

RISSE'S DOLPHIN

Grampus griseus

Risso's dolphin is a large, robust dolphin around 3.5 m in length, with a blunt, rounded head, and a slight melon but no beak. It is distinctively greyish in colour (whitening with age), often with numerous white scars on the flanks. It is a relatively slow swimmer (4-12 km/hr), and although usually slightly wary of vessels, it occasionally bow-rides (mainly juveniles), and regularly engages in a variety of surface behaviour including breaching (particularly juveniles), spyhopping, tail-slapping, and communal diving.

It is a gregarious species, forming small to medium-sized groups, typically ranging from 2-50 animals. In European waters, the modal group size is 6-12 off the UK, 15-20 off Spain. However, it has been recorded singly as well as in temporary aggregations of several hundreds or even thousands (Kruse *et al.* 1999; Evans, in press). In the North Atlantic, Risso's dolphins have occasionally been seen swimming with other cetaceans, including long-finned pilot whales, white-beaked and Atlantic white-sided dolphins, and bottlenose dolphins.

Risso's dolphins have been reported to feed mostly on cephalopods, although small fish are also taken (Kruse *et al.* 1999). Analysis of stomach contents of five individuals from British waters indicated a diet of mainly octopus *Eledone cirrhosa*, but also cuttlefish *Sepia officinalis*, sepiolids and small bottom-dwelling squid such as *Loligo forbesi* and *Todarodes sagittatus* (Clarke and Pascoe 1985; Zonfrillo *et al.* 1988; Santos Vázquez 1998).

Global distribution

Risso's dolphins occur in virtually all of the world's oceans between 60° S and 60° N, although there may be a gap in distribution in the tropical Atlantic (Kruse *et al.* 1999).

The species does not appear to be common anywhere, with the possible exception of some waters off California.

Primarily a warm water (ranging from 4.5-28° C) pelagic species (Baird and Stacey 1991), Risso's dolphin generally prefers continental slope waters. In the eastern Pacific, the species typically occurs seaward of the 180 m depth contour and inhabits coastal areas only where the continental shelf is near the shore (Leatherwood *et al.* 1980; Kruse 1989). The average depth of water in which sightings have been made in this region is 1,000 m. Hain *et al.* (1981) and Kenney and Winn (1986, 1987) also recorded frequent use of the continental shelf edge off eastern USA. In UK continental shelf seas, Risso's dolphins have been recorded mainly over slopes of 50-100 m depth (Evans, in press). By contrast, in the Mediterranean Sea, the species has been noted mainly at between 500 and 1,000 m depths (Fabbri *et al.* 1992; Gannier and Gannier 1994; Cañadas and Sagarminaga 1996).

North Atlantic status

As a comparatively uncommon species there have been no attempts to estimate Risso's dolphin abundance over wide areas in the north-east Atlantic. Waring *et al.* (1999) report the results of four surveys off eastern North America. The most complete of these indicated a population estimate of 16,818 (CV=0.52). Atkinson *et al.* (1999) identified at least 142 individuals over two summers in the north-western Minch off western Scotland.



