

A3a.7 MARINE AND OTHER MAMMALS

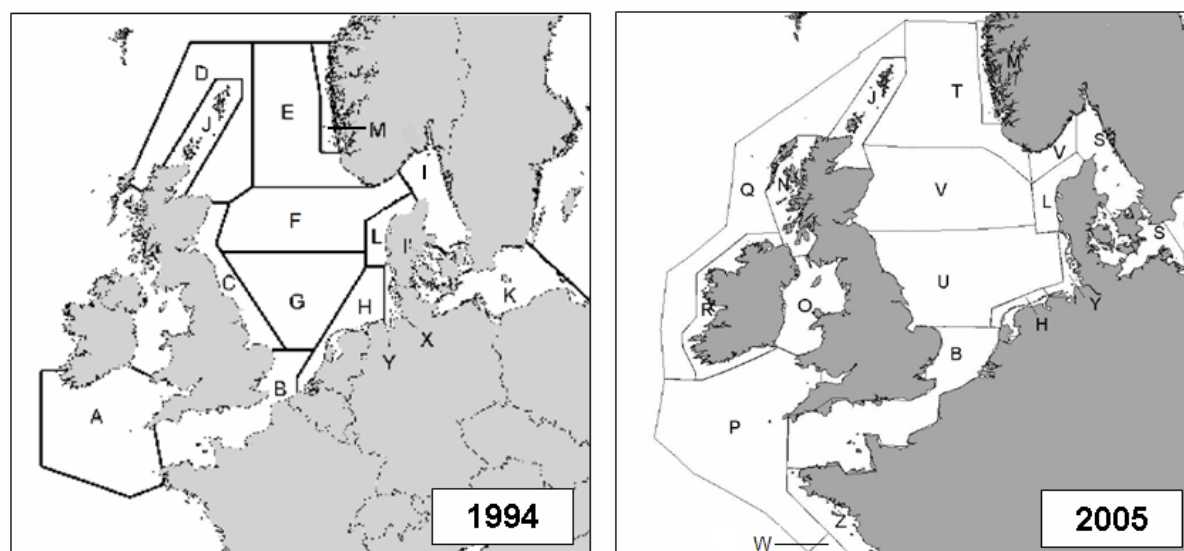
A3a.7.1 Introduction

The sections below describe marine mammal and otter occurrence in UK waters. A summary is provided of the current understanding of their distribution, abundance, ecological importance, and the main environmental issues of concern. Where possible, information is provided on any known or likely trends in these characteristics. In addition, the various conservation frameworks in place to facilitate their management and conservation are described.

Reviews of marine mammal distribution, ecology and sensitivities in UK waters have been carried out by the Sea Mammal Research Unit (SMRU), University of St. Andrews, in contribution to previous oil and gas SEAs 2 to 7, and also for the SEA 8 area (English Channel and Southwest Approaches) (Hammond *et al.* 2001, 2002a, 2003, 2004, 2005, 2006, 2008). Additionally, an updated collation of background information on marine mammals relevant to the current Offshore Energy SEA was produced by SMRU Limited (Murphy *et al.* 2008). Where relevant, information on the ecology of marine mammals is drawn from a wide range of other publicly available reports and peer-reviewed studies. The contribution of Evans *et al.* (2008) to the Marine Climate Change Impacts Partnership Annual Report 2007-2008 provides information on interactions between marine mammals and climate change around the UK.

Widespread ship-based and aerial surveys of cetaceans in the North Sea and adjacent waters took place in the summers of 1994 and 2005 for the SCANS and SCANS-II programmes (Small Cetacean Abundance in the European Atlantic and North Sea); results of these are presented in Hammond *et al.* (2002b) and SCANS-II (2008). The areas surveyed in these surveys are illustrated in Figure A3a.7.1.

Figure A3a.7.1 – SCANS and SCANS-II survey strata



Notes: 1994: shipboard surveys (A-I), aerial surveys (I'-Y); 2005: shipboard surveys (U, S, P, V, T, Q, W), aerial surveys (B, H, J, L, M, N, O, R, Y, Z). Survey stratum 'W' (2005) extended south along the European coast to Gibraltar. Sources: Hammond *et al.* (2002b), SCANS-II (2008)

A compilation of cetacean sighting records from a variety of systematic surveys and opportunistic sightings is presented in Reid *et al.* (2003). This provides the most

comprehensive information available to date on cetacean distribution in northwest European waters, along with summary information on ecology. The atlas incorporates some 2,500 days of observation carried out since 1973. Although subject to a number of possible biases, the maps presented in this resource provide a synoptic overview of distributions, integrated over a long time period and all seasons. For the most common species, seasonal maps of sightings are available, although considerable variation in monthly observation effort must be considered. Many of these sightings come from the European Seabirds at Sea (ESAS) database, which draws heavily upon data from JNCC Seabirds at Sea Team (SAST) surveys, where marine mammals are recorded in addition to seabirds.

ESAS sightings over the period 1979-1999 from the waters north and west of Scotland specifically are presented in Pollock *et al.* (2000). While the distribution of survey effort varied between months (greatest in summer) and years (limited in deep-water areas until 1997), the majority of the area was surveyed to some extent in all months of the year. Further information on the distribution and abundance of cetaceans along the shelf edge (and offshore waters beyond this) of the UK, Ireland, France and Spain is provided by the Cetacean Offshore Distribution and Abundance (CODA) survey. The survey covered approximately 10,000km of transects using five ships; strata and transects are shown in Figure A3a.7.22. Survey effort took place in the summer of 2007; early results are provided by Macleod & Hammond (2008), with abundance estimates reported in Murphy *et al.* (2008); a full report is expected to be released later in 2009.

The Hebridean Whale and Dolphin Trust have been carrying out ship-based summer sightings surveys around the Inner and Outer Hebrides for several years. Resulting sightings reports, along with species-specific studies, provide further information on the distribution of cetaceans in this area. Additional synthesis of sighting information comes from the Sea Watch Foundation, providing regional overviews of cetacean occurrence around the UK (Sea Watch Foundation website).

Information on the distribution of large whales (fin, humpback and blue) in deep waters to the west of Britain and Ireland is provided by acoustic monitoring using US Navy-operated hydrophone arrays mounted to the seabed in this area. Charif & Clark (2000) present results of this monitoring from 1996-1998, with analyses of data collected over a 10 year period from 1996-2005 presented in Charif & Clark (2008).

There is extensive information on the distribution and abundance of grey seals around Britain from annual aerial surveys of breeding colonies and from over 100 animals fitted with satellite tags (e.g. Matthiopoulos *et al.* 2004, SCOS 2005). Information on the abundance and distribution of harbour seals is drawn from aerial surveys of haul-out sites (e.g. Thompson *et al.* 2005, Lonergan *et al.* 2007), reports by the SMRU-advised Special Committee on Seals (SCOS) (e.g. SCOS 2007), and telemetry data from 143 seals from eight sites around the UK coast fitted with satellite tags (Sharples *et al.* 2008).

A3a.7.2 Cetacean distribution and abundance: UK context

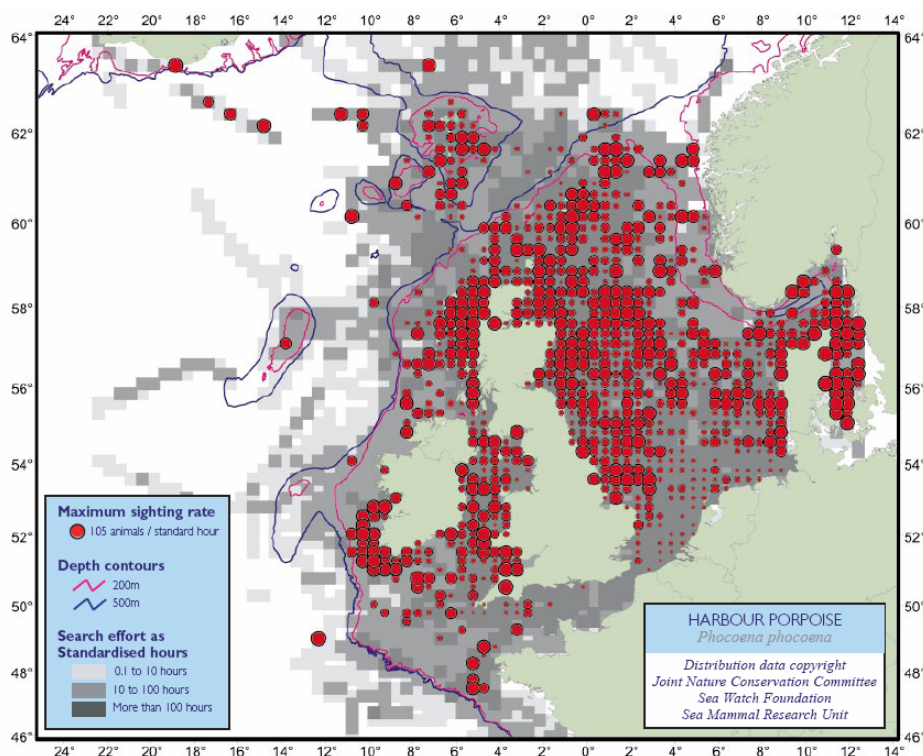
More than twenty cetacean species have been recorded in UK waters. Of these, ten species are known to occur regularly: minke whale, harbour porpoise, bottlenose dolphin, short-beaked common dolphin, white-beaked dolphin, white-sided dolphin, killer whale, Risso's dolphin, and long-finned pilot whale. Nine further species are infrequently recorded: striped dolphin, sperm whale, pygmy sperm whale, sei whale, fin whale, humpback whale, Cuvier's beaked whale, Sowerby's beaked whale and the northern bottlenose whale (Murphy *et al.* 2008).

A3a.7.2.1 Harbour porpoise

Harbour porpoise (*Phocoena phocoena*) distribution is restricted to temperate and sub-arctic (primarily 5-14°C) seas of the Northern Hemisphere. In the Northeast Atlantic, it is common and widely distributed on the continental shelf (mainly at depths of 20-200m) from the Barents Sea and Iceland south to the waters off the Iberian coast (Hammond *et al.* 2008). The harbour porpoise is the most common cetacean in UK waters. They are widely distributed and abundant throughout the majority of UK shelf seas, both coastally and offshore, with notably fewer sightings in the far southern and southeastern North Sea and eastern Channel (Reid *et al.* 2003). In coastal waters, they are often encountered close to islands and headlands with strong tidal currents (e.g. Pierpoint 2008). Sightings become increasingly rare close to the continental shelf edge, with relatively few records of porpoise in deeper waters beyond the shelf edge. Figure A3a.7.2 shows sightings rates of harbour porpoises (numbers sighted per hour), corrected for probability of detection under different sea states, for the area around the UK. The mating/calving periods for the harbour porpoise ranges from May to August in the Northeast Atlantic (Learmonth 2006).

For the entire SCANS-II survey area, harbour porpoise abundance in the summer of 2005 was estimated as 385,617 (CV=0.20; 95% CI = 261,266-569,153). For survey strata within or overlapping UK waters only, abundance was estimated as 328,142. Harbour porpoises typically occur in groups of 1-3 animals; larger aggregations have been reported, probably where many smaller groups are concentrated in the same area rather than coordinated schools (Reid *et al.* 2003).

Figure A3a.7.2 – Sighting rates of harbour porpoise



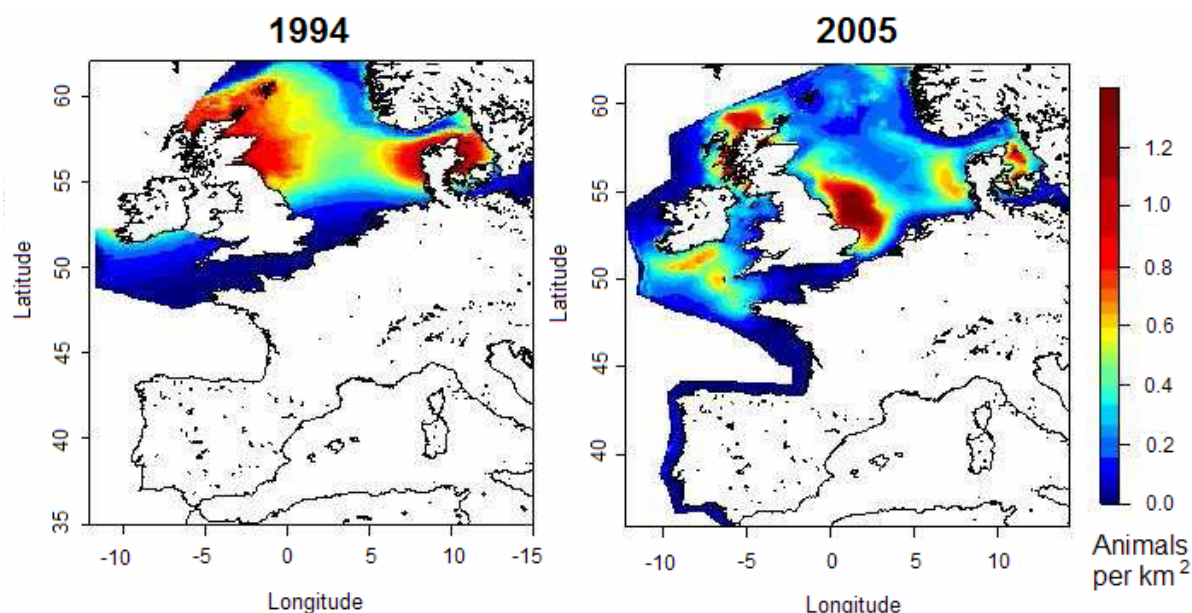
Source: Reid *et al.* (2003)

Density surface modelling of harbour porpoise from the SCANS project in 1994 suggested high densities of animals north of Scotland and in the western central and northern North Sea. Repeat surveys for SCANS-II in 2005 showed considerable differences in distribution (SCANS-II 2008). While areas of high density remained north of Scotland, density around

Orkney and Shetland appeared considerably lower than that in 1994. In 2005, harbour porpoise were observed in relatively high densities throughout much of the UK southern North Sea, an area from which they were largely absent in 1994. Lower densities were shown for the central North Sea and Moray Firth in 2005 compared to those of 1994, while elevated densities were observed in the Celtic Sea, where very few individuals were observed in 1994.

Figure A3a.7.3 compares the results of these two years; these are mathematical extrapolations of survey data, and therefore differ slightly from the distribution of actual sightings. The predicted density in unsurveyed areas is determined by modelled relationships between observed density and habitat variables (longitude and latitude, plus distance from coast, depth or aspect of seabed slope if selected) in surveyed areas, and represents the best prediction of density at this time of year (July) from the available data.

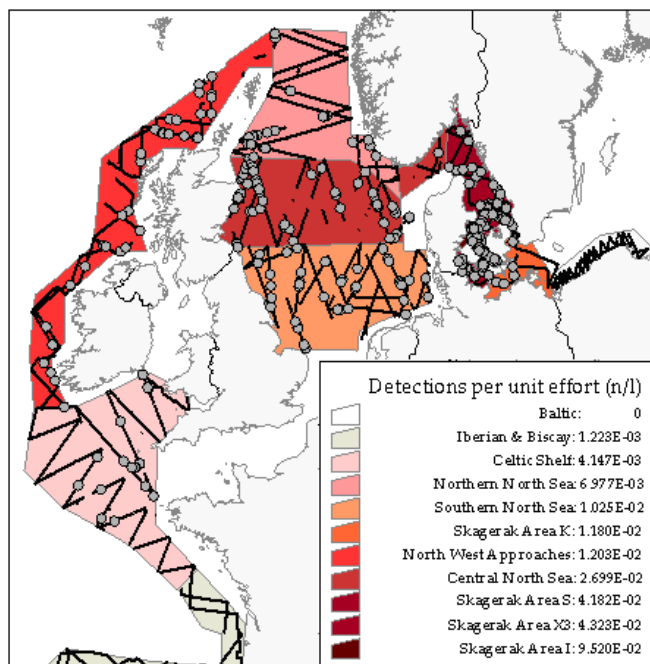
Figure A3a.7.3 – Modelled density of harbour porpoise in 1994 and 2005



Notes: Density values are predictions based on the observed distributions and their relationships with habitat variables (longitude and latitude, plus distance from coast, depth or aspect of seabed slope if selected). Source: SCANS-II (2008)

In addition to visual observations, SCANS-II survey vessels also carried out acoustic monitoring of harbour porpoise click trains throughout the study area. Figure A3a.7.4 shows the distribution of survey effort and acoustic detections of harbour porpoise, with survey strata shaded according to the number of click train detections per km of transect.

Figure A3a.7.4 – Acoustic detection rates of harbour porpoise 2005



Notes: survey legs (black lines), harbour porpoise click train detections (grey circles) and the overall encounter rate (red shading) in number of detections per km. Source: SCANS-II (2008)

Over the entire area, detection rates were greatest in the Skagerrak. In strata overlapping UK waters, detection rates were greatest in the central North Sea, followed by shelf waters west of Scotland and Ireland, the southern North Sea, then the northern North Sea. The lowest detection rates in those UK waters surveyed were observed on the Celtic Shelf.

