km+

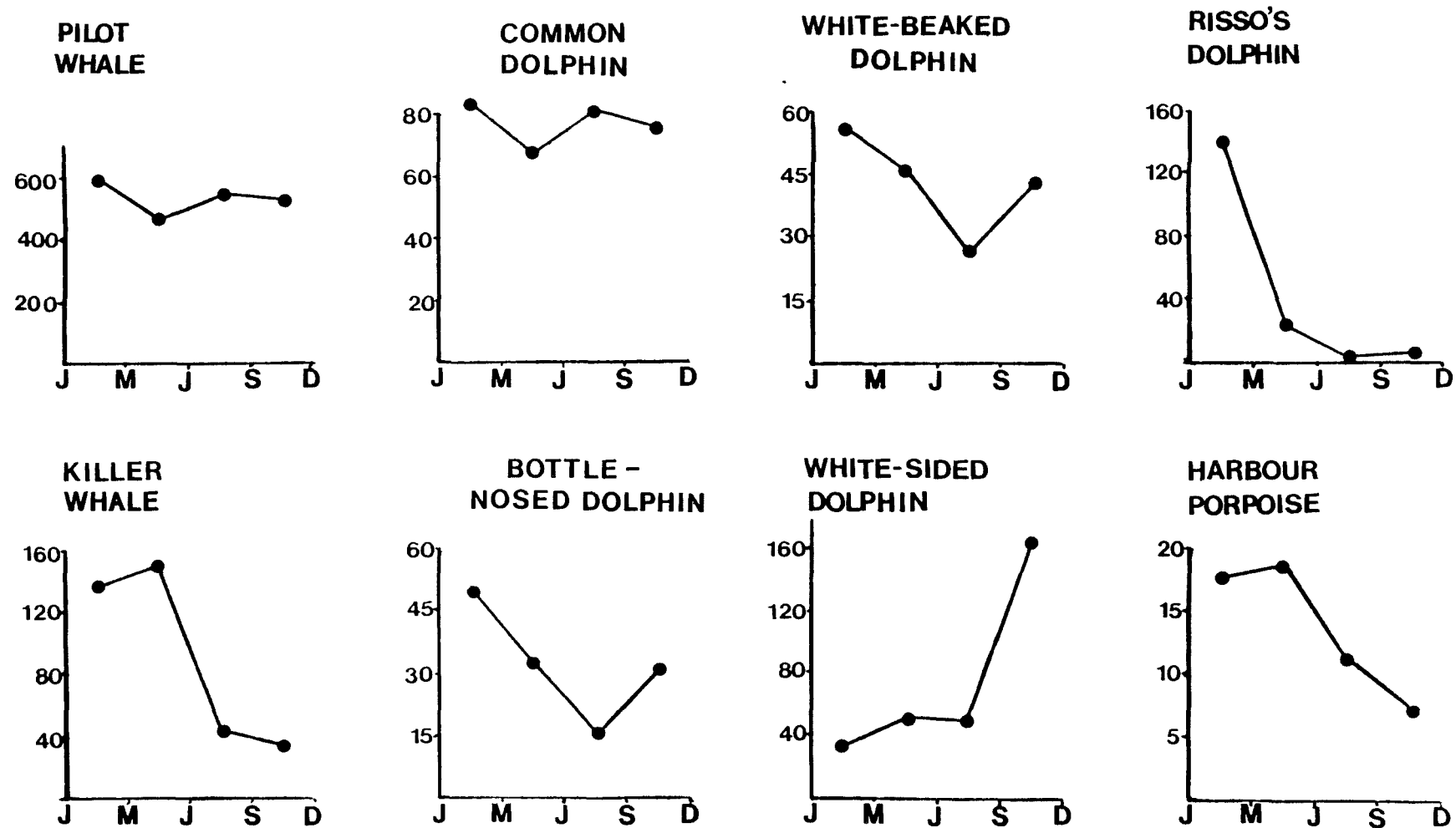


APPENDIX 4(b) Percent of the total number of individuals recorded at different distances from land for twelve common cetacean species. Numbers above each figure represent the total number of individuals for which distances from land were recorded

The distance categories are as follows: 1 = 1-3 miles
2 = 4-12 miles 3 = 13-200 miles