NW European distribution

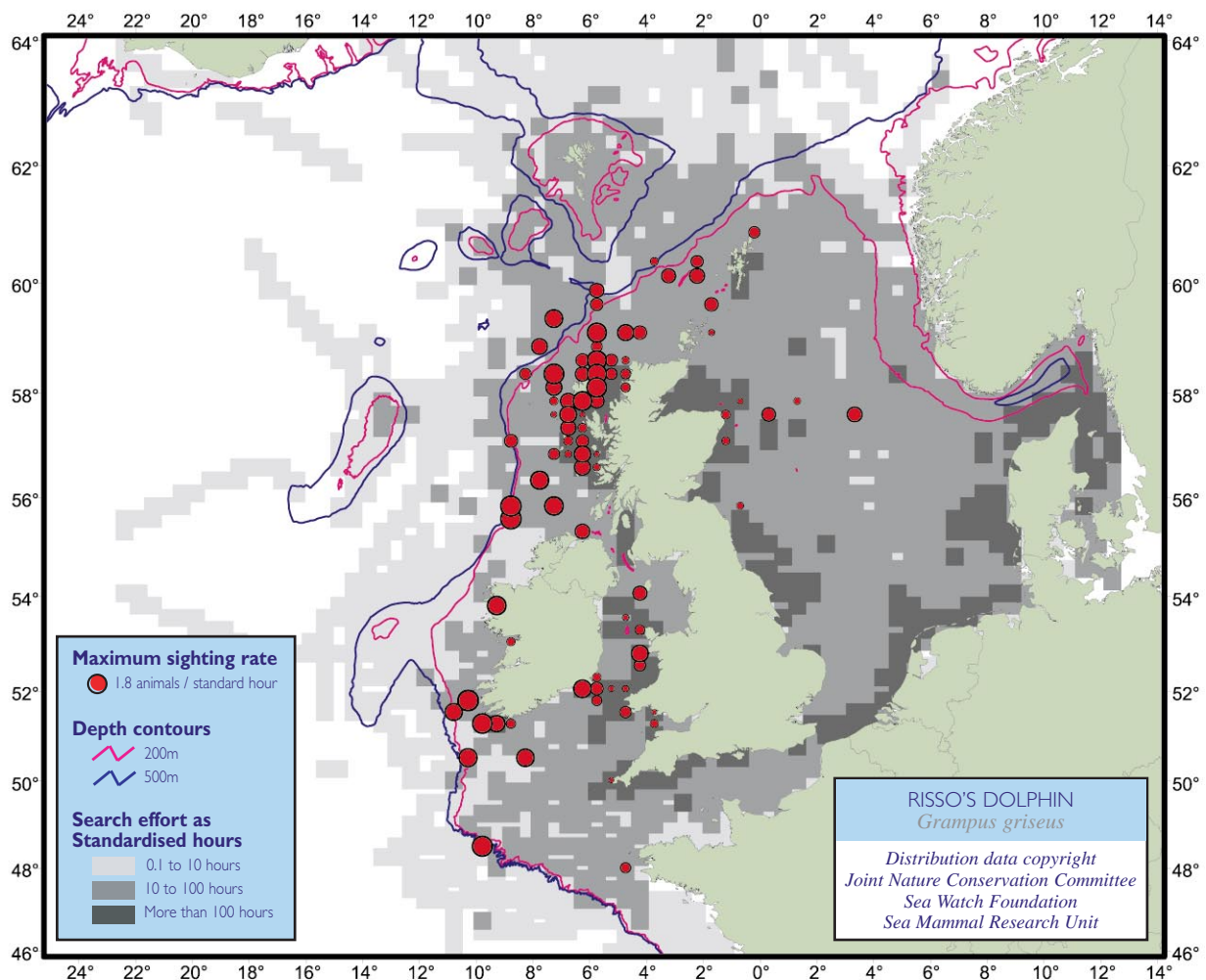
In north-west Europe, Risso's dolphin appears to be a continental shelf species. Most sightings are from western Scotland, with the waters surrounding the Outer Hebrides forming an obvious centre of distribution. There are other clusters of sightings in the southern Irish Sea and off south-west Ireland. There are few records from the central and southern North Sea and the Channel (although there are a number of casual sightings in the western portion south towards the Bay of Biscay - Evans 1992; Coles *et al.* 2001). Sightings around Shetland and Orkney, and off Norway are amongst the furthest north in the eastern Atlantic (Øien 1987; Evans 1996; Pollock *et al.* 2000). A few records come from waters immediately over the shelf break, but none from deeper areas.

There appears to be some seasonality in patterns of occurrence, with Risso's dolphins being seen more

frequently offshore near the continental shelf edge in winter (October to May). All records near the Wyville Thompson Ridge were made from October to December; those on the shelf edge south-west of Ireland during May (there was very little effort in this region from October to April). By contrast, the highest sightings rates in the Minch were between May and September. Most sightings from the Irish Sea were also between July and September. Near-shore records off south-west Ireland were obtained primarily between May and August, and in the northern North Sea in July and August, although some animals were present off north-east Scotland and Shetland in winter.



RISSO'S DOLPHIN *Grampus griseus*



MELON-HEADED WHALE

Peponocephala electra

The melon-headed whale is a medium-sized dolphin about 2.5 m in length. It has a slender, almost black, torpedo-shaped body with a centrally placed, sickle-shaped dorsal fin, a triangular-shaped head and a rounded forehead. The slightly underslung jaw presents a very indistinct beak, often with white lips. The flippers have pointed tips.

An apparently gregarious species, the melon-headed whale is usually observed in large herds ranging from 50 to 1,500 individuals (Bryden *et al.* 1977; Perryman *et al.* 1994). Mass strandings have been reported on several occasions, often showing a sex ratio in groups of two females to every male. The species is a fast swimmer, often breaking the surface as a tightly packed group; it commonly bow-rides vessels. It is known to breach and spyhop. Melon-headed whales have been observed associating with other cetaceans, particularly Fraser's dolphin (Perryman *et al.* 1994). The varied diet includes fish, ommastrephid squid and shrimps (Perryman *et al.* 1994). The species has also been reported herding and possibly attacking small dolphins (*Stenella* spp.) escaping from tuna seine nets in the tropical Pacific (Leatherwood and Reeves 1983).