Table - A3a.7.1 - Estimated abundance of harbour porpoise in UK waters, 2005

Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	10,254	0.36	0.274
T	Northern North Sea	1	134,206	23,766	0.33	0.177
V	Central North Sea (north)	1	160,517	47,131	0.37	0.294
U	Central North Sea (south)	1, 2	156,972	88,143	0.23	0.562
B	Southern North Sea and Channel	2, 4	123,825	40,927	0.38	0.331
P	Celtic Shelf	4	197,400	80,613	0.50	0.408
O	Irish Sea	6	45,417	15,230	0.35	0.335
N	Minch and western Scotland	6, 7	30,626	12,076	0.43	0.394
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	10,002	1.24	0.067
Total (strata overlapping UK waters)			1,036,077	328,142	-	0.317
Total (all SCANS-II strata)			1,370,114	385,617 [261,266-569,153]	0.20	0.281

Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

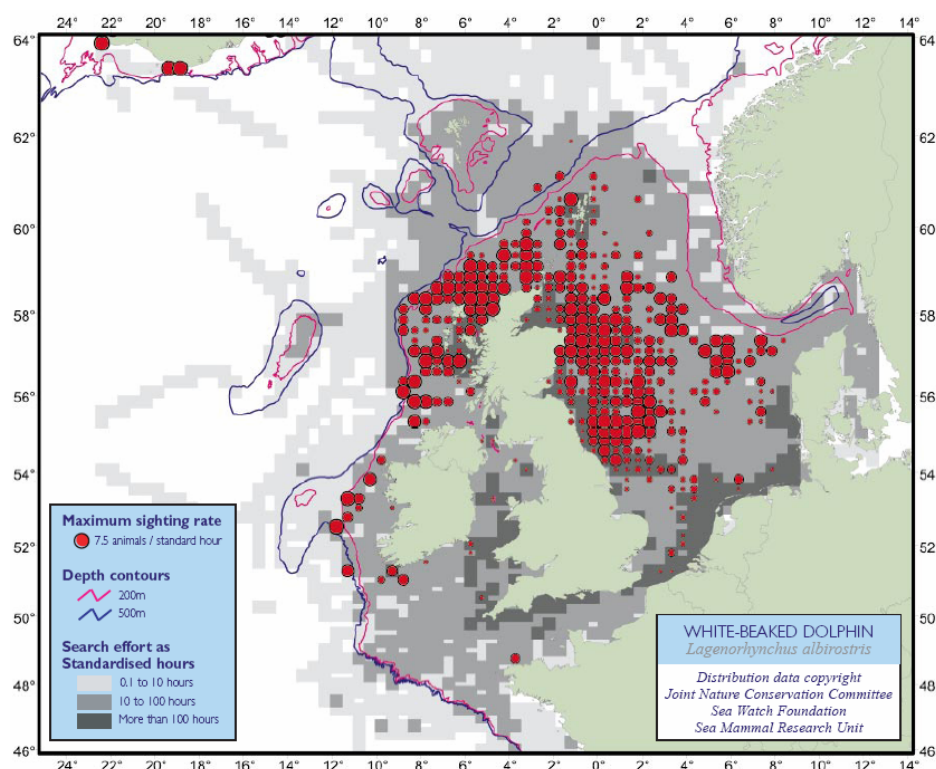
A3a.7.2.2 White-beaked dolphin

White-beaked dolphins (*Lagenorhynchus albirostris*) are restricted to the North Atlantic. In the Northeast Atlantic their range extends from the British Isles to Spitsbergen. They are the

second most commonly occurring cetacean in UK shelf waters, and are regularly encountered in coastal and offshore waters (Figure A3a.7.5). Their distribution is generally restricted to the northern half of UK waters, with sightings rare below 54°N in the North Sea, while they are very rare in the Channel and Irish and Celtic Seas. Analysis of summer sightings on shelf waters around the UK from 1983-1998 showed the vast majority of white-beaked dolphins to occur in waters below 13°C in temperature (MacLeod *et al.* 2008). Very few records of white-beaked dolphins exist for deeper waters beyond the shelf edge. While sighted throughout the year, sightings are slightly more frequent from July to October. Data from 1907-2003 show a seasonal peak in strandings of white-beaked dolphins from June to September, with the majority occurring around the Scottish coast and along the east coast of England (Canning *et al.* 2008).

For the entire SCANS-II survey area, white-beaked dolphin abundance in the summer of 2005 was estimated as 22,664 (CV=0.42; 95% CI = 7,504-21,307); for white-beaked and/or Atlantic white-sided dolphin (*Lagenorhynchus* spp.), estimated abundance was 37,981 (CV=0.36; 95% CI = 19,169-75,255). For survey strata within or overlapping UK waters only, white-beaked dolphin abundance was estimated as 22,398, and for *Lagenorhynchus* spp. 27,228. Group size is typically less than 10, although schools of up to 50 are not uncommon and larger aggregations of 100-500 animals have been reported in northern parts of their range (Reid *et al.* 2003).

Figure A3a.7.5 – Sighting rates of white-beaked dolphin



Source: Reid *et al.* (2003)

Table A3a.7.2 - Estimated abundance of white-beaked dolphin in UK waters, 2005

Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	682	0.86	0.0182
T	Northern North Sea	1	134,206	1,525	0.56	0.0114
V	Central North Sea (north)	1	160,517	7,862	0.37	0.0490
U	Central North Sea (south)	1, 2	156,972	493	0.48	0.0031
B	Southern North Sea and Channel	2, 4	123,825	0	-	0
P	Celtic Shelf	4	197,400	0	-	0
O	Irish Sea	6	45,417	75	0.80	0.0017
N	Minch and western Scotland	6, 7	30,626	9,731	0.91	0.3177
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	2,030	0.60	0.0136
Total (strata overlapping UK waters)			1,036,077	22,398	-	0.0289
Total (all SCANS-II strata)			1,370,114	22,664 [7,504-21,307]	0.36	0.0165

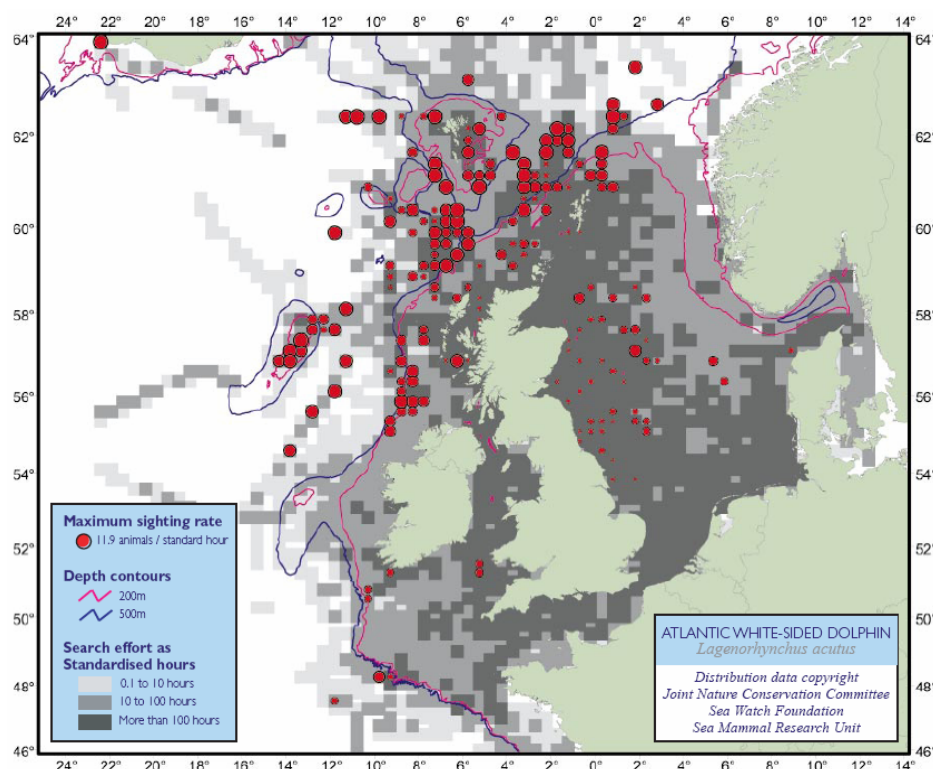
Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

A3a.7.2.3 Atlantic white-sided dolphin

Atlantic white-sided dolphins (*Lagenorhynchus acutus*) are confined to the North Atlantic. They share most of their range with the white-beaked dolphin, but in the Northeast Atlantic they are primarily an offshore, oceanic species. At sea, the two species can be difficult to distinguish and they are often recorded simply as *Lagenorhynchus* spp. They are regularly sighted in the waters north and west of Scotland, with greatest numbers observed along the shelf break and over deeper waters further offshore, including the Faroe-Shetland Channel to the north (Pollock *et al.* 2000, Macleod *et al.* 2003). While they have been observed throughout the year in these areas, greatest numbers are observed from May to November (Reid *et al.* 2003). The species is infrequently recorded in nearshore waters of Orkney and Shetland, often in large groups, and primarily during summer. They are also occasionally observed in offshore waters of the central and northern North Sea from July to September. In shelf waters, Atlantic white-sided dolphins have been reported as forming mixed schools with the visually similar white-beaked dolphin. Over deeper waters, they are regularly recorded in association with long-finned pilot whales (*Globicephala melas*), and occasionally larger baleen whales.

While data from the SCANS-II survey were too few to calculate abundance estimates for white-sided dolphin alone, *Lagenorhynchus* spp. abundance in the summer of 2005 for the entire SCANS-II survey area was estimated as 37,981 (CV=0.36; 95% CI = 19,169-75,255). For survey strata within or overlapping UK waters only, abundance was estimated as 27,228. Abundance estimates for waters off northwest Scotland during summer 1998 were: 21,371 (CV = 0.54) for west of the Outer Hebrides, and 74,626 (CV = 0.72) for the Faroe Shetland Channel (Macleod 2004a, cited in Murphy *et al.* 2008). Observed group sizes are often of tens to hundreds of animals and sometimes up to 1,000, particularly offshore (Reid *et al.* 2003).

Figure A3a.7.6 – Sighting rates of Atlantic white-sided dolphin



Source: Reid et al (2003)

Table A3a.7.3 - Estimated abundance of *Lagenorhynchus* spp. in UK waters, 2005

Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	0	-	0
T	Northern North Sea	1	134,206	12,627	0.80	0.0941
V	Central North Sea (north)	1	160,517	6,460	0.35	0.0402
U	Central North Sea (south)	1, 2	156,972	405	1.00	0.0026
B	Southern North Sea and Channel	2, 4	123,825	0	-	0
P	Celtic Shelf	4	197,400	0	-	0
O	Irish Sea	6	45,417	0	-	0
N	Minch and western Scotland	6, 7	30,626	0	-	0
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	7,736	0.29	0.0517
Total (strata overlapping UK waters)			1,036,077	27,228	-	0.0263
Total (all SCANS-II strata)			1,370,114	37,981 [19,169-75,255]	0.36	0.0277

Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

A3a.7.2.4 Bottlenose dolphin

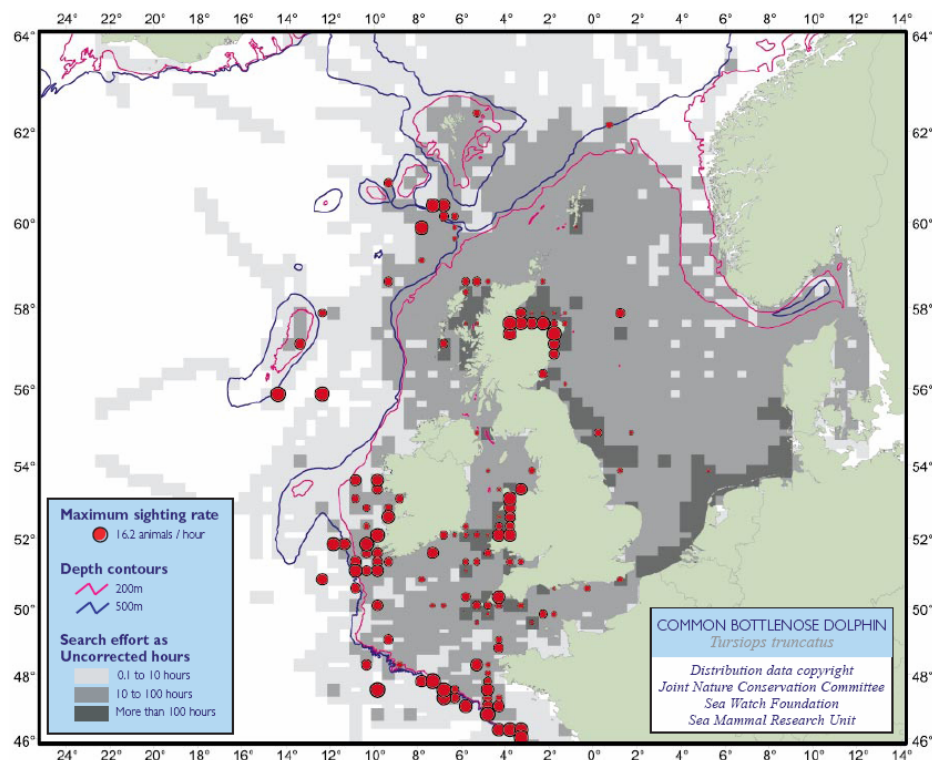
The bottlenose dolphin (*Tursiops truncatus*) has a worldwide distribution in tropical and temperate seas of both hemispheres. In UK waters, they are frequently reported in shelf waters off northeast and southwest Scotland, in the Irish Sea, and in the western Channel. Elsewhere in the European Atlantic, they are regularly present in shelf waters off Spain,

Portugal, northwest France and south and west Ireland. Data obtained during the SCANS surveys indicated that the western Celtic Sea is a relatively important area for bottlenose dolphins, with large numbers recorded off the south and west of Ireland and along the shelf edge southwards towards the French coast. In coastal waters, bottlenose dolphins favour river estuaries, headlands and sandbanks, mainly where there is uneven bottom relief and/or strong tidal currents (e.g. Wilson *et al.* 1997a, Ingram & Rogan 2002). North and west of Scotland, bottlenose dolphins are also encountered further offshore along the shelf edge and beyond, including the Faroe-Shetland Channel and Rockall Trough and Bank. Here, they are often observed in mixed schools with long-finned pilot whales.

A small, seemingly resident population of bottlenose dolphins exists off the east coast of Scotland. They typically range from coastal waters of the Moray Firth to the Firth of Forth, with occasional observations from further offshore in the North Sea; the dolphins are most frequently sighted within the inner Moray Firth. Concentrations of bottlenose dolphins occur off the Welsh coast in Cardigan Bay (particularly the southern portion), although are infrequently sighted along much of the Welsh coast. Research suggests a small, possibly resident population of bottlenose dolphins to also occur in the waters around the Inner Hebrides (Mandleberg 2006). Sightings are also occasionally reported off the west coast of the Outer Hebrides and in the northern entrance to the Minch. Bottlenose dolphins are recorded in the western Channel off the coast of Cornwall throughout most of the year. Additionally, several small resident groups are present off the north coast of France.

In UK coastal waters, peak sightings occur between July and October, with a secondary peak reported in some localities during March and April; however, animals are present near to shore in every month of the year (Hammond *et al.* 2008).

Figure A3a.7.7 – Sighting rates of bottlenose dolphin



Source: Reid *et al.* (2003)

For the entire SCANS-II survey area, bottlenose dolphin abundance in the summer of 2005 was estimated as 12,645 (CV = 0.27; 95% CI = 7,504-21,307). For survey strata within or overlapping UK waters only, abundance was estimated as 8,026. In European offshore waters, the CODA survey estimated bottlenose dolphin abundance in the summer of 2007 as 19,295 (CV = 0.25; 95% CI = 11,842-31,440). Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 17,245, with the majority observed in waters west and southwest of Ireland (Murphy *et al.* 2008). Group size is commonly 2-25, although may occasionally number tens or low hundreds of animals; larger schools tend to occur in deeper waters (Reid *et al.* 2003).

Table A3a.7.4 - Estimated abundance of bottlenose dolphin in UK waters, 2005

Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	412	0.86	0.0110
T	Northern North Sea	1	134,206	117	0.79	0.0009
V	Central North Sea (north)	1	160,517	123	4.83	0.0008
U	Central North Sea (south)	1, 2	156,972	0	-	0
B	Southern North Sea and Channel	2, 4	123,825	395	0.74	0.0032
P	Celtic Shelf	4	197,400	5,370	0.49	0.0272
O	Irish Sea	6	45,417	235	0.75	0.0052
N	Minch and western Scotland	6, 7	30,626	246	1.04	0.0080
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	1,128	0.68	0.0075
Total (strata overlapping UK waters)			1,036,077	8,026	-	0.0077
Total (all SCANS-II strata)			1,370,114	12,645 [7,504-21,307]	0.27	0.0092

Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

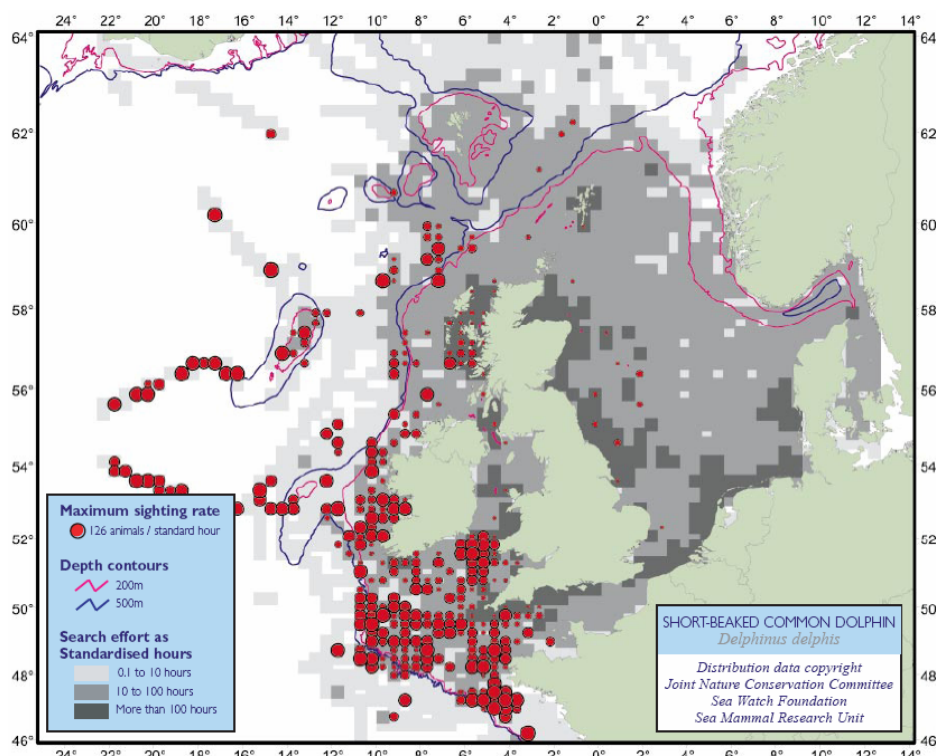
A3a.7.2.5 Common dolphin

The common dolphin (*Delphinus delphis*) has a worldwide distribution and inhabits both oceanic and shelf-edge waters of tropical, subtropical and temperate seas of the Atlantic and Pacific Oceans. They are widely distributed throughout the Northeast Atlantic, although the majority of sightings have been reported in waters south of 60°N. Analysis of summer sightings on shelf waters around the UK from 1983-1998 showed the vast majority of common dolphins to occur in waters above 14°C in temperature (MacLeod *et al.* 2008). Strong seasonal shifts in their distribution have been noted, with winter movements onto the Celtic Shelf and into the western English Channel (Northridge *et al.* 2004); high densities have been reported during this period. Relatively few sightings have been reported in the eastern English Channel and the North Sea. During the mating/calving period for this species from May to September the majority of sightings have been reported along and off the continental shelf slope to the southwest of the UK (Murphy *et al.* 2005; Murphy & Rogan 2006). Large numbers are also observed off the west coast of the Republic of Ireland in coastal and shelf waters. In UK and Irish waters, common dolphins often form mixed schools with striped dolphins (*Stenella coeruleoalba*).