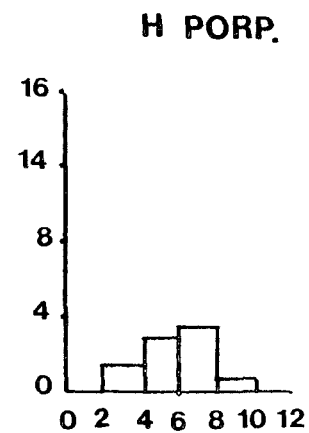
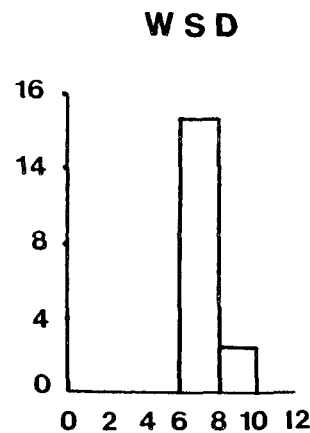
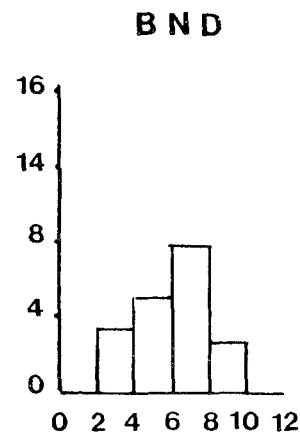
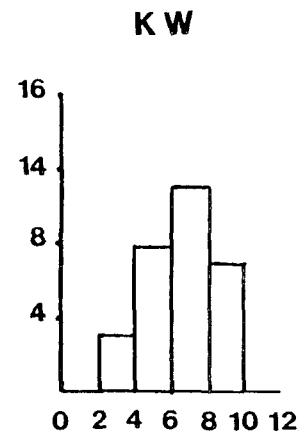
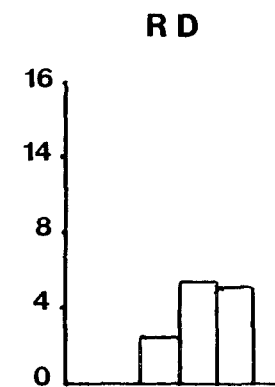
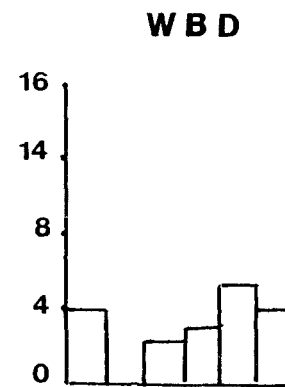
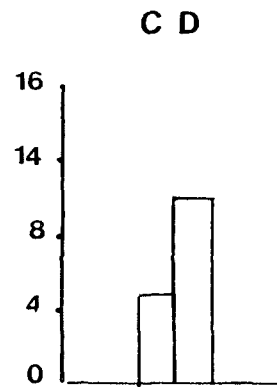
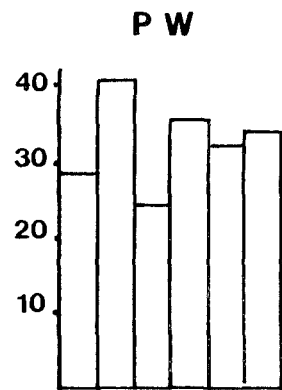
MEAN DISTANCE FROM LAND (km.) THAT CETACEAN SPECIES WERE RECORDED



APPENDIX 5

Vertical axis refers to mean number of individuals;
horizontal axis refers to four three monthly periods:
Jan-Mar; Apr-June; July-Sept; Oct-Dec

JUVS. AS % OF TOTAL



70

APPENDIX 6 Seasonal distribution of juveniles for eight commoner cetacean species

Vertical axis refers to percentage of total number of sightings that include juveniles in the group; horizontal axis refers to two-monthly periods (Jan/Feb - Nov/Dec)

APPENDIX 7

RECORDS OF BASKING SHARKS

NO. INDIVS	LOCATION	DATE	OBSERVER
1	2m S of Old Head Kinsale, Cork	4 Aug 1968	PGH Evans
1	3m S of Galley Hd, Cork	4 Aug 1968	PGH Evans
2	3m S of Three Castles Hd, Cork	4 Aug 1968	PGH Evans
1	20m SW of Cape Clear, Cork	23 Aug 1968	PGH Evans
1	15m SW of Cape Clear, Cork	23 Aug 1968	PGH Evans
1	10m SW of Cape Clear, Cork	23 Aug 1968	PGH Evans
1	2m S of Cape Clear, Cork	24 Aug 1968	PGH Evans
2	5m S of Cape Clear, Cork	24 Aug 1968	PGH Evans
1	10m S of Cape Clear, Cork	24 Aug 1968	PGH Evans
1	20m S of Cape Clear, Cork	24 Aug 1968	PGH Evans
1	20m S of Cape Clear, Cork	24 Aug 1968	PGH Evans
2	3m S of Galley Hd, Cork	26 Aug 1968	PGH Evans
1	2m SE of Mizen Hd, Cork	26 Aug 1968	PGH Evans
1	5m W of Bray Hd, Kerry	27 Aug 1968	PGH Evans
1	15m W of Bray Hd, Kerry	27 Aug 1968	PGH Evans
2	2m SW of Is. of Arran, Scotland	29 May 1976	DG McIntyre
15	Inchmarnoch Sound - Is. of Bute	31 May 1976	DG McIntyre
1	1m S of Great Saltee Is, Wexford	27 May 1980	CS Lloyd
?1	10m W of Brittany, France	21 July 1980	PGH Evans
1	Mid N. Atlantic 56°56'N 20°28'W	5 Aug 1980	DA McKenzie
1-2	5 records in Firth of Clyde	July-Aug 1980-3	0 Beauvoisin