Global distribution and North Atlantic status

Melon-headed whales appear to have a worldwide distribution, occurring in deep tropical and subtropical seas mainly between 40° N and 35° S. They are usually observed seaward of the edge of continental shelves, and around oceanic islands.

There is no information on the abundance of melon-headed whales in the North Atlantic, although large herds numbering a few hundreds have been seen in the eastern Caribbean (Evans, unpublished data).

NW European distribution

The only record from Europe of this species is of a skull found near Charlestown, Cornwall, found in September 1949, and originally misidentified as white-beaked dolphin (Mikkelsen and Sheldrick 1992).

FALSE KILLER WHALE

Pseudorca crassidens

False killer whales are 5-6 m in length and have a slender, almost all-black torpedo shaped body with a tall, usually sickle-shaped dorsal fin slightly behind the middle of the back. The head is small and narrow, tapering to overhang the lower jaw. An area of light grey is often present on the sides of the head and there can also be a blaze of grey on the chest between the flippers. The flippers are long, narrow and tapered, with a distinctive broad hump on the front margin near the middle.

The species appears to be highly social. Although groups of 10-50 animals are typical, larger herds numbering 600-800 have been reported (Ross 1984; Leatherwood *et al.* 1988). Occasional mass strandings of false killer whales may comprise animals of mixed age and sex groups (Sergeant 1982; Odell and McClune 1999). Fast-swimming and active, they can breach clear of the water, and sometimes approach and bow-ride vessels. They commonly associate with other cetaceans, such as bottlenose dolphins.

The diet of false killer whales is very varied, and includes many species of squid and large fish (Ross 1984; Baird *et al.* 1989). The species is also known to prey on small dolphins (e.g. *Stenella*, *Delphinus*) in the purse seine fishery for tuna in the tropical eastern Pacific, and has been recorded attacking sperm whales and on one occasion a humpback whale calf (Hoyt 1983; Odell and McClune 1999).

Global distribution and North Atlantic status

The false killer whale is a pelagic species with a worldwide distribution, occurring mainly in deep tropical to warm

temperate waters, usually seaward of continental shelf breaks. It has also been observed around oceanic islands and in waters of 200 m depth or less (Kasuya 1971; Odell and McClune 1999).

In the north-east Atlantic, the species has been recorded only occasionally north of the British Isles, most reports having come from the Bay of Biscay south to the Canary Islands.

NW European distribution

In Britain, there have been only a few strandings, all involving large groups: c. 150 in the Dornoch Firth, north-east Scotland in October 1927; c. 25 along the Carmarthen and Glamorgan coasts, south Wales, in May 1934; and c. 75 along the east coast of Britain in 1935 (Fraser 1934, 1946). There have been no strandings since then. Strandings have also occurred in Holland and Denmark.

There have been five sightings of false killer whales in UK waters since 1976, at distances ranging from 5-54 km from land: two in the Atlantic off western Scotland, two in the northern North Sea off north-east Scotland, and one in the South-west Approaches south of Cornwall, (Evans 1992). All sightings were made between July and November.



KILLER WHALE

Orcinus orca

Adult male killer whales may reach a length of 9 m, about 25% larger than adult females, and have a very tall, triangular and erect dorsal fin, which is sometimes tilted forwards. Immatures and adult females both have a smaller, sickle-shaped dorsal fin and cannot readily be distinguished from one another. When the animal surfaces, the grey saddle shows up over the black back, behind the dorsal fin. It has a conical-shaped black head, with a distinctive white oval patch above and behind the eye, an indistinct beak, white throat and large paddle-shaped flippers.

Killer whales live in very stable, matriarchal, extended family groups. Mothers form long-term, close associations with their sons, although both sexes may remain in their natal group throughout adulthood (Balcomb *et al.* 1982; Bigg *et al.* 1990). Mating with unrelated individuals probably occurs during brief periods of pod coalition, when members of different pods come together and exhibit much sexual activity (Osborne 1986; Heimlich-Boran 1988). A wide variety of behaviour has been observed, including various types of breaching, fluke- and flipper-slapping, lobtailing, and spyhopping (Jacobsen 1986). Non-predatory associations with other cetaceans (for example, minke whale and various pelagic dolphin species) have frequently been recorded (Jefferson *et al.* 1991). Most sightings in UK waters are of singles or groups of less than eight individuals (mean = 4.6), although groups of up to one hundred have been observed (Evans 1988; Pollock *et al.* 2000).