Common dolphins are sighted fairly frequently in coastal waters around the Hebrides during summer, primarily from May to August, and there are fairly frequent offshore sightings on the shelf and shelf slope to the west and northwest of Scotland. Limited survey effort in deeper waters to the west suggests common dolphins are widespread and abundant in this area, at

least in summer months. In some years, they are also sighted further north and east on the shelf, occasionally being observed in the northern North Sea and waters surrounding Orkney and Shetland. Sightings further north and east in shelf seas have increased in recent years.

Figure A3a.7.8 – Sighting rates of common dolphin

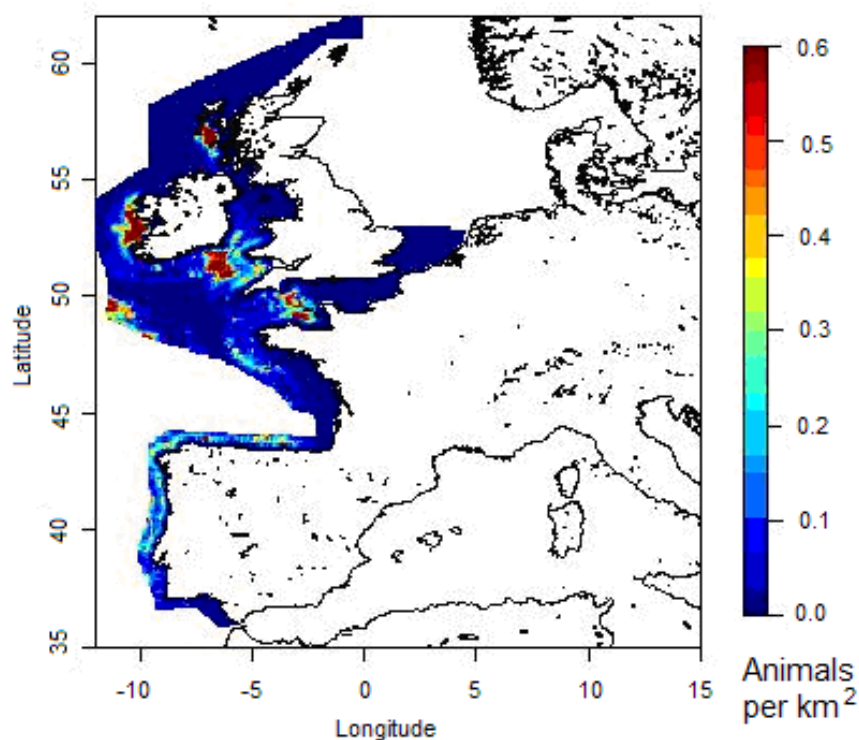


Source: Reid *et al.* (2003)

Density surface modelling of common dolphins in summer 2005 based on the SCANS-II survey showed well defined areas of higher density south of the Outer Hebrides, west of Ireland, in the Celtic Sea offshore of southeast Ireland, in the western Channel approximately between Devon and northern France, and to a lesser extent along the coast of north Cornwall (Figure A3a.7.9). Outside of these areas, animals were present throughout much of the waters southwest of the UK and Ireland, extending into the St. Georges Channel and southern Irish Sea. High densities were also estimated far offshore close to the limit of survey extent in the Southwest Approaches, while moderate densities appeared along much of the Iberian coast.

For the entire SCANS-II survey area, common dolphin abundance in the summer of 2005 was estimated as 63,366 (CV = 0.46; 95% CI = 26,973-148,865); when dolphins identified as common and/or striped dolphins are also included, estimated abundance was 89,404 (CV = 0.35; 95% CI = 46,110-173,349). For survey strata within or overlapping UK waters only, abundance was estimated as 29,632 for common dolphins alone and 40,496 for common and/or striped dolphins. In European offshore waters, the CODA survey estimated common dolphin abundance in the summer of 2007 as 118,264 (CV = 0.38; 95% CI = 56,915-246,740), with the majority sighted along the continental shelf slope west of France. Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 57,184, with greatest numbers observed in the southern stratum (Murphy *et al.* 2008). Common dolphins are found in a wide range of group sizes from small schools to large concentrations of 1000 to 5000 individuals (e.g. Murphy 2004); average group size reported in Reid *et al.* (2003) was 14 individuals.

Figure A3a.7.9 – Modelled density of common dolphin in 2005



Notes: Density values are predictions based on the observed distributions and their relationships with habitat variables (longitude and latitude, plus distance from coast, depth or aspect of seabed slope if selected). Source: SCANS-II (2008)

Table A3a.7.5 - Estimated abundance of common dolphin in UK waters, 2005

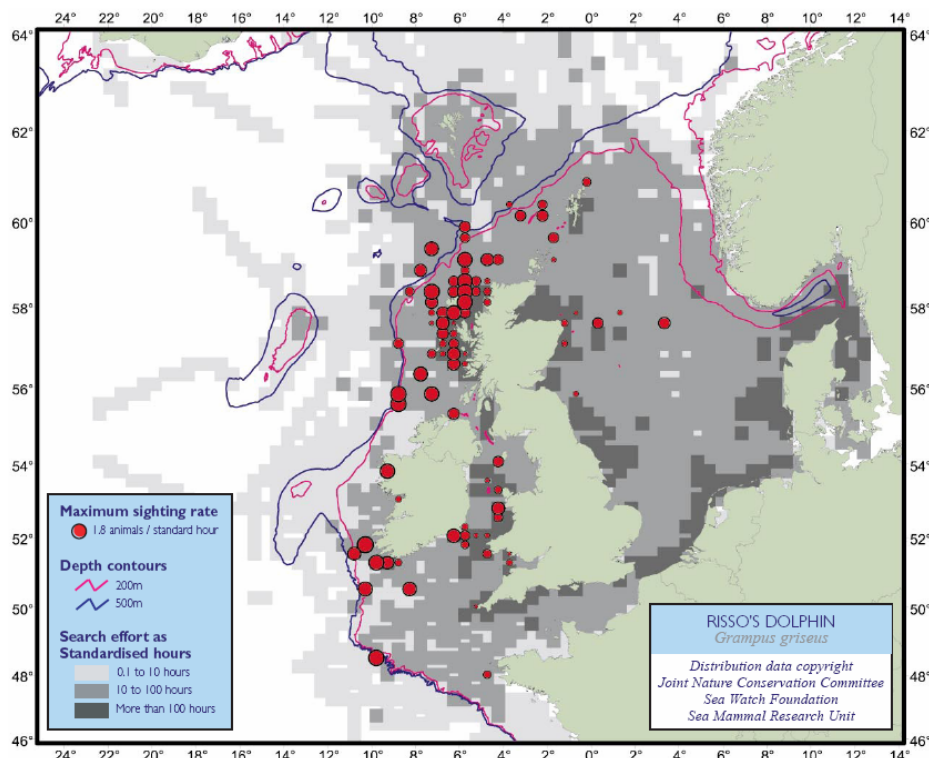
Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	0	-	0
T	Northern North Sea	1	134,206	0	-	0
V	Central North Sea (north)	1	160,517	0	-	0
U	Central North Sea (south)	1, 2	156,972	0	-	0
B	Southern North Sea and Channel	2, 4	123,825	14,349	1.66	0.1159
P	Celtic Shelf	4	197,400	11,141	0.61	0.0560
O	Irish Sea	6	45,417	366	0.73	0.0081
N	Minch and western Scotland	6, 7	30,626	2,322	0.61	0.0758
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	1,454	0.81	0.0100
Total (strata overlapping UK waters)			1,036,077	29,632	-	0.0286
Total (all SCANS-II strata)			1,370,114	63,366 [26,973-148,865]	0.46	0.0462

Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

A3a.7.2.6 Risso's dolphin

Risso's dolphins (*Grampus griseus*) are widely distributed in tropical and temperate seas of both Northern and Southern Hemispheres. They occur in small numbers along the Atlantic European seaboard from Shetland south to northwest France, the southern Bay of Biscay, around the Iberian Peninsula and into the Mediterranean Sea (Hammond *et al.* 2008). The majority of Risso's dolphin sightings in UK waters have been reported around the Hebrides, most frequently around the coast of the Outer Hebrides. The species is uncommon but regularly sighted in nearshore waters around Shetland and Orkney, in the southern Irish Sea and off southwest Ireland. It is rare in the North Sea and all but the western end of the Channel. They are typically observed in small groups of 5-25 individuals, most frequently from June to September. In the North Atlantic, Risso's dolphins have occasionally been observed in association with other cetaceans, including long-finned pilot whales, white-beaked dolphins, white-sided dolphins and bottlenose dolphins (Reid *et al.* 2003). There are currently no estimates of Risso's dolphin abundance in UK waters or the wider Northeast Atlantic.

Figure A3a.7.10 – Sighting rates of Risso's dolphin



Source: Reid *et al.* (2003)

A3a.7.2.7 Striped dolphin

In the last twenty years, a northwards movement in the distribution of striped dolphin (*Stenella coeruleoalba*) (normally classified as a warm water species) has been seen. They were documented in UK stranding records between 1923 and 1939, but were not reported stranded again until 1975. Following this, they have been reported in almost every year, with increasing frequency. The distribution of the striped dolphin is normally restricted to deep offshore waters of 1,000m or more, although they are reported stranded along both the UK and the French Channel coasts (Sabin *et al.* 2002; Kiszka *et al.* 2004). Santos *et al.* (2008) report 52 striped dolphin strandings in Scotland over the period 1992-2003, with the

majority occurring on the west coast and highest numbers from January to March and August. While these numbers are low, their occurrence has been regular in recent years around Scotland; it has been suggested that striped dolphins may now be considered resident in Scottish waters (Santos *et al.* 2008).

While data from the SCANS-II survey were too few to calculate abundance estimates for striped dolphin alone, abundance of common and/or striped dolphin in the summer of 2005 for the entire SCANS-II survey area was estimated as 89,404 (CV=0.35; 95% CI = 46,110-173,349). For survey strata within or overlapping UK waters only, abundance was estimated as 40,496. In European offshore waters, the CODA survey estimated striped dolphin abundance in the summer of 2007 as 61,364 (CV = 0.93; 95% CI = 12,323-305,568), with the majority sighted towards the south in the Bay of Biscay and off northwest Spain. Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 33,773, with greatest numbers observed in the southern stratum (Murphy *et al.* 2008). Striped dolphins often occur in large groups of hundreds or even thousands, although 6-60 individuals is the most common group size in European waters. In UK and Irish waters, group size is typically less than 10 individuals and they often occur in mixed schools with common dolphins (Reid *et al.* 2003).

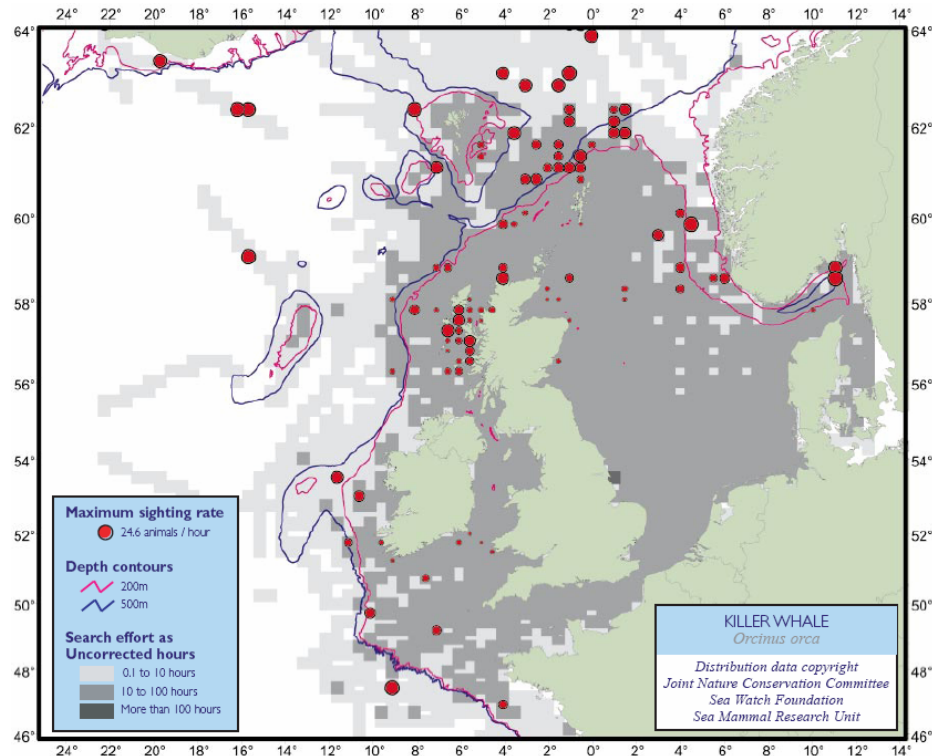
A3a.7.2.8 Killer whale

The killer whale (*Orcinus orca*) has a worldwide distribution in tropical, temperate and polar seas in both hemispheres; their abundance is greatest at higher latitudes. Killer whales are widely distributed on the Atlantic seaboard of northern Europe, mainly around Iceland, western Norway and northern Scotland. They have been observed throughout the northern North Sea, including the east coast of Scotland, the Firth of Forth and as far south as the Farne Islands. Sightings are fairly frequent in coastal waters of Shetland and Orkney, and also around the Hebrides, and have been increasing in frequency in recent years. Very few sightings have been recorded in shelf seas to the southwest of the UK. Many coastal observations are in the vicinity of seal colonies.

Offshore observations are often in the vicinity of fishing vessels, particularly larger boats targeting pelagic species, with greatest sightings occurring north and east of Shetland (Luque *et al.* 2006, Foote *et al.* 2007). They have been reported in most months of the year, with the greatest frequency between April and September. They are also sighted further offshore along the shelf slope and deeper waters north and west of Scotland. Ongoing photo-ID and genetic studies lead by the University of Aberdeen are expected to reveal further information on the occurrence and ecology of killer whales in Scottish waters and the wider northeast Atlantic.

No overall population estimates exist for killer whales in the Northeast Atlantic or UK waters. Sightings in UK waters are of single animals or groups of less than 8 individuals; however, larger groups of approximately 100 have been observed (Pollock *et al.* 2000, Reid *et al.* 2003, Shetland Wildlife website).

Figure A3a.7.11 – Sighting rates of killer whale



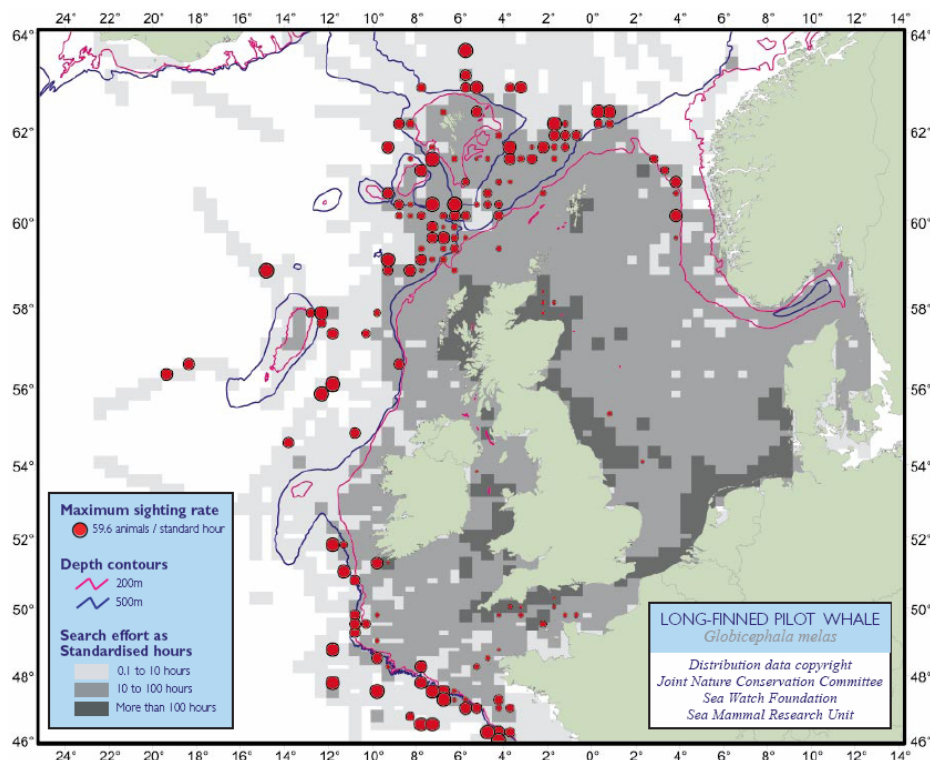
Source: Reid *et al.* (2003)

A3a.7.2.9 Long-finned pilot whale

The long-finned pilot whale (*Globicephala melas*) has a worldwide distribution in temperate and sub-polar seas of both hemispheres; it is common and widely distributed in deep North Atlantic waters, and also occasionally occurs in coastal areas. In UK and Irish waters, long-finned pilot whales occur mainly along the continental shelf slope, particularly around the 1,000 metre isobath (Hammond *et al.* 2008). They are frequently encountered along the shelf slope north and west of Scotland, and also in the western Celtic Sea where sightings are frequent along the shelf edge and increasingly so southwards towards the French coast. They are also occasionally reported in coastal waters, primarily around Orkney, Shetland and to the west of the Outer Hebrides. Sightings have occurred in all months of the year, with no clear peak in occurrence.

Pilot whale abundance in the central and eastern North Atlantic was estimated at approximately 780,000 in 1989 (IWC website). There are currently no estimates of pilot whale abundance in UK waters; numbers in European offshore waters derived from the CODA survey are not yet available, although sightings were frequent and widespread northwest and west of the UK and Ireland (Macleod & Hammond 2008, Murphy *et al.* 2008). They are typically encountered in groups of up to 20 individuals, but may form larger aggregations, including mixed schools with bottlenose dolphins (Reid *et al.* 2003).