This species has one of the most varied diets of all cetaceans, ranging from fish and squid to birds, turtles, seals and other cetaceans (Hoyt 1990; Jefferson *et al.* 1991). Fish species taken in the eastern North Atlantic include herring, mackerel, cod, salmon, halibut, and bonito (Evans 1980; Couperus 1993; Ugarte and Similä 1993). Several studies in the Pacific suggest that transient

pods feed primarily upon marine mammals, and resident whales mainly on fish (Felleman *et al.* 1991; Baird *et al.* 1992). Killer whales often feed co-operatively when hunting, particularly when pursuing marine mammal prey (Jacobsen 1986; Hoelzel 1991). When feeding, they may lunge at the surface, or engage in 'carousel' feeding, where schools of fish (herring) are herded into a tight ball, aided by tail slaps used to stun the fish (Ugarte and Similä 1993).

Global distribution

The killer whale has a worldwide distribution in tropical, temperate and polar seas in both the southern and the northern hemisphere, occurring at greatest abundance in colder waters at higher latitudes (Dahlheim and Heyning 1999). It is usually found within 800 km of continents (Perrin 1982) and although it generally prefers deep waters it occurs also in shallow bays, inland seas, and estuaries.

North Atlantic status

Although killer whale numbers in the North Atlantic appear to be greatest in sub-Arctic and Arctic waters, the distribution of the species extends south to the Caribbean, Azores, Madeira, Canaries and occasionally the western Mediterranean. No overall population estimates exist, but recent sightings surveys in the eastern North Atlantic, mainly between Iceland and the Faroe Islands, indicate a population in the region of somewhere between 3,500 and 12,500 animals (Gunnlaugsson and Sigurjónsson 1990).

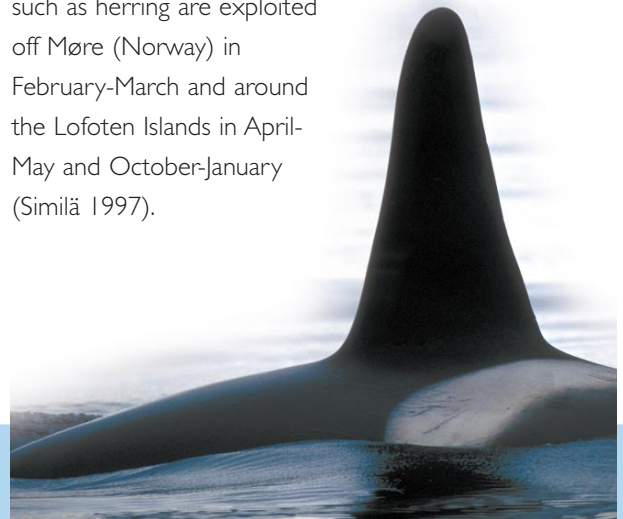


NW European distribution

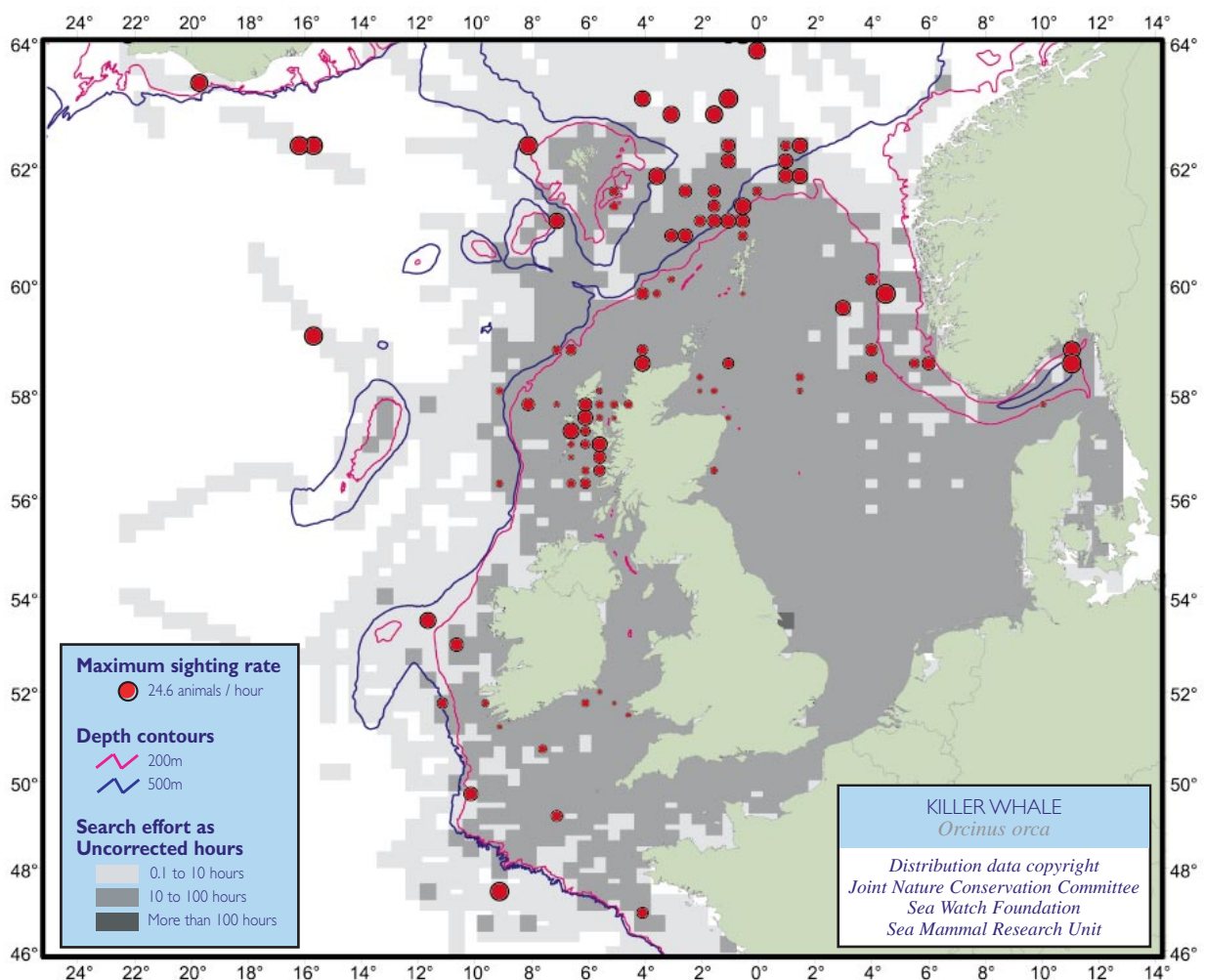
Killer whales are widely distributed in the deep North Atlantic and in coastal northern European waters, particularly around Iceland, the Faroe Islands and western Norway. In UK waters, it is most common off northern and western Scotland, but occurs also west and south of Ireland; it is rare in the central and southern North Sea, Irish Sea, and Channel.

In UK waters, killer whales occur in all months of the year, but have been recorded near-shore mainly between April and October (Evans 1988, 1992). Between Shetland and Norway, however, the species has been recorded regularly from November to March, commonly associating with purse seine fishing boats (Couperus 1993), and even taking mackerel out of the nets (Sea Watch, unpubl. data). Recent surveys north and west of Scotland suggest that killer

whales concentrate along the continental slope north of Shetland during May and June (Bloor *et al.* 1996; Pollock *et al.* 2000), although these are the months when killer whales usually first appear in coastal waters around the Northern Isles and Outer Hebrides (Evans 1988). Seasonal movements may be associated with the distribution of particular prey; for example, seals are preyed upon close to land particularly from June to October when they haul out to breed, and pelagic fish such as herring are exploited off Møre (Norway) in February-March and around the Lofoten Islands in April-May and October-January (Similä 1997).



KILLER WHALE *Orcinus orca*



LONG-FINNED PILOT WHALE

Globicephala melas

The two species of pilot whale, short-finned and long-finned, can be difficult to separate at sea. Generally, the short-finned pilot whale is a tropical and warm-temperate species, whereas long-finned pilot whales occur in cooler waters. While the possibility exists that some of the pilot whales seen off north-west Europe are short-finned, all sightings here are assumed to be of long-finned pilot whales. This assumption is supported by the fact that all strandings in the study area have been of long-finned.

The species is one of the largest dolphins, with males reaching 6.25 m in length. It has a square, bulbous head (particularly in old males), with a lightly protruding beak. The fairly low, long-based dorsal fin is situated slightly forward of the centre of the back; it is sickle-shaped and becomes flag-shaped with age. The body is black or dark grey in colour with a greyish-white, anchor-shaped patch on the chin, and a grey area on belly; the flippers are narrow and elongated, with a distinct wrist, particularly in older animals. The species is slow-swimming; a radio-tagged individual averaged a speed of 3.3 km/hr, with bursts of up to 16 km/hr (Mate 1989). This animal frequently rested on the sea surface in bouts of c. 15 minutes, mainly in the morning, following nocturnal foraging activity (Mate 1989). Besides 'logging' at the surface, the species commonly spyhops and lobtails.

Breaching is rare in adults, but has been more commonly observed in juvenile animals. Pilot whales are frequently seen in association with other cetaceans, notably bottlenose dolphins, but also common, striped and white-sided dolphins, and fin, sperm, northern bottlenose and killer whales (Bernard and Reilly 1999; N. Gricks, pers. comm.).