Figure A3a.7.12 – Sighting rates of long-finned pilot whale



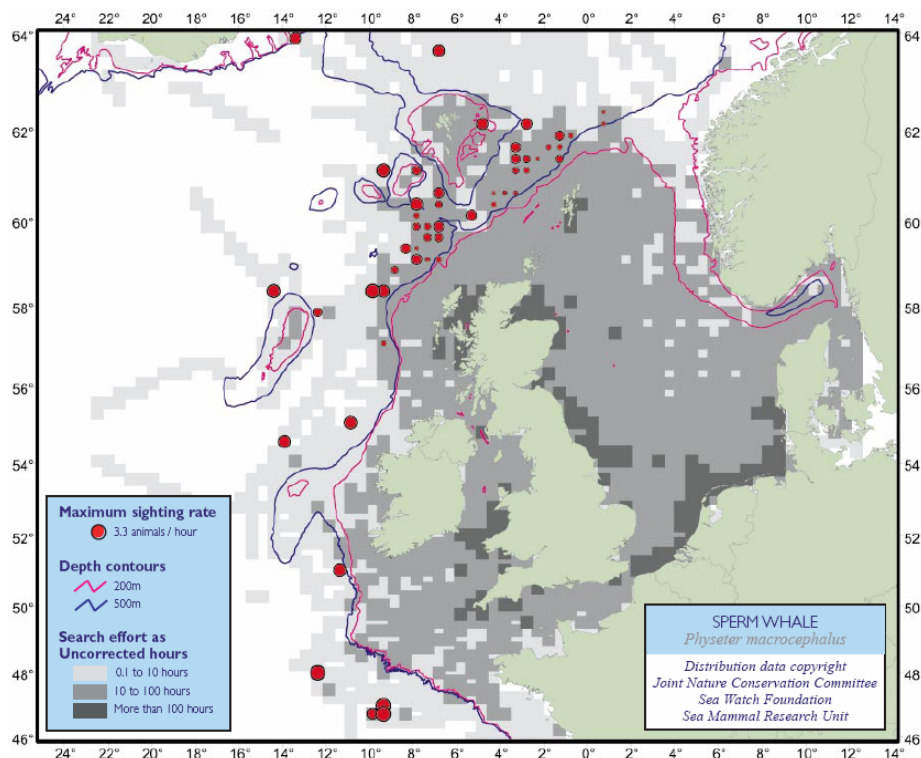
Source: Reid *et al.* (2003)

A3a.7.2.10 Sperm whale

Sperm whales (*Physeter macrocephalus*) have a wide distribution that includes most seas and all oceans. They are widely distributed in deep waters to the north and west of Scotland, both on and beyond the shelf slope. Where records exist, all animals were males, with males migrating to high latitudes to feed. Limited survey effort has shown animals to be numerous in the Faroe-Shetland Channel in May, and also in the Rockall Trough in October (Hammond *et al.* 2006). Acoustic monitoring northwest of the Outer Hebrides in the winter of 1997-1998 detected sperm whales over a wide area of the continental slope, primarily in waters >500m depth (Lewis *et al.* 1998). They have also been observed fairly regularly in the waters around Orkney and Shetland, with sightings and strandings reported in most months (Hammond *et al.* 2003). It can be assumed that these waters represent a migratory route for some portion of the northeast Atlantic population at certain times of the year. A few sightings have also been recorded over deep waters southwest of the UK.

The world population of sperm whales has been estimated at 360,000 individuals (Whitehead 2002). Estimates of sperm whale abundance in UK waters rely on those for offshore European waters, as derived from the summer 2007 CODA survey. Across the entire survey area, abundance was estimated as 2,091 (CV = 0.34; 95% CI = 1,077-4,057), with sightings widespread across the area. Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 1,122, with greatest numbers observed in the southern stratum (Murphy *et al.* 2008). Group size may number tens of animals, although these are commonly spread over a wide area with only a proportion visible at the surface at one time (Reid *et al.* 2003).

Figure A3a.7.13 – Sighting rates of sperm whale



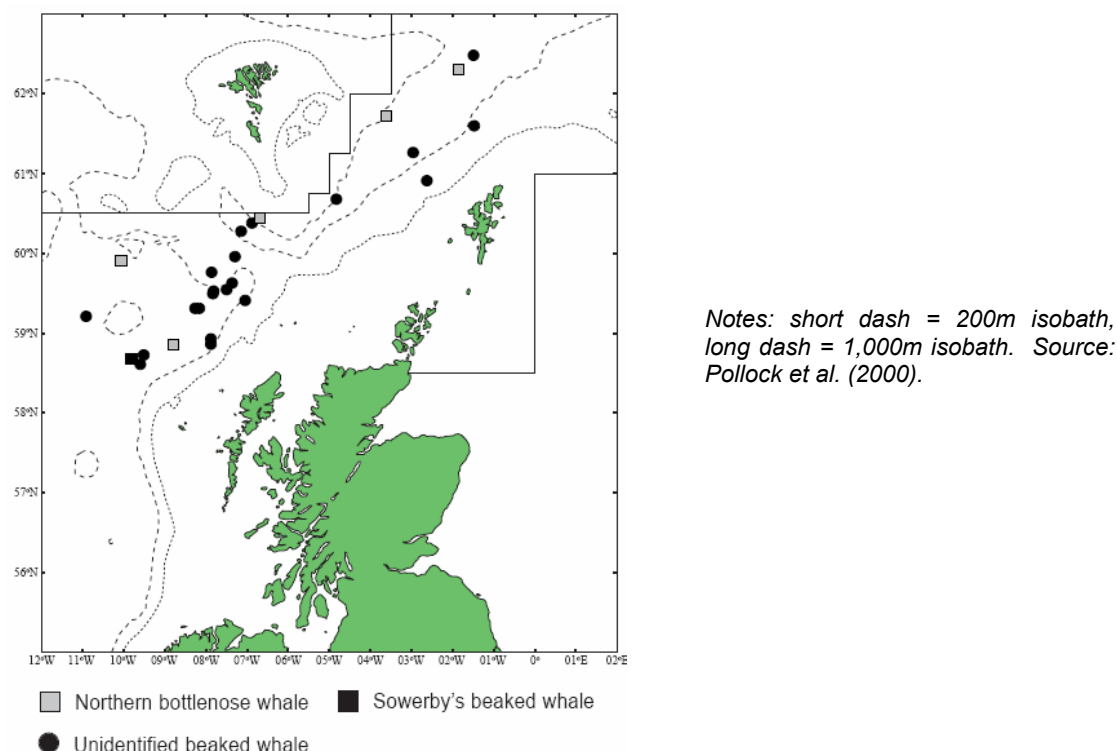
Source: Reid *et al.* (2003)

A3a.7.2.11 Beaked whales

The distribution and occurrence of beaked whales in UK waters is poorly understood. They have been recorded in deep waters to the north and west of Scotland, both on and beyond the shelf slope. This area may represent an important part of their habitat, but its significance is unknown due to the infrequency of encounters and small numbers of animals observed. Almost all sightings of beaked whales are in water $\geq 1000\text{m}$ depth; however, rare observations have also been recorded from coastal waters of the Hebrides, Orkney, Shetland and the northern North Sea. Species recorded include the northern bottlenose whale (*Hyperoodon ampullatus*), Cuvier's beaked whale (*Ziphius cavirostris*), Sowerby's beaked whale (*Mesoplodon bidens*) and unidentified species of the genus *Mesoplodon*. Sightings reported in Pollock *et al.* (2000) are shown in Figure A3a.7.14; the majority of the animals listed as unidentified are believed to be *Mesoplodon* spp., with many likely to be *M. bidens*.

Population estimates are not available for most beaked whale species occurring in the Northeast Atlantic. North Atlantic Sightings Surveys in 1987 and 1989 suggested a northern bottlenose whale population of approximately 40,000, although numbers in UK waters are unknown. In European offshore waters, the CODA survey estimated beaked whale abundance in the summer of 2007 as 6,992 (CV = 0.25), with the majority sighted northwest of the UK and Ireland and in the Bay of Biscay. Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 4,297, with greatest numbers observed in the northern stratum (Murphy *et al.* 2008). Beaked whales are typically encountered as single individuals or groups of less than 10, although northern bottlenose whales have been observed in larger groups (Reid *et al.* 2003).

Figure A3a.7.14 – Sightings of beaked whales 1979-1999



A3a.7.2.12 Other toothed cetaceans

Other toothed cetaceans infrequently-rarely reported in UK waters include the pygmy sperm whale (*Kogia breviceps*) and false killer whale (*Pseudorca crassidens*). The pygmy sperm whale is distributed worldwide in tropical to temperate seas of both hemispheres, primarily in deep oceanic waters beyond the continental shelf edge. Records in European waters are rare, with sightings restricted to the Bay of Biscay, South West Approaches, western Ireland and occasional records from the North Sea off the east coast of England and Scotland (Reid *et al.* 2003). False killer whales show a similar global distribution; in European waters most reports are from the Bay of Biscay to the Canary Islands. UK records include a few strandings of large groups (approximately 25-150) from 1927-1935, and a few sightings since 1976 to the south of Cornwall and off western and northeast Scotland (Reid *et al.* 2003).

A3a.7.2.13 Minke whale

Minke whales (*Balaenoptera acutorostrata*) are widely distributed in all the major oceans of the world from tropical to polar seas; they are most abundant in relatively cool waters, and on the continental shelf in waters <200m depth. In the Northeast Atlantic they range from Norway to France and into the northern and central North Sea (Hammond *et al.* 2008). Within UK waters, minke whales are most frequently sighted in the western central-northern North Sea, and west of Scotland around the Hebrides.

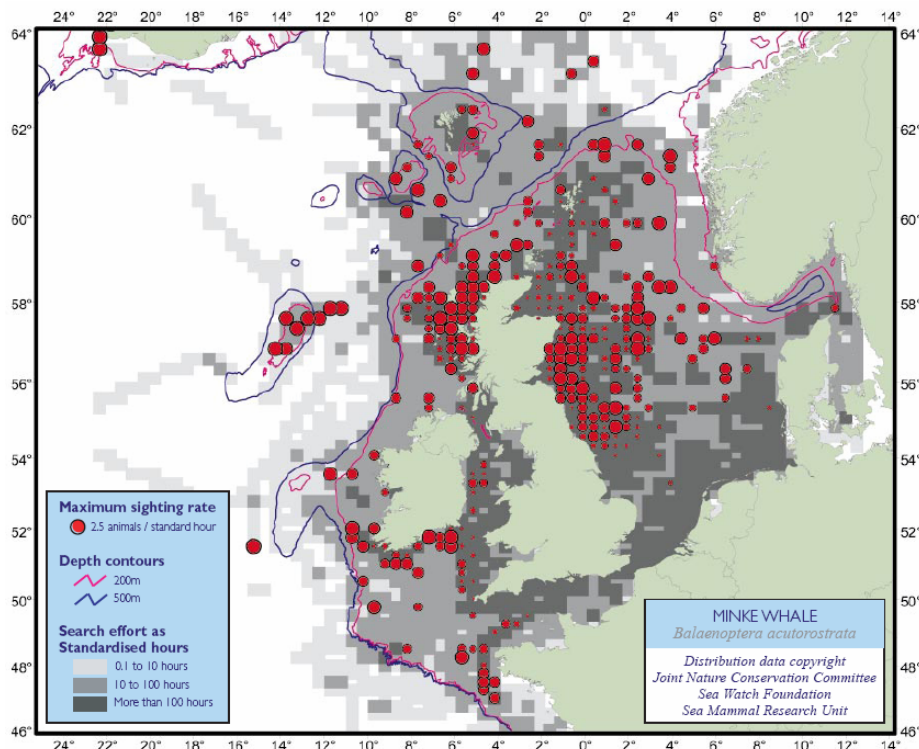
They are primarily a seasonal visitor to UK waters, with whales appearing to move south into the North Sea and western Scotland at the beginning of May and remaining present until October; sightings are rare outside of this period. During these summer months, they are widely distributed throughout the region, including coastal and offshore shelf waters, and deeper waters on and beyond the shelf slope. Pollock *et al.* (2000) reported several

sightings of minke whales in the Faroe-Shetland Channel, although the vast majority (>90%) of sightings were in shelf waters of <200m depth.

Minke whales are rare in the southernmost North Sea and eastern English Channel; North Sea sightings generally extend no further south than the Dogger Bank. In the western English Channel they are evenly distributed in low numbers along the continental shelf edge, and also present throughout much of the Celtic Sea and western Irish Sea during summer. Here, the highest densities are recorded off southern Ireland, while density surface modelling from the SCANS-II survey also showed an area of higher density in the western English Channel during the summer of 2005. Figure A3a.7.16 shows results of density surface modelling for minke whale in the summers of 1994 and 2005 as derived from the SCANS surveys.

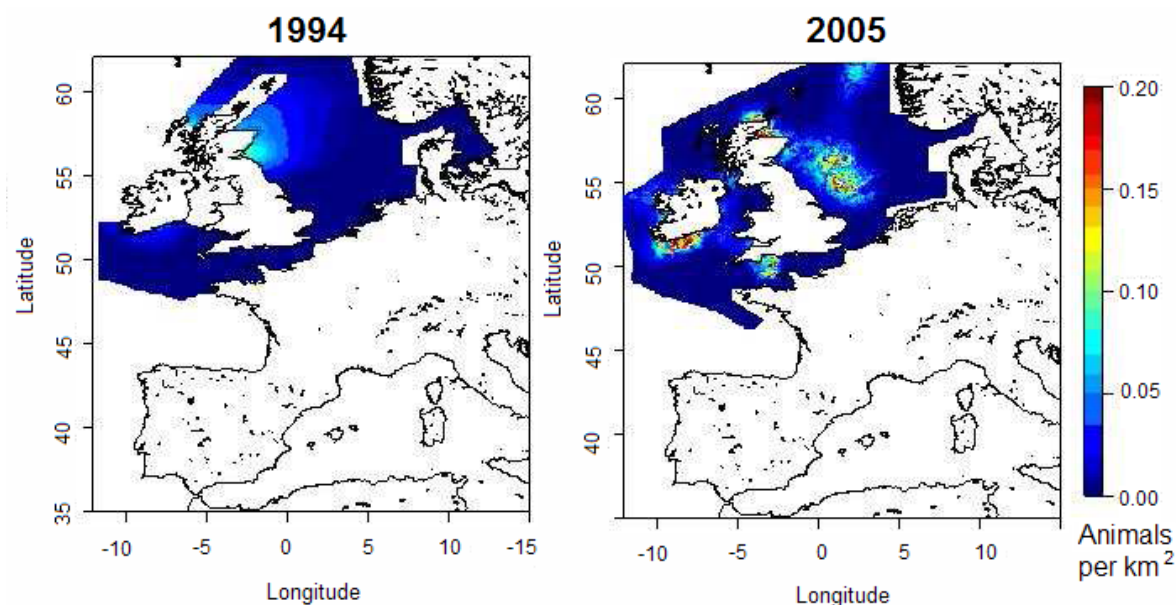
For the entire SCANS-II survey area, minke whale abundance in the summer of 2005 was estimated as 18,614 (CV=0.30; 95% CI = 10,445-33,171). For survey strata within or overlapping UK waters only, abundance was estimated as 13,818. In European offshore waters, the CODA survey estimated minke whale abundance in the summer of 2007 as 6,765 (CV = 0.99; 95% CI = 1,239-36,925), all of which occurred in the two strata overlapping UK waters (1 and 2). Greatest numbers were observed in the northern stratum (Murphy *et al.* 2008). Minke whales in the UK waters are considered by the International Whaling Commission as part of a single northeast Atlantic stock; however, some population differentiation may exist between the North Sea and the rest of the northeast Atlantic (Andersen *et al.* 2003). Minke whale abundance in the northeast Atlantic is estimated as approximately 150,000 (Hammond *et al.* 2008, IWC website). They are usually observed singly or in pairs although may form larger feeding aggregations of 10-15 individuals (Reid *et al.* 2003).

Figure A3a.7.15 – Sighting rates of minke whale



Source: Reid *et al.* (2003)

Figure A3a.7.16 – Modelled density of minke whale in 1994 and 2005



Notes: Density values are predictions based on the observed distributions and their relationships with habitat variables (longitude and latitude, plus distance from coast, depth or aspect of seabed slope if selected). Source: SCANS-II (2008)

Table A3a.7.6 - Estimated abundance of minke whale in UK waters, 2005

Survey strata	Area	RS	Area (km ²)	Abundance	CV	Density
J	Northern Isles and Moray Firth	1, 8	37,477	835	1.02	0.0223
T	Northern North Sea	1	134,206	1,738	0.52	0.0130
V	Central North Sea (north)	1	160,517	4,449	0.45	0.0277
U	Central North Sea (south)	1, 2	156,972	3,519	0.69	0.0224
B	Southern North Sea and Channel	2, 4	123,825	1,202	0.96	0.0097
P	Celtic Shelf	4	197,400	1,719	0.43	0.0087
O	Irish Sea	6	45,417	1,073	0.89	0.0236
N	Minch and western Scotland	6, 7	30,626	0	-	0
Q	Shelf waters west of Scotland and Ireland	7, 8	149,637	1,856	0.46	0.0124
Total (strata overlapping UK waters)			1,036,077	13,818	-	0.0133
Total (all SCANS-II strata)			1,370,114	18,614 [10,445-33,171]	0.30	0.0136

Notes: survey strata overlapping UK waters shown only; see Figure A3a.7.1 for survey strata locations; RS = overlapping Regional Sea(s); CV = coefficient of variation; density = animals per km²; numbers in square brackets are lognormal 95% confidence intervals. Source: SCANS-II (2008)

A3a.7.2.14 Other baleen whales

Fin whales (*Balaenoptera physalus*) have a worldwide distribution, present in all oceans where they range from tropical to polar regions. They are largely pelagic and are rarely seen in nearshore waters. They are migratory, and exhibit seasonal movements between lower latitudes in winter and high latitudes in summer (NAMMCO website). Fin whales occur to the north and west of Scotland along the shelf slope and deeper waters beyond, with most observations from the Faroe-Shetland Channel and Rockall Trough (Reid *et al.* 2003, Macleod *et al.* 2003). Pollock *et al.* (2000) only observed fin whales between May and

October, with a peak in sightings in August. They are typically encountered singly or in pairs although do form larger pods of up to 20 individuals (Reid *et al.* 2003).

Sei whales (*Balaenoptera borealis*) can be found worldwide in all oceans and adjoining seas; they are primarily an offshore, deep water species. They migrate annually from cool and subpolar waters in summer to temperate and subtropical waters for winter. Sei whales exhibit a similar distribution to fin whales to the north and west of Scotland, with most observations from the Faroe-Shetland Channel and Rockall Trough (Reid *et al.* 2003, Macleod *et al.* 2003). The majority of sei whale sightings reported in Pollock *et al.* (2000) were in August. Group sizes of sei whales are generally very similar to those observed for fin whales.

Humpback whales (*Megaptera novaeangliae*) are present worldwide in tropical, temperate and polar seas of both hemispheres, typically favouring waters over and along the continental shelf edge and around oceanic islands (Reid *et al.* 2003). They also migrate annually from high latitude, cold water, feeding grounds in summer to low-latitude, warm water, breeding grounds in winter. In the UK the species is very rare on the continental shelf, with most records coming from the Northern Isles, northern Irish Sea, Firth of Clyde, southern Irish Sea, Celtic Sea and the western Channel (Reid *et al.* 2003). Rare sightings have been reported in deeper waters on and beyond the shelf slope. They are usually observed singly or in pairs and groups rarely exceed 4 or 5 individuals when not feeding or breeding (Reid *et al.* 2003). Most UK sightings have occurred between May and September.