Pilot whales mostly occur in large pods. Mean pod size recorded on sighting surveys in the north-east Atlantic is about 20 (Buckland *et al.* 1993), lower than the numbers per group killed in the Faroe Islands. The latter figure typically exceeds 50, with a mean of 84 in recent years (Zachariassen 1993). This could be due to fusion of two or more pods in each drive (or 'grind') in the Faroes, or to a variation in behaviour between animals in near-shore and offshore areas, or perhaps to the possibility that only large groups are hunted. During surveys off north and west Scotland, mean group size was found to be 11.5 (maximum 400), higher than for all other species except Atlantic white-sided dolphin (Pollock *et al.* 2000).



In the Bay of Biscay, mean recorded group size was 7.4 off the Brittany coast and the maximum pod size anywhere in the Bay was 40 (Coles *et al.* 2001). Pilot whales also occur solitary and in small groups: this seems to be the case particularly outwith their core range south-west of the Faroes and south and west of Iceland. Evans (1992) recorded median group sizes over the British and Irish continental shelf within 100 km of land of between 3 and 12 individuals (maximum 200). More than 100 km from land, where water depths exceed 500 m, median group size was 20 (maximum 1,000).

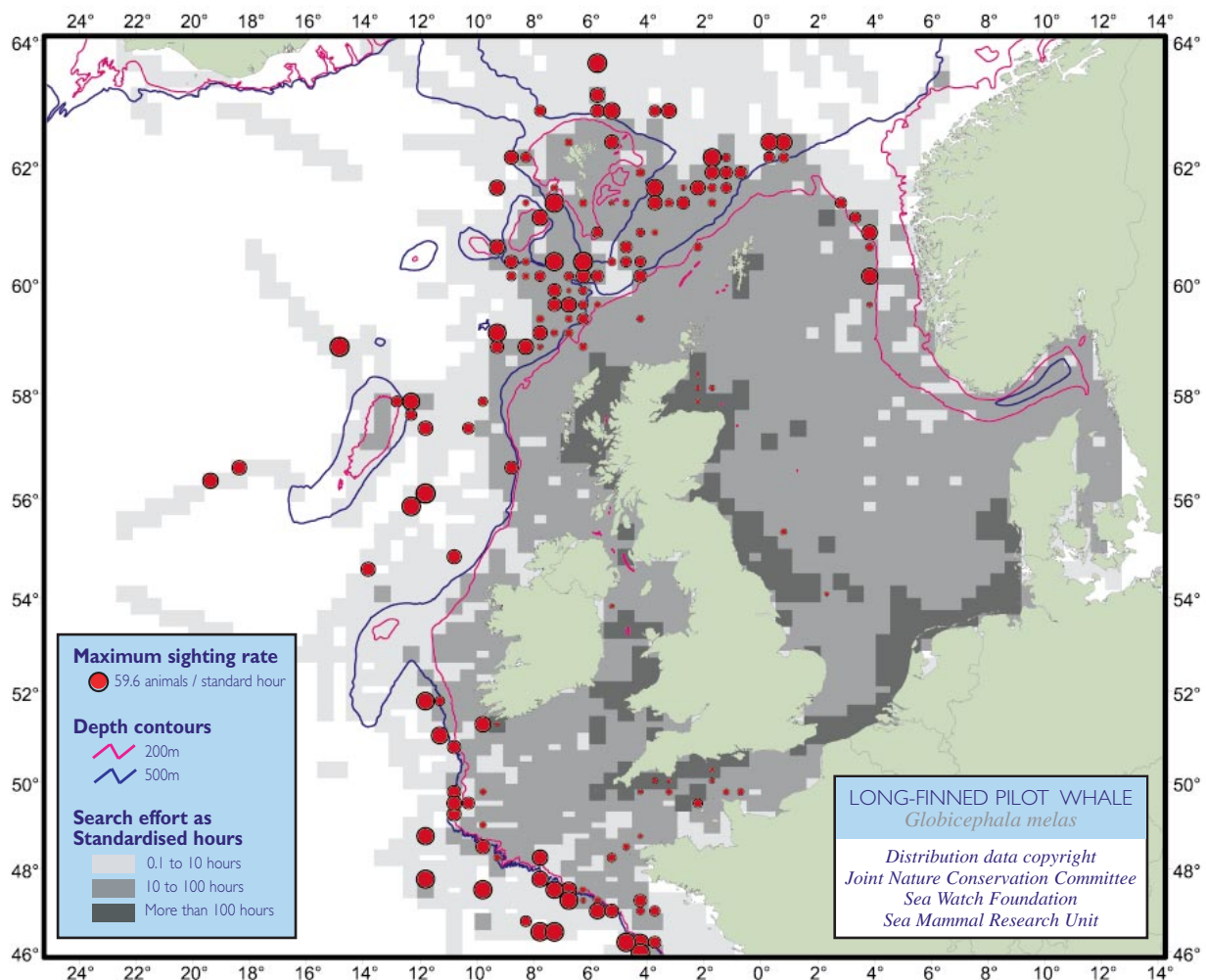
Pods of pilot whales comprise animals of all ages and sexes. All individuals within a pod, including adult males, are related, but males tend not to be the fathers of the calves in their pod (Amos *et al.* 1993). Aggregations of large numbers of pilot whales (up to 1,000 individuals) observed offshore west of the British Isles during April (Evans 1992) coincide with the start of the peak period of conception