Acoustic monitoring of fin, humpback and blue (*Balaenoptera musculus*) whale calls on the shelf edge and deeper waters north and west of the UK and Ireland showed fin whales to be the most frequently recorded species (Charif & Clark 2000 & 2008). Blue whales were recorded to a lesser extent, while humpback whales were the least frequently detected species.

Summer 2007 abundance estimates for fin and sei whales in UK waters are provided by the CODA survey. Across the entire survey area, fin whale abundance was estimated as 7,624 (CV = 0.21; 95% CI = 5,027-11,563), with sightings greatest west of France and off northwest Spain. Abundance in the two strata overlapping UK waters (1 and 2) was estimated as 3,915, with greatest numbers observed in the southern stratum (Murphy *et al.* 2008). Sei whales were only observed in stratum 3, waters off northwest Spain, during the CODA survey, where abundance was estimated at 366 (CV = 0.33, 95% CI = 176-762). For the category of large baleen whales (including fin, sei and “fin or sei” whales), abundance across the entire survey area was estimated as 8,236 (CV = 0.20; 95% CI = 5,475-12,390) and 4,102 for the two strata overlapping UK waters (1 and 2).

The best estimate of fin whale abundance for east Greenland-Iceland, northern Norway and Faroese waters derived from North Atlantic Sightings Surveys over the period 1996-2001 is approximately 31,000 (NAMMCO website). Numbers of humpback whales seem to have increased in recent years in Icelandic waters (Pike *et al.* 2005); this may also have led to increased abundance in waters to the west of the UK and Ireland, although a lack of data in this area prevents identification of any potential trends (Hammond *et al.* 2006).

A3a.7.3 Seal distribution and abundance: UK context

A3a.7.3.1 Grey seals

Grey seals (*Halichoerus grypus*) are found across the North Atlantic Ocean and in the Baltic Sea. Approximately half of the world population occur in the northeast Atlantic (including

Baltic Sea); with approximately 40% of these animals occurring in the UK (SCOS 2006). The best estimate of population size in UK waters is approximately 130,000 experiencing growth of around 2.5% per annum (SCOS 2007). These figures are based on extrapolations of pup production surveys.

Over 90% of the UK population breeds in Scotland, largely in the Hebrides and Orkney. Major colonies are also present on Shetland and the east coast of Scotland at the Isle of May and Fast Castle. Larger colonies in England include the Farne Islands in the northeast, Donna Nook at the mouth of the Humber, and smaller colonies around southwest England and Wales, including Lundy and Pembrokeshire. The distribution of grey seal colonies around the UK is shown in Figure A3a.7.17. No major colonies are present in Northern Ireland; surveys estimated that approximately 100 pups were born there in 2005, with Strangford Lough the largest colony present (SCOS 2007).

Results of the most recent pup production surveys and trends at the main colonies in the UK are shown in Table A3a.7.7. Pup-production numbers from major colonies across Europe are as follows: Republic of Ireland 300 (1998 data), Wadden Sea 200 (2004), Norway 1,200 (2003), Russia 800 (1994), Iceland 1,200 (2002), Baltic 4,000 (2003) (see SCOS 2007 and references therein).

Table A3a.7.7 - Grey seal pup production at main colonies surveyed in UK

Location	Regional Sea	2006 pup production	Change 2005-2006	Average annual change 2002-2006
Inner Hebrides	7	3,461	+2.2%	+2.3%
Outer Hebrides	7, 8	11,612	-5.6%	+0.3%
Orkney	1, 8	19,332	+9.7%	+0.3%
Shetland	1, 8	3,871 (2004 count)	-	-
Isle of May & Fast Castle	1	2,631	-3.2%	+0.9%
All other Scottish colonies	-	3,605	-	-
Farne Islands	1	1,254	+10.2%	-0.2%
Donna Nook ¹	2	1,437	+12.6%	+15.6%
SW England & Wales	4, 6	1,750 (1994 count)	-	-
Total Scotland	-	40,641	+3.2%²	+1.2%²
Total England & Wales	-	4,441	+11.5%²	+9.0%²
Total UK	-	45,082	+3.3%²	+1.2%²

Notes: ¹ Including Blakeney Point and Horsey (east Norfolk) in 2006. ² Change in pup production calculated from annually monitored sites only. Source: SCOS (2007)

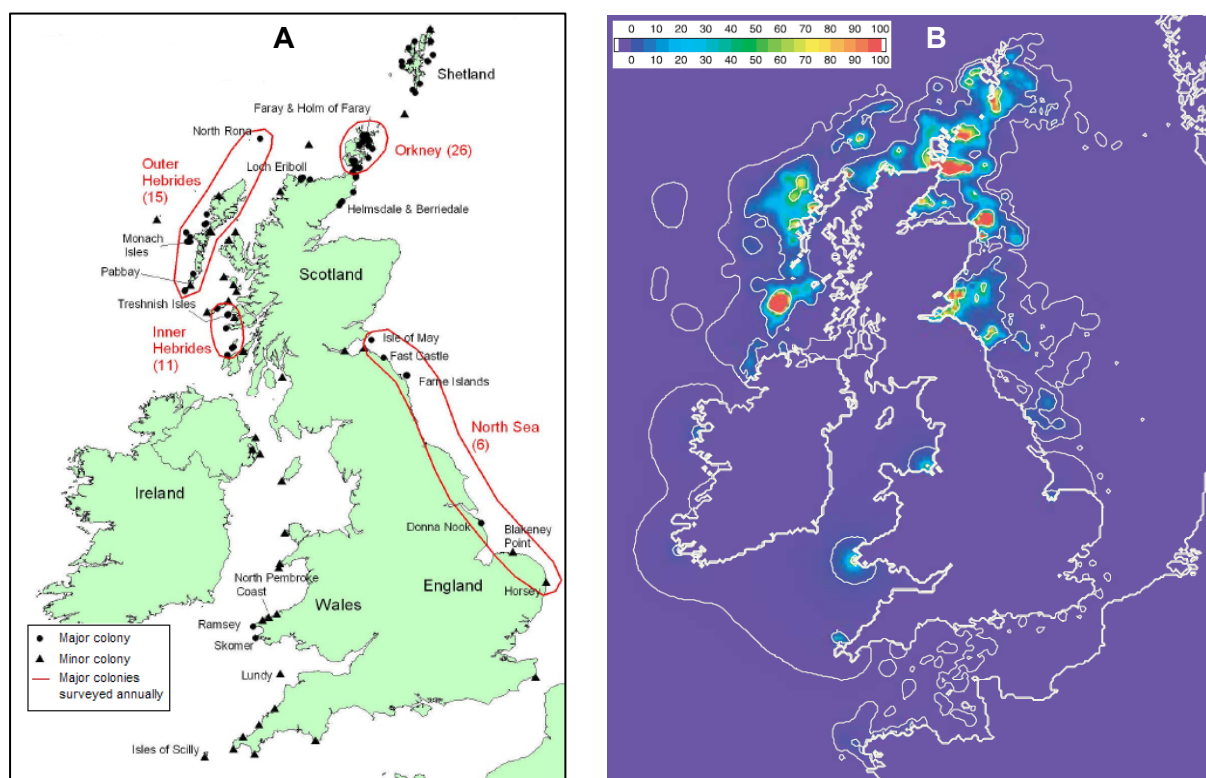
Most of the grey seal population will be on land for several weeks from October to December during the pupping and breeding season, and again in February and March during the annual moult. Densities at sea are likely to be lower during this period than at other times of the year. They also haul-out and rest throughout the year between foraging trips to sea. Studies at two Scottish colonies have indicated that breeding females tend to faithfully return to their natal breeding colony for most of their lives (Pomeroy *et al.* 2000).

Mature females give birth to a single pup which is nursed for about three weeks before it is weaned and moults into its sea-going adult coat. Some information on the distribution and movements of grey seals comes from using numbered tags attached to the flippers of pups. These indicate that young seals disperse widely in the first few months of life. Pups marked in the UK have, for example, been recaptured or recovered along the North Sea coasts of Norway, France and The Netherlands, mostly during their first year (Wiig 1986).

Considerable data are available on the distribution of adult British grey seals at sea during summer (May-September), courtesy of satellite-relay data loggers. Analyses of these data have produced estimates of modelled at-sea usage by grey seals, as shown in Figure A3a.7.17. Models are based on 110 seals tagged over the period 1991-1999, primarily >2 years of age from the northeast UK, although consider the total estimated population size of all documented haul-out sites in the UK, along with several on the Republic of Ireland, northeast France and the Channel Islands (see McConnell *et al.* 1999 and Matthiopoulos *et al.* 2004 for details).

Grey seal foraging movements are on two geographical scales: long and distant trips from one haul-out site to another; and local repeated trips to discrete offshore areas (McConnell *et al.* 1999). The large distances travelled indicate that grey seals in the North Sea are not ecologically isolated and can thus be considered as coming from a single ecological population.

Figure A3a.7.17 - Grey seal breeding colonies (A) and marine usage (B)



Notes: (A) Major and minor breeding colonies, those circled in red are surveyed annually. (B) Warmer colours represent areas of higher usage. Contours show log-transformed usage to reveal some detail in areas used less frequently. Sources: (A) SCOS (2007); (B) Matthiopoulos *et al.* (2004)

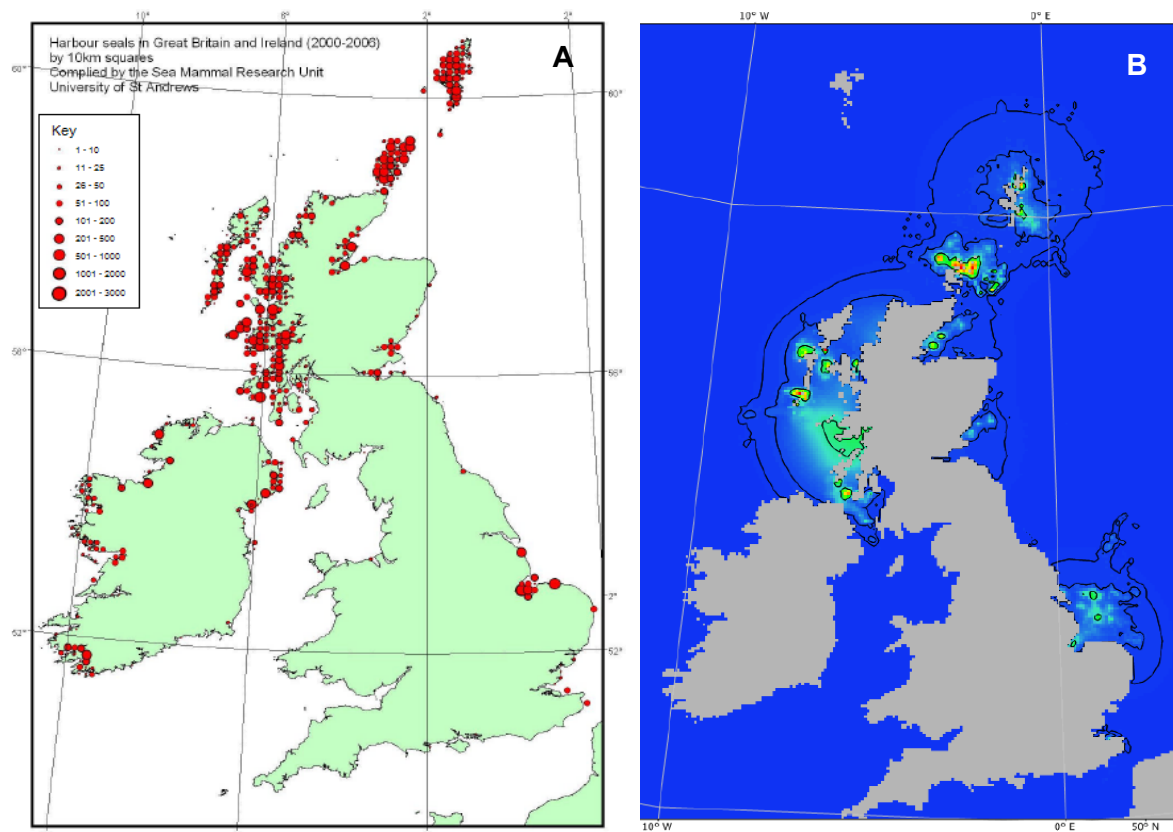
A3a.7.3.2 Harbour seals

Harbour (or common) seals (*Phoca vitulina*) are one of the most widespread pinniped species and have a practically circumpolar distribution in the Northern Hemisphere. Animals around the UK belong to a European sub-species (*P. vitulina vitulina*) which mainly occur in UK, Icelandic, Norwegian, Swedish, Danish, German and Dutch waters; approximately 33% of the world population of this sub-species occurs in the UK (SCOS 2007).

Around Britain and Ireland, harbour seals haul out on tidally exposed areas of rock, sandbanks or mud. Pupping occurs on land from June to July, while the moult is centred around August and extends into September. Therefore, from June to September harbour seals are ashore more often than at other times of the year. The distribution of seals at haul-out sites around the UK is shown in Figure A3a.7.18. The largest concentrations are found in Scotland, primarily on Orkney, Shetland and the Inner and Outer Hebrides. Large numbers also occur on the English east coast at The Wash and adjacent coastline. Many other haul-out sites supporting lower numbers are present around the UK coast, the largest of which are found in the Moray Firth, east coast of Northern Ireland, the Firths of Tay and Forth, the greater Thames area and southwest Scotland.

Seals are widespread throughout coastal waters surrounding these colonies, and are abundant in waters surrounding larger colonies. Their distribution at sea is constrained by the need to return periodically to land. Although harbour seals seem to show some fidelity to particular haul-out sites, they occasionally make rapid, relatively long-distance movements to other haul-outs (SCOS 2005). Analyses of satellite tagging data have produced estimates of modelled at-sea usage by harbour seals, as shown in Figure A3a.7.18. These are based on 143 seals tagged at 8 regions: Shetland (15 seals), Orkney (15), Outer Hebrides (21), Inner Hebrides (24), Moray Firth (10), St Andrews Bay (25), The Wash (24) and the Thames (9), with the total estimated population sizes of these regions incorporated into the model (Sharples *et al.* 2008).

Figure A3a.7.18 - Harbour seal numbers at haul-out sites (A) and marine usage (B)



Notes: (A) Numbers derived from aerial surveys over the period 2000-2006 by 10km squares. (B) Warmer colours represent areas of higher usage. Contours show log-transformed usage to reveal some detail in areas used less frequently. No seals were tagged in Northern Ireland. Sources: (A) SCOS (2007); (B) Sharples *et al.* (2008)

Estimated numbers of harbour seals in the UK are derived from aerial survey counts of hauled out individuals during the moult; these provide minimum population estimates as they are believed to record between 60-70% of actual numbers. Counts between 1996 and 2006 have resulted in a minimum estimated UK population of approximately 28,000 animals¹. The vast majority (85%) of these seals are found in Scotland (SCOS 2007). Aerial counts from major monitoring sites along this coastline over the period 2000-2006 are shown in Table A3a.7.8.

Table A3a.7.8 - Minimum estimates (aerial survey counts) of harbour seals in the UK by survey regions

Region	Regional Sea	Current estimate	Current year of survey	Previous estimate	Previous year of survey
Dumfries and Galloway	6	42	2005	6	2000
Strathclyde, Firth of Clyde	6	581	2005	991	1996
Strathclyde west	7	6,702	2000, part 2005	5,342	1996
Highland west	7	4,966	2005	4,947	1996/7
Outer Hebrides	7, 8	1,981	2006, part 2003	2,098	2003
Highland east & north	1, 8	1,056	2005	1,232	1997
Orkney	1, 8	4,256	2006	7,752	2001
Shetland	1, 8	3,021	2006	4,883	2001
Grampian	1	113	2005	62	1997
Tayside	1	101	2005	121	1997
Fife	1	445	2005	414	1997
Lothian	1	104	2005	40	1997
Borders	1	0	2005	0	1997
Blakeney Point	2	719	2006	741	2005
The Wash	2	1,695	2006	2,124	2005
Donna Nook	2	299	2006	470	2005
Scroby Sands	2	71	2006	57	2004
Other east England sites	1, 2	225	1994, 2000, 2003	n/a	-
South and west England	4	20	n/a	n/a	-
Total Scotland	-	23,368	-	27,888	-
Total England	-	3,029	-	n/a	-
Total Northern Ireland	-	1,248	2002	n/a	-
Total UK	-	27,645	-	n/a	-

Notes: Numbers are counts of hauled-out seals from aerial surveys and provide a minimum population estimate, likely to represent approximately 60-70% of the total population. See SCOS (2007) for details of region boundaries. Source: SCOS (2007)

Genetic analyses suggest that there are genetically distinct populations of harbour seals in European waters, with little movement of breeding animals between six distinct units: east coast of England, Ireland-Scotland, Wadden Sea, western Scandinavia, east Baltic and Iceland (Goodman 1998). However, satellite telemetry has shown some movement of animals between these units outside of the breeding season (SCOS 2007). Such movement can also be inferred from the rapid spread of phocine distemper virus (PDV) among European populations in 1988 and 2002.

A3a.7.3.3 Other species

Hooded seals (*Cystophora cristata*) are widely distributed in the northern part of the North Atlantic, with two main stocks defined for management purposes in the northwest and

¹ Actual population size of 50,000-60,000 (SCOS 2007).

northeast Atlantic. The northeast Atlantic stock breeds on sea ice between east Greenland and the island of Jan Mayen (the West Ice) in the Greenland Sea; population size in 2005 was estimated at approximately 88,300 individuals, although considerable uncertainty exists (ICES 2006). They embark on long excursions from the sea ice, particularly outside of breeding (late March) and moulting (June-August) periods, and have been recorded in the deeper waters to the north and west of Scotland (Folkow *et al.* 1996, Pollock *et al.* 2000).

Several other species have been recorded on the coasts of adjacent areas as vagrants, including bearded seal (*Erignathus barbatus*), ringed seal (*Phoca hispida*), harp seal (*Phoca groenlandica*) and walrus (*Odobenus rosmarus*) (Harwood & Wilson 2001).

A3a.7.4 Otter distribution and abundance

Otters (*Lutra lutra*) are semi-aquatic mammals which may inhabit rivers, lakes, coastal areas and marshy areas some distance from open water. Coastal populations utilise shallow, inshore marine areas for feeding but also require fresh water for bathing and terrestrial areas for resting and breeding holts.

Otters were formerly widespread throughout the UK before experiencing a rapid and catastrophic decline across much of the UK and Europe from the 1950s to the 1970s; they were effectively lost from central and southeastern counties of England by the 1980s (UK BAP website). Today, otters are largely restricted to Scotland, particularly the islands and the northwest coast, Wales, Northern Ireland, parts of East Anglia and the southwest England. However, surveys suggest that populations are recovering and animals are re-colonising parts of their former range (JNCC website a). The most important otter populations utilising coastal habitats occur in western Scotland, west Wales and The Wash and north Norfolk coast. Figure A3a.7.19 illustrates the distribution and relative importance of Special Areas of Conservation (see Section A3a.7.17) where otter are present.

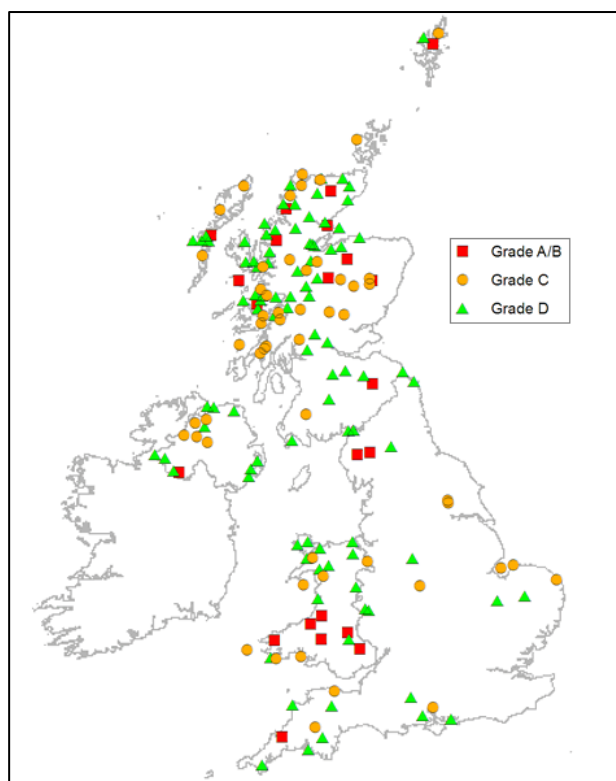


Figure A3a.7.19 - The distribution of Special Areas of Conservation where otter are present

Grade A/B sites are those with otter populations of European importance, grade C are those of national importance, while grade D fall slightly below that of national importance.

Source: JNCC website a

A3a.7.4.1 Bat distribution and abundance

There are seventeen species of bat recorded living in Britain and Ireland, some of which are extremely rare. The great majority of these species do not undertake large scale migrations and so do not spend significant time over the sea. The exception to this is *Nathusius' pipistrelle* (*Pipistrellus nathusii*) which is known to undertake long distance migrations in Europe (including sea crossings). While several species of bat have been recorded from offshore platforms in the North Sea, the majority of records are of *Nathusius' pipistrelle*. This species has a widespread distribution from western Europe to western Asia; it migrates in autumn-winter from its stronghold in eastern Europe in a southwest direction to central western Europe, before returning to eastern Europe during late spring (review in Russ *et al.* 2001).

Nathusius' pipistrelle is uncommon in the UK, and there are only a few records of maternity colonies, primarily in Northern Ireland (Russ 2004). Russ *et al.* (2001) reported 91 records of individuals 'in the hand' in the UK (earliest record in 1940), with bat detector records from a further 36 localities in the UK and Ireland. The distribution of these and more recent records (to end 2007) are shown in Figure A3a.7.20.

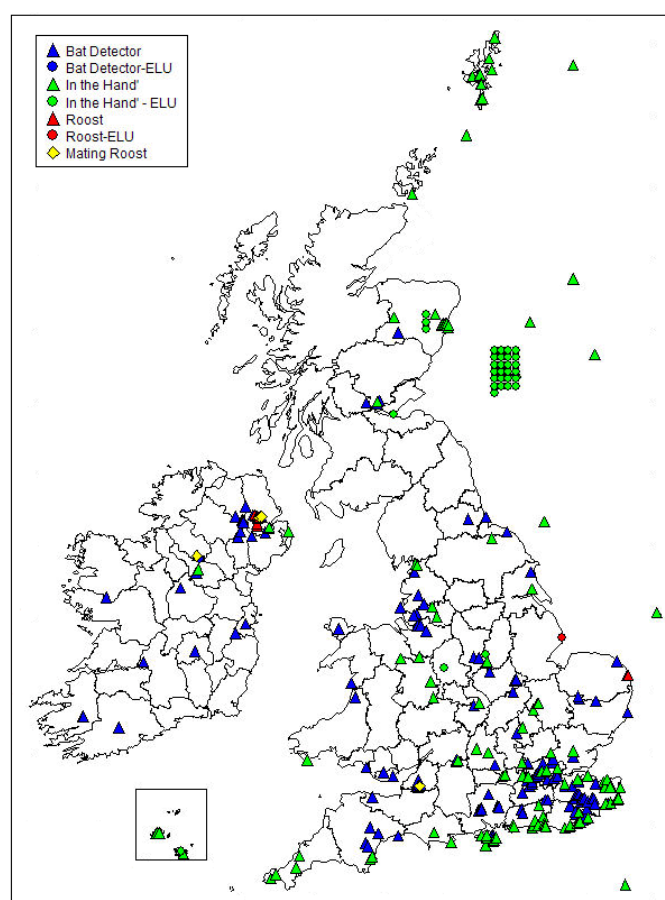


Figure A3a.7.20 - Records of Nathusius' pipistrelle in the UK and Ireland

Offshore observations from oil/gas platforms and boats are uncommon but widely distributed in the western North Sea from east of Shetland to the eastern Channel. While records are distributed throughout all months of the year, there are clear peaks in spring and autumn; these suggest migratory movements into and out of the British Isles in autumn and spring, respectively (Russ *et al.* 2001). Records on offshore platforms are consistent with this.

Notes: record spots cover a 10km² area; the coverage is for Great Britain, Ireland and the surrounding islands; ELU = exact location unknown; records located in the sea are from oil rigs and boats.

*Source: Russ *et al.* (2001), Russ (2004)*

A3a.7.5 Ecological importance

The abundance and availability of fish and other prey, particularly those species mentioned below, is clearly of prime importance in determining the success of marine mammal populations in UK waters and beyond. Changes in the availability of principal prey items can therefore be expected to have considerable effects on marine mammals. It is currently not possible to predict how any particular change in prey abundance would be likely to affect any of these marine mammal populations (Hammond *et al.* 2008).

A3a.7.5.1 Cetaceans

There is relatively little information on the ecology of cetaceans in UK waters. Information is primarily drawn from analyses of stomach contents of a limited number of stranded or bycaught individuals.

Harbour porpoise

Harbour porpoises in the North Sea seem to feed mainly on fish found on or near to the seabed. Analyses of the stomach contents of harbour porpoise stranded in Scotland, primarily the east coast, from 1992 to 2003 revealed sandeels and whiting to be the main prey items (Santos *et al.* 2004). Other small gadoids and cephalopods were also important, along with clupeids such as herring in some years. Regional, seasonal and inter-annual differences in diet composition were identified.

Samples from 50 animals stranded or bycaught in the North Sea between 1995 and 2002 showed the diet to comprise 90% whiting and small amounts of herring, sandeel, sprat and cod (Hammond *et al.* 2002a). For most of the past 40 years, the contents of porpoise stomachs throughout the North Sea have been dominated by much the same range of species, namely small gadoids, clupeids and sandeels. However, there is some evidence that the diet has changed during this period from one composed mainly of herring to the current diet dominated by sandeels and whiting (Hammond *et al.* 2002a).

The diet of marine mammals stranded on the Dutch, French and Belgian coasts from 1994-2000 was investigated by Das *et al.* (2003) through comparisons of carbon and nitrogen isotope ratios in their muscle compared to that of a wide range of potential prey species in the southern North Sea. The trophic level of harbour porpoises (3.4) was estimated to be lower than that of white-beaked dolphin (4.2) and also grey (3.9) and harbour (4.1) seals, although variations were observed with sex and age of porpoises. This suggests that harbour porpoise in the southern North Sea consume a greater proportion of zooplankton-feeding fish such as clupeids and sandeels than the other species investigated.

Investigations of harbour porpoise diet in British waters revealed the diet off southern England to be dominated by whiting, followed by poor cod and scad (Roberts 2005, cited in Hammond *et al.* 2008). Off Wales, whiting was also the dominant prey species consumed, followed by gobies.

Harbour porpoises are the most numerous marine mammals in the area under consideration, with a total North Sea population of around a quarter of a million animals. Total fish consumption per annum is likely to run into hundreds of thousands of tonnes for the North Sea as a whole. The significance of this species' predation from an ecological perspective has not been assessed, nor is the importance of the area under consideration with respect to the entire North Sea.

Other toothed cetaceans

Information on the diet of bottlenose dolphins is scarce; limited analyses of stomach contents have shown gadoids to be the main component, along with salmon, other fish species and cephalopods (Santos *et al.* 2001). Observations of feeding behaviour have been reported in a few locations within the inner Moray Firth (Kessock Channel, Chanonry narrows and mouth of the Cromarty Firth) and the waters surrounding Aberdeen harbour (Wilson *et al.* 1997a, Hastie *et al.* 2004, Stockin *et al.* 2006). In French shelf waters, the predominant prey species reported in the stomachs of bottlenose dolphins were blue whiting, hake, scad, *Trisopterus* species, horse mackerel and the squid *Loligo vulgaris* (Learmonth *et al.* 2004, cited in Hammond *et al.* 2008; De Pierrepont *et al.* 2005). In Irish waters, haddock, saithe and pollock were the dominant prey species reported.

The diet of common dolphins includes a variety of fish and squid (see Hammond *et al.* and references therein). Fish prey remains identified in the stomachs of stranded specimens examined from UK and Irish waters revealed horse mackerel, mackerel, Norway pout and sardines to dominate, with other *Trisopterus* spp., whiting, herring, sprat and sandeel also present. Cephalopods prey included mainly *Loligo* spp., *Alloteuthis subulata*, *Ancistroteuthis lichtensteini*, *Todarodes sagittatus*, *T. eblane* and *Sepiolo atlantica*, but various other species of squid, octopus and cuttlefish were also consumed. In a limited number of animals bycaught in Scottish waters, whiting was dominant. In the Celtic Sea and western Channel, the common dolphin predominately feeds on horse mackerel, sardines and mackerel. Common dolphins bycaught in Irish and French tuna driftnets on and beyond the continental shelf slope in summer were predominately feeding nocturnally on meso-pelagic fishes such

as myctophids and squids. De Pierrepont *et al.* (2005) reported *Trisopterus* spp. and gobies as the main prey species consumed in French Channel waters.

White-beaked dolphins have been recorded taking whiting and other gadoids, sandeels, herring and octopus. Studies of the stomach contents of white-beaked dolphins stranded mainly on the Scottish east coast identified haddock and whiting as the predominant fish species consumed (Canning *et al.* 2008). The diet of Atlantic white-sided dolphin in UK waters is unknown, although a diet consisting of pelagic species such as herring, mackerel, horse mackerel, silvery pout and squid has been reported from elsewhere in the North Atlantic (Reeves *et al.* 1999a, cited in Hammond *et al.* 2004). In the eastern North Atlantic the diet of striped dolphins consists of a variety of mesopelagic and benthic fish, squid and crustaceans; studies of striped dolphins stranded around Scotland from 1992-2003 showed whiting and *Trisopterus* spp. to be the main prey species in the diet (Santos *et al.* 2008).

There has been limited documentation of killer whale diet in UK waters; however, herring is known to be a major component in Norwegian waters and killer whales are occasionally recorded feeding in the vicinity of pelagic vessels targeting herring and mackerel in Scottish waters (Luque *et al.* 2006). They have also been reported preying on seals around major colonies, particularly in Orkney and Shetland.

Risso's dolphins are generally assumed to feed on squid (Hammond *et al.* 2008). Long-finned pilot whales primarily target squid, with animals in the northwest Atlantic also reported to have consumed small amounts of fish such as saithe, mackerel and blue whiting (Gannon *et al.* 1997). In French Channel waters, cuttlefish (primarily *Sepia* species) were the dominant prey item of pilot whales (De Pierrepont *et al.* 2005). It is generally assumed that sperm whales in waters adjacent to the UK feed on deepwater squid, as has been reported in animals stranded off the east coast of Scotland (Santos *et al.* 1999). In some parts of the world deepwater fishes have also been reported in sperm whale diet (Hammond *et al.* 2006). There is very little information on the feeding habits of beaked whales; however, analysis of stomach contents of a few stranded animals suggests that they primarily consume deeper water (ca. 200-1000m) squid along with some fish species (Hammond *et al.* 2006, MacLeod *et al.* 2003).

Baleen whales

Minke whales feed on a variety of fish, including herring, cod, and haddock in Norwegian waters. Stephenson (1951, cited in Hammond *et al.* 2008) reported that most minke whales taken by commercial whaling in the UK waters of the North Sea during 1948 had been feeding on herring, with some mackerel and sandeels also reported. Analysis of stomach contents of ten minke whales stranded in Scotland from 1992-2002 showed sandeels to be the dominant prey item, with sprat, herring, mackerel and Norway pout consumed to a lesser extent (Pierce *et al.* 2004). Animals caught in the North Sea by Norwegian fisheries showed a similar diet composition, along with the addition of whiting (Olsen & Holst 2001). Minke whales around the Isle of Mull were shown to prefer areas of sandeel habitat in early summer, and pre-spawning herring habitat in late summer (MacLeod *et al.* 2004). De Pierrepont *et al.* (2005) identified poor cod, goby, cod and pollock in the stomach of one minke whale that stranded on the French Atlantic coast.

The feeding habits of fin whales in UK waters are unknown, but elsewhere in the Northeast Atlantic they are reported as consuming planktonic crustaceans and small schooling fish such as herring, capelin, and sandeels. Sei whales in the North Atlantic have also been reported as consuming planktonic crustaceans and small schooling fish, although are regarded as more specialist feeders (Pollock *et al.* 2000).

A3a.7.5.2 Seals

Grey seal foraging destinations at sea are typically localised areas characterized by a gravel/sand seabed sediment, which is the preferred burrowing habitat of their primary prey, sandeels. The limited distance from a haul-out site of a typical foraging trip indicates that the ecological impact of seal predation may be greater coastally than further offshore.

Grey seals are important marine predators in the UK marine environment. Their diet primarily comprises sandeels, gadoids (cod, haddock, whiting, ling) and flatfish (plaice, sole, flounder, dab), in that order of importance, but varies seasonally and from region to region (Hammond & Grellier 2006). Around the Outer Hebrides, Orkney and Shetland, sandeels and gadoids typically dominate during winter, while flatfish and herring increase in importance during summer months. Food requirements depend on the size of the seal and fat content of the prey but an average consumption estimate is 7kg of cod or 4kg of sandeels per seal per day. An estimate of annual grey seal prey consumption in the North Sea is approximately 150,000 tonnes, of which almost 50% is sandeels (SCOS 2007).

Harbour seals are also important predators in the UK marine environment. The diet is composed of a wide variety of prey including sandeels, gadoids, herring and sprat, flatfish, octopus and squid. Diet varies seasonally and from region to region; current knowledge of the likely daily ration suggests approximately 3kg of fatty fish or up to 5kg of whitefish per day (SCOS 2007). Based on this, a very approximate estimate of minimum annual consumption of prey by harbour seals hauling out on Orkney, Shetland and the west coast of Scotland (including islands) would be 33,000-64,000 tonnes.

Based on information on dive depths and the distribution of likely prey species, it has been suggested that hooded seals feed on Greenland halibut, redfish, polar cod, herring, deep-water squid and blue whiting (Folkow & Blix 1999). Stomach contents analyses of seals east of Greenland have confirmed this prey composition, also noting an important contribution from sandeels during summer (NAMMCO website).

A3a.7.5.3 Otters

In general otters feed on a wide range of prey with a strong bias towards fish; however, they are somewhat opportunistic predators and will take many prey items provided they are of appropriate size. In UK coastal waters, they generally consume bottom-dwelling fish, some crustaceans, and have also been occasionally observed taking small water birds.

The diet of otters in coastal studies in Shetland by Kruuk *et al.* (1987) and Kruuk & Moorhouse (1990) consisted mostly of eelpout (*Zoarces viviparus*) and rockling (*Ciliata* spp.), which are nocturnal species most active at night. In northwest Scotland, Yoxon (2008) observed otters preying primarily on small benthic fish, with the five key prey species being viviparous blenny (*Lipophrys pholis*), five-bearded rockling (*Ciliata mustela*), butterfish (*Pholis gunnellus*), sea scorpion (*Taurulus bubalis*), and saithe (*Pollachius virens*). Britton *et al.* (2006) recorded sea bass (*Dicentrarchus labrax*) and thick lipped mullet (*Chelon labrosus*) as prey items of otters in south west England.

Crustaceans are thought to be of secondary importance (Crass 1995), with coastal otters in Shetland feeding mainly on inter-tidal or benthic species (Kruuk & Moorhouse 1990). Watt (1993) recorded that the diet of coastal cubs and sub-adults comprised a significantly greater proportion of crustaceans, mainly shore crab (*Carcinus maenas*), and less fish than that of adults; there was a negative correlation between age and the proportion of crustaceans in

the diet. Shore crabs and other hard bodied crustaceans are relatively unprofitable prey for otters as they provide little meat and require a lengthy handling time.

A3a.7.5.4 Bats

All UK resident bat species feed exclusively on a variety of insects. Nathusius' pipistrelles mainly feed on flying aquatic insects of small-medium size, primarily Chironomidae (non-biting midges). They feed over lakes, rivers and a variety of adjacent riparian habitats, including broadleaf and mixed woodland, parkland, and occasionally farmland (Russ 2004).

A3a.7.6 Features of Regional Sea 1

The central and northern North Sea has a moderate to high diversity and density of cetaceans, with a general trend of increasing diversity and abundance of cetaceans with increasing latitude. Harbour porpoise and white-beaked dolphin are the most widespread and abundant species, occurring regularly throughout most of the year. Minke whales are regularly recorded as a frequent seasonal visitor. Coastal waters of the Moray Firth and east coast of Scotland support an important population of bottlenose dolphins, while killer whales are sighted with increasing frequency towards the north of the area. Atlantic white-sided dolphin, Risso's dolphin and long-finned pilot whale can be considered occasional visitors, particularly in the north of the area. Large numbers of grey and harbour seals breed in the area, with high densities observed in many coastal waters and some areas further offshore.

Cetaceans

Regional Sea 1 overlaps with SCANS-II survey strata J (the Northern Isles and Moray Firth), T (northern North Sea), and V and U (central North Sea). Estimated summer 2005 abundances of surveyed species in these areas combined were: 169,294 harbour porpoise; 10,562 white-beaked dolphins; 19,492 *Lagenorhynchus* spp.; 653 bottlenose dolphins; 88 common and/or striped dolphin; and 10,541 minke whales.