(Desportes *et al.* 1993; Martin and Rothery 1993). Pilot whale diet near the Faroes features squid, especially *Todarodes sagittatus*, as a key component (Desportes and Mouritsen 1993). The diet is diverse, however, and a total of 12 genera of cephalopods, 15 genera of fish, and 3 species of crustaceans were recorded in the same study. The commonest two fish types were mid-water shoaling species occurring off the continental shelf, namely blue whiting and greater argentine.

Global distribution

Long-finned pilot whales occur in temperate and sub-Arctic regions of the North Atlantic, and in the southern oceans. Bernard and Reilly (1999) indicate limits of 40° N and 80° N in the North Atlantic. The species has been recorded at scattered locations south of about 30° S in the southern oceans, but occurs slightly further north in the cold water upwellings off southern Africa and South America.

LONG-FINNED PILOT WHALE *Globicephala melas*



The species occurs mainly in deep waters (200-3,000 m) seaward and along the edges of continental shelves where bottom relief is greatest, although it may occasionally venture into coastal waters such as fjords and bays.

North Atlantic status

Wide-area transect surveys were made in the northern and north-eastern North Atlantic in the summers of 1987 and 1989. These indicated that few pilot whales occur north of Iceland (66° N) and that their core range is deep water south-west of the Faroes and south and west of Iceland. Surveys covered a larger proportion of the range in 1989 and the best estimate of numbers was 778,000 (CV=0.30; Buckland *et al.* 1993). Further west, Waring *et al.* (1999) reported their best estimate of numbers in the species' habitat between Virginia and the Gulf of St Lawrence to be 8,176 (CV=0.65). Given the gaps in these surveys, and the

difficulties of estimating some parameters such as group size from ship-based surveys, an estimate of the total North Atlantic population cannot be made. The species occurs also in the Bay of Biscay south to the Iberian Peninsula, and is common in the Mediterranean Sea.

NW European distribution

The distribution map of the pilot whale highlights its deep water habitat, the species occurring in greatest numbers to the north of Scotland and south-east of the Faroes as well as along the shelf edge from southern Ireland south to the Bay of Biscay. Most records are from waters deeper than 200 m, with relatively few occurrences in shallower water around northern Scotland, the northern North Sea and the Channel. Occasionally, the species ventures into coastal waters in areas such as the Faroes, northern Scotland, western Ireland and the South-west Approaches to the





Channel, even entering fjords and bays. North of Scotland, highest sightings rates occurred over deeper areas (500-2,000 m) to the north and south of the Wyville Thompson Ridge although several sightings were from the western side of the Norwegian Rinne (along the 200 m depth contour). There are no records from the Porcupine Bank or its fringes. To the south-west of Ireland south to the Bay of Biscay, sightings are mostly along the continental shelf edge or beyond at depths of 200-2,000 m, occurring in all months with adequate survey effort.

There appears to be little seasonality in the pattern of sightings, although Evans (1980) found that incidental sightings peaked in the south-west English Channel and

North Sea between November and January, when pods were frequently seen near vessels fishing for mackerel and when bycatches (in the Channel) were reported. Median group size ranged from 10-15 (maximum 200) between May and August, whereas for six out of eight months between September and April, it varied between 20 and 25 (maximum 1,000 - Evans 1992).

The species probably dives to a few hundred metres and its spatio-temporal distribution has been linked to its preferred prey of squid, particularly *Todarodes sagittatus*, *Gonatus* and *Illex* spp., although fish such as Atlantic mackerel and shrimps may also be taken seasonally (Mercer 1975; Evans 1980; Waring *et al.* 1990).