Harbour porpoise are frequently sighted throughout the central and northern North Sea, in both coastal and offshore waters. While sighted throughout the year, peak numbers are generally recorded in summer months from June to October. The 1994 SCANS survey showed this area to be one of the most important for harbour porpoise in the North Sea, with high densities predicted throughout the area (Hammond *et al.* 2002b). While a more southerly distribution in the North Sea was observed in 2005, acoustic detections of porpoises were recorded throughout the area, with high detection rates recorded in waters off northeast Scotland and the outer Moray Firth (SCANS-II 2008).

Along with harbour porpoise, white-beaked dolphin are the most commonly occurring cetacean in the central and northern North Sea, and are regularly encountered in coastal and offshore waters in the region. While sighted throughout the year, sightings are slightly more frequent from July to October. Atlantic white-sided dolphins appear to be seasonally present in the North Sea, where they are most frequently sighted in waters >10km from the coast in the northern and central North Sea from June to September (Sea Watch Foundation website).

Killer whales have been observed throughout the northern North Sea; sightings are fairly frequent in coastal waters of Shetland and Orkney, and they are also occasionally sighted off the east coast of Scotland, in the Firth of Forth and as far south as the Farne Islands. While they have been reported in most months of the year, sightings are most frequent between April and September.

During summer months, minke whales are well distributed (both coastally and offshore) throughout the central and northern North Sea, particularly in the west. They are frequently sighted in small numbers off the coast of Scotland and northeast England, with sightings extending south to Flamborough Head. Sightings are most frequent in this area from July to October. In summer 2005, relatively high densities were observed in the Moray Firth and offshore waters of the central North Sea, including Dogger Bank (SCANS-II 2008).

Bottlenose dolphins

A small, seemingly resident population of bottlenose dolphins (*Tursiops truncatus*) exists off the east coast of Scotland. They typically range from coastal waters of the Moray Firth to the Firth of Forth, with occasional observations from further offshore in the North Sea; the dolphins are most frequently sighted within the inner Moray Firth. Bottlenose dolphin is listed in Annex II of the Habitats Directive², and the importance of this population, and the Moray Firth, is reflected in the designation of part of this area as a Special Area of Conservation (SAC).

In the 1980s, the core of the population's known range was focused in the inner Moray Firth, typically within three main areas; the Kessock Channel, Chanonry Narrows, and around the mouth of the Cromarty Firth (Wilson *et al.* 1997a, 2004; Hastie *et al.* 2003). While dolphins are seen in these areas throughout the year, an apparent influx of animals is observed from May to September. Surveys along the southern coast of the Moray Firth from 2001-2005 encountered bottlenose dolphins along the majority of the coastline, primarily in waters <25m depth (Robinson *et al.* 2007). Abundance estimates for the southern Moray Firth coast (east of the SAC) for May-October over the period 2001-2004 ranged from 61-108 individuals, including sightings in all months and considerable variability in abundance estimates between years (Culloch & Robinson 2008). Additionally, the majority (80%) of groups encountered included calves. It is suggested that the southern outer Moray Firth is an important area for this population of bottlenose dolphins, and provides more than a corridor to other areas of greater importance (Culloch & Robinson 2008).

Since the early 1990s, the population's range has expanded south and now includes waters off Aberdeenshire, St Andrew's Bay and the Firth of Forth (Wilson *et al.* 2004). Dolphins are present year round off Aberdeenshire, with a peak in abundance during March to May (Stockin *et al.* 2006). Peak sightings in St Andrews Bay occur in June to August (Hammond *et al.* 2004). Two social units appear to exist within the population: those which are only observed in the inner Moray Firth, and those which are observed throughout the known range (Lusseau *et al.* 2006).

Occasional North Sea offshore observations may indicate that these animals are also distributed offshore for at least for part of the year (Reid *et al.* 2003; SMRU 2007). However, understanding of these animals' offshore distribution is poor due to limited survey effort away from the coast. Occasional visual and acoustic surveys in offshore waters of the Moray Firth have encountered very few bottlenose dolphins (Hastie *et al.* 2003, Bailey 2006, Talisman 2006, SCANS-II 2008). The Whale and Dolphin Conservation Society are coordinating marine mammal surveys of the outer Moray Firth throughout 2008; when available, results should improve understanding of bottlenose dolphin (and other species) distribution in the wider Moray Firth region.

² Council Directive 92/43/EEC on the conservation of natural habitats of wild flora and fauna

Based on data primarily from the inner Moray Firth and mouth of the Cromarty Firth, population size in 1992 was estimated as approximately 129 individuals (95% CI = 110-174) (Wilson *et al.* 1999a). Using the same method, Thompson *et al.* (2004) present abundance estimates based on data over the entire known range of the population to vary between 75-200 from 1990-2002. Estimates were typically subject to considerable uncertainty and highly variable between some years. No clear trend in abundance is apparent. Estimates of dolphins using the inner Moray Firth showed a slight decline over the period 1990-2000 (Wilson *et al.* 2004), and a slight increase from 2002-2004. For 2004, it was estimated that 102 different individuals used the SAC (Thompson *et al.* 2006). The population can be described as vulnerable due its small size and location at the northernmost limit of its natural range. The population has also been shown to have a low mitochondrial genetic diversity and potentially be geographically isolated (Parsons *et al.* 2002). The condition of bottlenose dolphins in the Moray Firth SAC is currently classified as 'unfavourable-recovering' - reflecting a decline in utilisation of the SAC due to the aforementioned range expansion along the Scottish east coast (JNCC 2007f).

Seals

Major grey seal colonies in the central and northern North Sea include Orkney, Shetland, the Isle of May and Fast Castle and the Farne Islands. Amongst these sites, approximately 25,000 newborn pups were counted in 2006 (Shetland data from 2004), of which 80% were on Orkney (SCOS 2007). Models of marine usage by grey seals show hotspots of activity in the North Sea around the Farne Islands, the Firth of Forth, off the northeast coast of Scotland at Rattray Head and around Orkney and Shetland; activity in these areas represents some of the highest in UK waters (Matthiopoulos *et al.* 2004).

Harbour seals are widely distributed around most of the coasts of Orkney and Shetland and along the east coast of Scotland. There are many important haul-out and breeding sites on these coastlines, several of which contain internationally important numbers. Seals are abundant throughout coastal waters surrounding these sites. Models of marine usage by harbour seals show foraging areas off much of the east coast of Scotland, with hotspots of activity north of St Andrews, in the Moray Firth, northeast of Orkney and east of Shetland (Sharples *et al.* 2008); marine usage in these areas is among the highest in UK waters. Continuing declines have been observed at major harbour seal colonies throughout Britain, with the possible exception of the Inner Hebrides (Lonergan *et al.* 2007). This is particularly noticeable in Shetland and Orkney, where declines in abundance of approximately 40% have been observed between 2001 and 2006.

A3a.7.7 Features of Regional Sea 2

Compared to the central and northern North Sea, the southern North Sea generally has a relatively low density of marine mammals, with the likely exception of harbour porpoise. While over ten species of cetacean have been recorded in the southern North Sea, only harbour porpoise and white-beaked dolphin can be considered as regularly occurring throughout most of the year, and minke whale as a frequent seasonal visitor. Bottlenose dolphin, Atlantic white-sided dolphin and long-finned pilot whale can be considered uncommon visitors. Important numbers of grey and harbour seals are present off the east coast of England, particularly around The Wash where harbour seals forage over a wide area.

Cetaceans

Regional Sea 2 overlaps with SCANS-II survey strata U (central North Sea, south) and B (southern North Sea and Channel). Estimated summer 2005 abundances of surveyed species in the central North Sea (south) were: 88,143 harbour porpoise; 493 white-beaked dolphins; 405 *Lagenorhynchus* spp.; and 3,519 minke whales. Numbers in the southern North Sea and Channel were: 40,927 harbour porpoise; 395 bottlenose dolphins; 14,349 common dolphins; and 1,202 minke whales.

There is a general trend of increasing diversity and abundance of cetaceans with increasing latitude in the southern and central North Sea; a greater number and range of cetaceans are sighted off the coast of northeast England and Scotland than in southern regions.

Within the southern North Sea, harbour porpoises were most frequently sighted in the north and west, particularly in waters off the north Norfolk, Lincolnshire and East Yorkshire coasts. Sightings in the south of the region are rare, typically consisting of small numbers in nearshore waters, and most frequent from April to October. Further north, they are well distributed and sighted throughout the year, although most frequently and in greatest numbers from July-November. In summer 2005, harbour porpoise were observed in high densities throughout much of the UK southern North Sea, an area from which they were largely absent in 1994 (SCANS-II 2008).

White-beaked dolphins are widely distributed in offshore areas in the north of Regional Sea 2. Very few sightings recorded along the east coast of England south of the Humber estuary, with a limited number of offshore sightings in the shallowest waters of the North Norfolk Sandbanks and Dogger Bank. No white-beaked dolphins were recorded from the channel in either of the SCANS surveys.

Minke whales are not regularly present throughout the southern North Sea, but are well distributed (both coastally and offshore) throughout the western central and northern North Sea. Occasional sightings extend south to Flamborough Head and the north Humberside coast; sightings are most frequent in this area from July to October. Relatively high densities of minke whale were observed over the Dogger Bank in summer 2005 (SCANS-II 2008).

A limited number of sightings of Atlantic white-sided dolphins have been recorded in the southern North Sea, primarily in the northwest >10km from the coast, northeast of Flamborough Head and around Dogger Bank. Bottlenose dolphins are not commonly sighted in the southern North Sea; although they have been increasingly frequent in recent years off the Northumberland coast. Occasional sightings are also recorded in nearshore waters off the coast of Kent and Essex. These occur from April to December, with a peak in sightings from August to September (Sea Watch Foundation website).

A recent visual survey over the Dogger Bank area in September 2008 recorded several sightings of harbour porpoise, along with one definite and one suspected observation of minke whale and two dolphin encounters, suspected to be white-beaked dolphins (Leaper 2008). It was suggested that rough seas had likely contributed to under-recording of cetaceans. Surveys of a similar area in February and March 2008 recorded harbour porpoise, harbour seal and unidentified dolphins in March, but no marine mammals were observed in February (Cork Ecology 2008).

Seals

A long established colony of breeding grey seals exists at Donna Nook, at the mouth of the Humber. Smaller surveyed colonies are present further south at Blakeney Point on the north

Norfolk coast, and also at Horsey on the east Norfolk coast. Amongst these three colonies, 1,437 newborn pups were counted in 2006 (SCOS 2007). Breeding grey seals are also recorded at Flamborough Head and The Wash. Small numbers of grey seals occur along the European continental coast of the southern North Sea, the majority of which are recorded in the Dutch Wadden Sea; pup production in this area was 200 in 2004 (SCOS 2007). Models of marine usage by grey seals show a generally low density of activity in the southern North Sea, with greatest activity within The Wash and off the coast of Flamborough Head (Matthiopoulos *et al.* 2004).

Several harbour seal colonies and haul-out sites are present on the east coast of England; minimum numbers here are estimated at approximately 3,000 animals. Approximately half of the English east coast population are recorded in The Wash, with Blakeney Point the second largest English colony, then Donna Nook. Colonies are also present at Scroby Sands off the east Norfolk coast and in the greater Thames area. The English east coast population has fluctuated considerably since the late 1980s in response to phocine distemper virus (PDV) epidemics in 1988 and 2002, causing 50% and 22% declines in population size respectively (Thompson *et al.* 2005). Further information on population trends is provided in Section A3a.7.15. Tagging studies of harbour seals hauling out at The Wash have shown animals to forage over a wide area at distances much greater from haul-out sites than many other parts of the UK. Models of marine usage by harbour seals in the southern North Sea show a large area of fairly diffused activity extending from The Wash, with the greatest activity offshore of the Humber. Seals hauling-out in the greater Thames area appear to forage over a smaller area closer to the coast (Sharples *et al.* 2008).

A3a.7.8 Features of Regional Sea 3

The eastern English Channel generally has a relatively low density and diversity of marine mammals; it is a transition zone between the communities of the southern North Sea and the western Channel/Celtic Sea. Bottlenose dolphins are the most frequently sighted species in coastal waters, followed by harbour porpoise - although these are considered quite rare. Further offshore, sightings are generally of long-finned pilot whales or common dolphin. The area is not particularly important for seals, with no major colonies present and very little activity recorded.

Cetaceans

Regional Sea 3 overlaps with the SCANS-II survey stratum B (southern North Sea and Channel); estimated summer 2005 abundances of surveyed species in this area were: 40,927 harbour porpoise; 395 bottlenose dolphins; 14,349 common dolphins; and 1,202 minke whales.

Seasonal movements of bottlenose dolphins in the English Channel have been reported with the majority of sightings reported off the Cornish coast during winter, followed by an eastwards movement during the spring to as far as the east Sussex coast (Williams *et al.* 1996, cited in Hammond *et al.* 2008). During summer, highest sightings were reported from Lyme Bay eastwards, and in the autumn the majority of sightings were reported off the Dorset coast, east of the Isle of Wight. Several small resident groups of bottlenose dolphins are present off the northwest coast of Brittany and Normandy (e.g. Kiszka *et al.* 2004). It has been suggested that animals along the French Channel coast form very stable groups that are resident in small areas, whereas those along the southern English coast are wider-ranging (Reid *et al.* 2003).

Long-finned pilot whales and common dolphin are more common in the western Channel, where sightings of long-finned pilot whales are highest during autumn and early spring; in the French side of the Channel pilot whales are primarily sighted off northeast Normandy and the Channel Islands, throughout the year. Densities of common dolphins in the western Channel increase 10-fold during winter (Brereton *et al.* 2005, cited in Hammond *et al.* 2008).

Seals

The eastern English Channel is not a particularly important area for seals. No major colonies of either grey or harbour seal are present along the coast. However, small grey and common seal colonies are present on the east Kent coast; small numbers of seals from these and other colonies on adjacent coasts can be expected to be present in the area. Models of marine usage by harbour seals do not show any significant activity in the eastern English Channel, while models of grey seal marine usage show low levels of activity close to the coast in the far east, and more widespread low-level activity across much of the Channel further west. This activity can be attributed to a number of individual grey seals moving between northern Brittany and the Channel Islands and the English Channel to as far east as the greater Thames area (Matthiopoulos *et al.* 2004).

A3a.7.9 Features of Regional Sea 4 and 5

The region experiences a relatively high density and moderate diversity of marine mammals. Four cetacean species occur frequently in the Regional Sea 4 area: minke whale, bottlenose dolphin, short-beaked common dolphin, and harbour porpoise. Long-finned pilot whale and Risso's dolphin are also regularly encountered. Grey seals are present in the area, but in low densities relative to the rest of UK shelf waters. Harbour seals are rarely encountered.

Cetaceans

Regional Sea 4/5 overlaps with SCANS-II survey strata B (southern North Sea and Channel) and P (Celtic shelf). Estimated summer 2005 abundances of surveyed species in the southern North Sea and Channel were: 40,927 harbour porpoise; 395 bottlenose dolphins; 14,349 common dolphins; and 1,202 minke whales. Numbers in the Celtic shelf area were: 80,613 harbour porpoise; 5,370 bottlenose dolphins; 11,141 common dolphins; 21,410 common and/or striped dolphins and 1,719 minke whales.

Harbour porpoise are widespread and numerous across much of the Celtic Sea, with the majority of individuals sighted off the southwest coast of Wales, outer Bristol Channel coast and west of Cornwall. Density surface modelling based on SCANS-II data predicted moderate densities of harbour porpoise across much of Celtic Sea and western Channel, with higher concentrations off the south coast of Ireland and west of the Isles of Scilly. Additionally, there has been a significant increase in the number of harbour porpoise reported stranded along the southwest coast of the UK in recent years, especially since 2000, during January and April (Jepson *et al.* 2005). Surveys during the months of May and June in 2004 estimated a harbour porpoise abundance of 163 individuals (95% CI = 67-400) in coastal waters off southwest England between south Devon and the Isles of Scilly, with an estimated density of 0.148 animals per km² throughout the 1,100 km² study area (Goodwin & Speedie 2008).

Studies using skeletal material, teeth and genetics suggest that populations of harbour porpoises may exist in the North Sea and adjacent waters, with possible separate populations occurring in the Irish Sea, off the southwest coast of the UK, and in the British and Danish North Sea (Hammond *et al.* 2008 and references therein). It has also been

reported that harbour porpoises off the UK southwest coast population are significantly larger than animals that strand along the Welsh coastline (Jepson 2003). It is not known if individuals from this UK southwest coast population mix with animals off France.

Data obtained during the SCANS 1994 survey indicated that the western Celtic Sea is a relatively important area for bottlenose dolphins (Hammond *et al.* 1995). Reid *et al.* (2003) also reported large aggregations of bottlenose dolphins in the vicinity of the shelf break to the southwest of the UK, particularly off southwest Ireland and southwards towards the French coast. Sightings are lower in offshore shelf waters, although still widespread. In coastal waters, sightings are highest off the Cornish coast during winter, followed by an eastwards movement during the spring into the eastern English Channel (Williams *et al.* 1996, cited in Hammond *et al.* 2008). A northerly shift in distribution of bottlenose dolphins off the Cornish coast across the Bristol Channel into Welsh waters has also been suggested (Wood 1998).

Several small resident groups of bottlenose dolphins are present off the northern France, although these are not believed to spend significant time in UK waters (Reid *et al.* 2003, Kiszka *et al.* 2004). An open population of bottlenose dolphins are present off the west and north coasts of Wales, primarily concentrated in the Cardigan Bay area (Pesante *et al.* 2008a). Bottlenose dolphins are occasionally sighted off southwest Wales and in the outer Bristol Channel.

Common dolphins are widespread and abundant in Regional Sea 4, with sightings reported throughout the year. However, strong seasonal shifts in their distribution have been noted, with winter movements onto the Celtic Shelf and into the western English Channel (Northridge *et al.* 2004); high densities have been reported during this period, including a 10-fold increase in density in the western English Channel during winter (Brereton *et al.* 2005, cited in Hammond *et al.* 2008). During the mating/calving period for this species from May to September the majority of sightings have been reported along and off the continental shelf slope to the southwest of the UK (Murphy *et al.* 2005; Murphy & Rogan 2006). However, large numbers of animals have been observed southwest of Wales (particularly over the 100m isobath) throughout much of the year (Reid *et al.* 2003). The vast majority of common dolphin strandings in the UK occur on the southwest coasts of England and Wales (Deaville *et al.* 2007).