HARBOUR PORPOISE

Phocoena phocoena

The harbour or common porpoise is the smallest and by far the most numerous of the cetaceans found in north-western European continental shelf waters. It has a small, rotund body with a short, blunt head, no beak, and a small, triangular dorsal fin. The species varies in size with geographical location, and males are slightly smaller than females of the same age. In the North Sea, females grow to about 160 cm in length, males to around 145 cm; newborn calves are typically 70-80 cm in length (Van Utrecht 1978; Lockyer 1995). Porpoises in Iberian waters and those south to Senegal are generally larger (Fraser 1958; Smeenk et al. 1992; Sequeira 1996; IWC 1996).

Typically, porpoises occur in small groups of one to three animals. Under certain circumstances they may form large aggregations but these do not appear to be co-ordinated schools, and probably result from many small groups and individuals concentrating at the same place at the same time for the same reason, for example to exploit good feeding resources (Hoek 1992).

The diet of the harbour porpoise comprises small fish of a wide variety of species (Read 1999). In the north-east Atlantic, small gadoids such as whiting, poor cod and Norway pout predominate, while herring, sandeels and gobies may be important at certain times or locations (Rae 1973; Santos Vázquez 1998).

Global distribution

The harbour porpoise occurs primarily in temperate waters of the North Pacific and North Atlantic, mainly but not exclusively over the continental shelves of these regions. In the eastern Atlantic, its distribution ranges from the Russian White Sea, in the summer at least, through most of the European shelf south to Senegal, with the most southerly records from just south of Cap Vert in Senegal (15° S). In the western Atlantic, porpoises have been recorded as far north as Upernavik in West Greenland (72° N), and as far south as Florida in the USA. In the Pacific, the species is found from northern Japan through the

Aleutian Islands chain to northern Alaska, seasonally as far east as the MacKenzie River delta, and also along the entire North American shelf from Alaska as far south as Monterey Bay (IWC 1996).

North Atlantic status

The harbour porpoise is the most numerous marine mammal in north-western European shelf waters. There have been several estimates of population numbers in different parts of this area, but the SCANS survey in July 1994 (Hammond et al. 1995) has been the most wide-ranging. The North Sea population was estimated at about 280,000 animals, with a further 36,000 in the Skagerrak and Belt Seas and another 36,000 over the Celtic shelf between Ireland and Brittany.

Surveys around Norway have resulted in estimates of about 11,000 porpoises in waters north of 66° N and the Barents Sea, and 82,000 for the northern North Sea and southern Norwegian waters (Bjørge and Øien 1995). In inner Danish waters, Heide-Jørgensen et al. (1993) estimated around 500-580 porpoises to the North of Fyn, just over 500 in the Great Belt and just under 100 in the Little Belt in June 1991 and June 1992. The same authors estimated around 90-200 in these two years for the Kiel Bight, and somewhere between 100 and 500 around the Island of Sylt. Elsewhere, Leopold et al. (1992) estimated that there were around 19,000 harbour porpoises on the continental shelf off south-west Ireland.

In certain areas, populations seem to have declined or have been eliminated, notably in the eastern Channel and southern North Sea (Addink and Smeenk 1999), the Black and the Baltic Seas. Porpoises were clearly abundant in the Baltic until some time in the 1960s, when they appear to have declined (Koschinski 2002).



It is thought that levels of accidental mortality in fishing nets in certain areas might be unsustainable (ASCOBANS 2000).

Tooth ultrastructure and genetic studies indicate population differentiation in the North Sea and adjacent waters, with possible sub-populations around the British Isles in the Irish Sea and Wales, in the northern North Sea, eastern (Denmark) and western (British Isles) North Sea and southern North Sea (the Netherlands) (Tiedemann 1996; Walton 1997; Evans *et al.* in press).

NW European distribution

In the north-western European region, the harbour porpoise is mainly confined to shelf waters, although sightings have occurred in deep water, for example between the Faroe Islands and Iceland, suggesting some movement between adjacent shelf areas. Areas of highest population density appear to be in the Belt Sea to the east of

Denmark and in the north-western North Sea, in water shallower than about 100 m. The southern, and especially the south-eastern, North Sea hosts relatively lower densities on an annual basis, and there have been few sightings in the Channel. On the Atlantic seaboard, there appear to be locally high densities of porpoises, such as off south-west Ireland and south-west Wales, and off the west coast of Scotland.

Seasonal movements are difficult to infer from the rather patchy monthly survey effort achieved. The highest sightings rates in the south-eastern North Sea, where there are relatively few sightings for the year as a whole, are during the first four months of the year, whereas the highest rates around the Outer Hebrides appear to be during summer (June to September). Whether such observations imply anything about seasonal movements, or are simply the results of differences in sightings efficiency among the various surveys involved, is not clear.

HARBOUR PORPOISE *Phocoena phocoena*