Minke whales are evenly distributed in low numbers along the continental shelf edge, and also present throughout much of the Celtic Sea and western Channel during summer. Concentrations of sightings have been reported around the Brittany coast and the northern edge of the Bay of Biscay (Reid *et al.* 2003). The species has been recorded in every month of the year in UK waters, but is mainly sighted near the coast between May and September. Density surface modelling based on SCANS-II data predicted high concentrations of minke whales in the western Channel between approximately Devon and northern France.

In waters to the southwest of the UK, long-finned pilot whales occur mainly along the continental shelf slope, particularly around the 1,000m isobath. In the shelf waters to the southwest of the UK, they are predominately sighted in the western English Channel off the southwest coast of England, during the autumn and early spring (Evans 1980, cited in Hammond *et al.* 2008). The majority of pilot whale strandings reported in the UK are along the southwest coast (Sabin *et al.* 2002). Risso's dolphins are regularly seen in the southern Irish Sea and off southwest Ireland, but are rare across the majority of the Celtic Sea and western Channel. Sightings have been reported on the continental shelf slope.

Several other species of toothed cetacean have been recorded in the Celtic Sea and western Channel area in low numbers: killer whale, striped dolphin, white-sided and white-

beaked dolphin. For beaked whales, only a handful of strandings have been recorded in the area, while fin and sei whales are only occasionally seen (Hammond *et al.* 2008).

Seals

Several minor grey seal colonies are present along the southwest coast of England, including the Isles of Scilly and Lundy. Two larger colonies are present at Skomer and Ramsey Islands off southwest Wales, immediately north of the Regional Sea 4 boundary. These colonies are not all regularly monitored; grey seal pup production amongst these sites was counted at 1,750 in 1994 (SCOS 2007). Models of marine usage by grey seals show a typically low level of activity across the majority of the Celtic Sea and western Channel. Areas of higher activity are observed in waters surrounding southwest Wales and to a lesser extent the northwest tip of Cornwall (Matthiopoulos *et al.* 2004).

A3a.7.10 Features of Regional Sea 6

Five species of cetacean are known to occur regularly in this area: harbour porpoise, short-beaked common dolphin, bottlenose dolphin, Risso's dolphin and minke whale. Grey and harbour seals are also regularly present in certain areas.

Cetaceans

Regional Sea 6 primarily overlaps with SCANS-II survey stratum O (Irish Sea); estimated summer 2005 abundances of surveyed species in this area were: 15,230 harbour porpoise; 75 white-beaked dolphins; 235 bottlenose dolphins; 366 common dolphins; 749 common and/or striped dolphins; and 1,073 minke whales. In the north, the area also partially overlaps survey stratum N - abundances for this area are given in Section A3a.7.11.

Harbour porpoise are widely distributed and sighted throughout much of the Irish Sea during most months of the year. Sightings are fairly frequent along the Welsh coast throughout the year, although peak from summer to autumn; sightings hotspots are off the coast of Pembrokeshire and adjacent islands. Off the northwest coast of England, the majority of sightings occur around the Isle of Man, with a peak from July to September (Sea Watch Foundation website). Density surface modelling based on SCANS-II data predicted low-moderate densities of harbour porpoise in the Irish Sea compared to other UK waters; highest densities were observed in the northwest Irish Sea.

Surveys in coastal waters west of the UK in July 2004 estimated harbour porpoise abundances of 387 individuals (95% CI = 170-877) off Northern Ireland and 1,645 individuals (95% CI = 823-3,289) in the Firth of Clyde, with estimated densities of 0.387 and 0.823 animals per km² throughout the study areas respectively (Goodwin & Speedie 2008).

In the Irish Sea, Risso's dolphins are uncommon. They are, however sighted with some regularity in the southern Irish Sea, primarily off the Wexford coast of Ireland near the Saltee Islands and west of Pembrokeshire in southwest Wales. There are also sightings around the Isle of Man. They have mainly been observed in the region in summer and rarely between December and March (Hammond *et al.* 2005). Common dolphins are regularly seen in the far south of the Irish Sea, particularly in summer. Minke whales are not common in the Irish Sea. They occur mainly in summer in the western side, over the Celtic deep, and very rarely north of the Isle of Man (Hammond *et al.* 2005) where small numbers appear to follow the spawning herring from the west side of the island to the east during the late summer and early autumn. Density surface modelling based on SCANS-II data predicted low densities of minke whale in the Irish Sea.

Bottlenose dolphin

In the Irish Sea, there are concentrations of bottlenose dolphins off west Wales (particularly Cardigan Bay) and off the coast of Co. Wexford in southeast Ireland. While effort-related sightings are few in the northern Irish Sea, the species is regularly sighted in summer off the Galloway coast of southwest Scotland, around the Isle of Man and north Anglesey (Hammond *et al.* 2005).

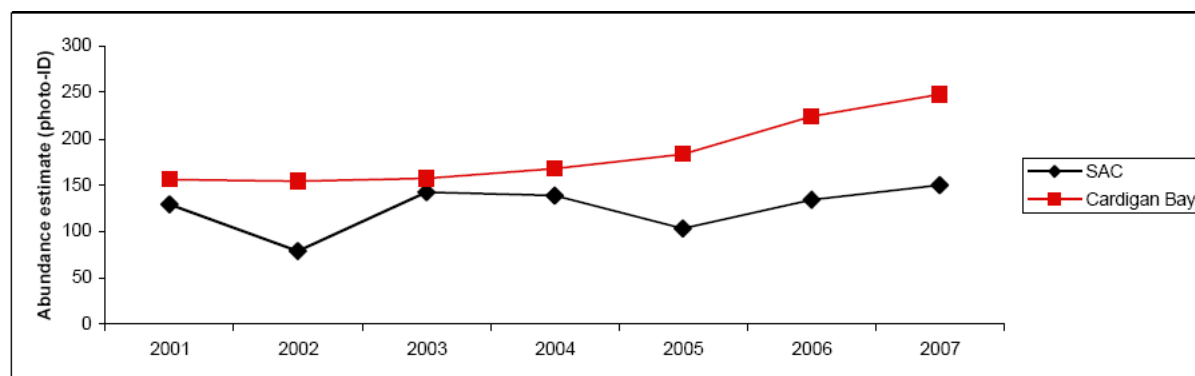
Off the coast of Wales, bottlenose dolphins are most commonly seen in Cardigan Bay within 10 miles of the coast and particularly within two miles; sightings are greatest in the southern portion of the bay. A shore-based study from 1989-1996 at New Quay recorded 92% of sightings to occur from April to November and 48% from June to August; sightings were lowest in March and highest in July (Bristow & Rees 2001). Mean group size of sightings in Cardigan Bay has been recorded as 5.85 individuals (Lott 2004, cited in Pesante *et al.* 2008b). They are also seen in North Wales and in northern Pembrokeshire.

Bottlenose dolphin is an Annex II species under the EU Habitats Directive³; two areas within Cardigan Bay are designated Special Areas of Conservation (SACs) with this species as an interest feature. Bottlenose dolphin is a primary feature of the Cardigan Bay SAC located in the south of the bay off the coast of Cardigan, New Quay and Aberaeron, and a qualifying feature of the Llyn Peninsula and the Sarnau SAC in the northern end of the bay and around the Llyn Peninsula.

Bottlenose dolphin abundance in the Irish Sea was estimated by the SCANS-II survey in summer 2005 at 235 animals (95% CI = 63-870) (SCANS-II 2008). Photo-ID studies of the dolphins inhabiting the Cardigan Bay SAC and coastal waters to Fishguard in summer 2001 estimated a population of 213 individuals (95% CI = 183-279), largely concentrated in coastal waters (Baines *et al.* 2002). Line transect surveys within the Cardigan Bay SAC in the summers of 2005, 2006 and 2007 provided abundance estimates of 154, 206 and 109 bottlenose dolphins respectively (Pesante *et al.* 2008a). Results of photo-ID surveys across a wider area of Cardigan Bay from 2001-2007, when combined with an open population model, provide population estimates ranging between 154 (95% CI = 138-209) in 2002 and 248 (95% CI = 231-277) in 2007 (Figure A3a.7.21). Estimates for the SAC alone range from 79 in 2002 to 150 in 2007. The population appears to be stable or increasing over this period (Pesante *et al.* 2008a). Between 13 and 20 bottlenose dolphin calves have been recorded born annually between 2005-2007 in the Cardigan Bay SAC. The condition of bottlenose dolphins is currently classified as 'favourable' in both the Cardigan Bay SAC and the Llyn Peninsula and the Sarnau SAC (JNCC 2007f).

³ Council Directive 92/43/EEC on the conservation of natural habitats of wild flora and fauna

Figure A3a.7.21 - Bottlenose dolphin abundance estimates for Cardigan Bay from 2001-2007



Notes: Trend in abundance estimates of bottlenose dolphin from photo-ID studies using an open population model, within the Cardigan Bay SAC (triangles, black line) and entire Cardigan Bay (squares, red line). Source: Pesante *et al.* (2008a)

The overall population is likely to be larger since at least part of the population ranges over an area wider than Cardigan Bay. Pesante *et al.* (2008b) report interim results of photo-ID monitoring of bottlenose dolphins occurring around the coast of North Wales, primarily Anglesey. A total of 84 dolphins were photographed in 9 boat-based sightings from August 2007-March 2008; 75 of these were matched with the Cardigan Bay catalogue, while 9 were not previously documented. Additionally, results of 72 land-based sightings from 2001-2007 were presented. Sightings trends differed considerably to those in Cardigan Bay, with the most frequent sightings occurring during winter (November-January) and a larger mean group size of 18 (Pesante *et al.* 2008b). These findings confirm that Cardigan Bay does not include the full geographic range of this population, but likely includes all of the West and North Wales coasts and a wide area of the Irish Sea.

Seals

In the Irish Sea area, the size of the grey seal population breeding in Wales and Ireland has been estimated at 5,000-7,000 animals (Keily *et al.* 2000). The larger haul-out sites are present around Pembrokeshire, the Llyn Peninsula, Liverpool Bay, the Firth of Clyde, southeast and east Ireland. Haul-outs are also present in Cardigan Bay, Anglesey, the Solway Firth, northern Isle of Man, east Northern Ireland and the Dumfries and Galloway coast (Hammond *et al.* 2005).

Satellite tagging of 19 grey seals at Irish Sea colonies from July to December 2004 provides some information of their distribution at sea. These data, in combination with counts of animals at haul-out sites in summer, forms the basis of models predicting marine usage by grey seals in the Irish Sea. The data show that the southern Irish Sea and northern St George's Channel is extensively used by grey seals, and that the southern part of Liverpool Bay is also heavily used; these areas can be assumed to be foraging areas. A significant portion of the Irish Sea area is clearly important as foraging habitat for grey seals hauling out in Wales and Ireland (Hammond *et al.* 2005).

There are few harbour seals around the Irish Sea except along the coast of Northern Ireland and in the Firth of Clyde; the number of seals in the area is likely to be around 3,500-4,000 (Hammond *et al.* 2005). Models suggest at-sea activity by harbour seals in the Irish Sea to be greatest towards the north in the Northern Channel (Sharples *et al.* 2008).

A3a.7.11 Features of Regional Sea 7

The Minches and western Scotland support a rich diversity and high density of marine mammals. Harbour porpoise and white-beaked dolphins are widespread and numerous. They are encountered throughout the year, although most frequently during summer months, when Risso's dolphins, common dolphins and minke whales are also sighted fairly frequently. Small numbers of bottlenose dolphins also occur around coastal waters of the Hebrides. Killer whales are occasionally observed throughout the area, most notably around seal haul-out sites during summer. Both grey and harbour seals are abundant throughout the area.

Cetaceans

Regional Sea 7 primarily overlaps with SCANS-II survey stratum N (the Minch and western Scotland); estimated summer 2005 abundances of surveyed species in this area were: 12,076 harbour porpoise; 9,731 white-beaked dolphins; 246 bottlenose dolphins; and 2,322 common dolphins. In the southwest, the area also partially overlaps survey stratum Q - abundances for this area are given in Section.

Harbour porpoise are widely distributed and frequently sighted throughout much of the Minches and western Scotland. While sighted throughout the year, peak numbers are generally recorded in summer months from June to September. Estimated summer abundance in the Minches and western Scotland from the SCANS-II survey was 12,076. Only the northern end of the Minches was surveyed in 1994, where relatively high densities of harbour porpoise were recorded. Surveys during the months of August and September in 2004 estimated a harbour porpoise abundance of 3,105 individuals (95% CI = 2,032-4,745) in coastal waters off western Scotland approximately between Oban and Gairloch, with an estimated density of 1.071 animals per km² throughout the 2,900 km² study area (Goodwin & Speedie 2008).

Along with harbour porpoise, white-beaked dolphins are the most commonly occurring cetaceans in the region. The species is regularly widely distributed throughout much of the area, with sightings most frequent from June to October. Estimated summer abundance of white-beaked dolphins in the Minches and western Scotland from the SCANS-II survey in 2005 was 9,731. Relatively high densities of white-beaked dolphins were also recorded in the northern Minches in 1994.

Bottlenose dolphins (*Tursiops truncatus*) are primarily sighted in small numbers around the Inner Hebrides. Research by the Hebridean Whale and Dolphin Trust (HWDT) suggests a small, possibly resident population to occur in these waters (Mandleberg 2006). Sightings are fairly common around Mull, Islay, Tiree and Skye, but are occasionally reported off the west coast of the Outer Hebrides and in the northern entrance to the Minch. Little is known of the bottlenose dolphins in this area, although research is underway to estimate their population size and residency patterns.

Risso's dolphins have been recorded throughout much of the region, although sightings are most frequent around the coast of the Outer Hebrides, particularly the northeast coast of Lewis. They are typically observed in small groups of 5-25 individuals, most frequently from June to September. Short-beaked common dolphins are observed throughout the year in coastal waters off southwest Scotland and in the Inner Hebrides as far north as Skye. Sightings are most frequent from May to August. Atlantic white-sided dolphins are primarily an offshore, oceanic species. They are occasionally sighted in the coastal waters of western Scotland, with most sightings in the northern Minch and southern Sea of Hebrides. Sightings are most frequent in July and August.

Killer whales sightings are fairly frequent in the Minches and western Scotland, and have been increasing in frequency in recent years. Repeat observations are recorded around many of the islands of the Inner Hebrides; with many observations are in the vicinity of seal colonies. They have been reported in most months of the year, with the greatest frequency between May and September.

Minke whale are seasonally present in the Minches and western Scotland, with whales appearing to move south into the area at the beginning of May and remaining present until October; sightings are rare outside of this period. During these summer months, they are widely distributed throughout the region, although greatest sightings are around the northern entrance to the Minches and the Argyll Islands. No minke whales were observed in the Minches and western Scotland in the SCANS-II survey in 2005. However, this species was sighted extensively throughout western Scotland in the summer of 2005 by land-based observers and on HWDT sightings surveys (HWDT 2006).

A few individuals of fin and humpback whales are occasionally sighted in the area during summer months. Small groups of pilot whales are also occasionally recorded during summer.

Seals

Over 90% of the UK population of grey seal breeds in Scotland, mostly on the west coast and Orkney. Among major colonies on western Scotland, approximately 11,500 and 3,500 newborn pups were counted on the Outer and Inner Hebrides respectively in 2006 (SCOS 2007). Seals tagged at haul-out sites on western Scotland utilise much of the coastal waters to the south and west of the Outer Hebrides, along with a considerable proportion of the adjacent offshore areas. Models of marine-usage show hotspots of activity north and west of Scotland around Orkney, Shetland, North Rona, the north mainland and west and south of the Outer Hebrides (Matthiopoulos *et al.* 2004). Sightings reported in Pollock *et al.* (2000) also show a wide distribution of grey seals in the Minches and western Scotland, particularly on the east coast of the Outer Hebrides.

The vast majority (85%) of harbour seals are found in Scotland, with minimum numbers on the Inner and Outer Hebrides and western mainland estimated at approximately 14,000 animals (SCOS 2007). Haul-outs are widely distributed and numerous in this area (see Figure A3a.7.18), with seals abundant throughout adjacent coastal waters. Models of marine-usage show moderate-high levels of activity throughout the majority of Regional Sea 7 from Skye south to the North Channel; hotspots of activity occur around Mull, Jura, Isla and adjacent coasts, at the entrance to the North Channel, the Sound of Barra and between Skye and North Uist (Sharples *et al.* 2008).

A3a.7.12 Key features of Regional Sea 8

The waters north and west of Scotland support a rich diversity and density of marine mammals, and are considered one of the most important areas for these animals in northwest European waters. Containing a variety of habitats, the region supports species commonly associated with shallower coastal areas, offshore shelf waters, and those occupying the deeper waters of the shelf edge and slope. Ten cetacean species are known to occur regularly in this area: harbour porpoise, white-beaked dolphin, Atlantic white-sided dolphin, Risso's dolphin, bottlenose dolphin, short-beaked common dolphin, killer whale, long-finned pilot whale, sperm whale and minke whale. Large numbers of grey and harbour

seals breed in the area, with high densities observed in many coastal waters and some shelf areas further offshore.

Cetaceans

Regional Sea 8 overlaps with SCANS-II survey strata Q (shelf waters west of Scotland and Ireland) and J (Northern Isles and Moray Firth). Estimated summer 2005 abundances of surveyed species in shelf waters west of Scotland and Ireland were: 10,002 harbour porpoise; 2,030 white-beaked dolphins; 7,736 *Lagenorhynchus* spp.; 1,128 bottlenose dolphins; 1,454 common dolphins; 1,578 common and/or striped dolphins; and 1,856 minke whales. Estimated abundances in the Northern Isles and Moray Firth were: 10,254 harbour porpoise; 682 white-beaked dolphins; 412 bottlenose dolphins; 88 common and/or striped dolphins; and 835 minke whales. Abundance estimates for white-sided dolphins in waters off northwest Scotland during summer 1998 were; 21,371 (CV = 0.54) for west of the Outer Hebrides, and 74,626 (CV = 0.72) for the Faroe Shetland Channel (Macleod 2004a, cited in Murphy *et al.* 2008).

Harbour porpoise and white-beaked dolphins are widespread and numerous throughout shelf waters, while minke whales, Risso's dolphins and killer whales are also widely distributed in shelf waters during summer months. Small numbers of bottlenose dolphins occur around coastal waters of the Hebrides. Deeper water species such as sperm whales, long-finned pilot whales and fin whales occur over the shelf slope and deeper waters beyond, as do killer whales. Sei whales, blue whales, humpback whales and beaked whales also occur in these deeper waters to a lesser extent. Atlantic white-sided dolphins are common along the shelf edge and slope, with bottlenose dolphins, common dolphins and Risso's dolphins occasionally observed in this area. Most of these species are occasionally observed on shelf waters to the north and west of Scotland, often in the waters surrounding Shetland.

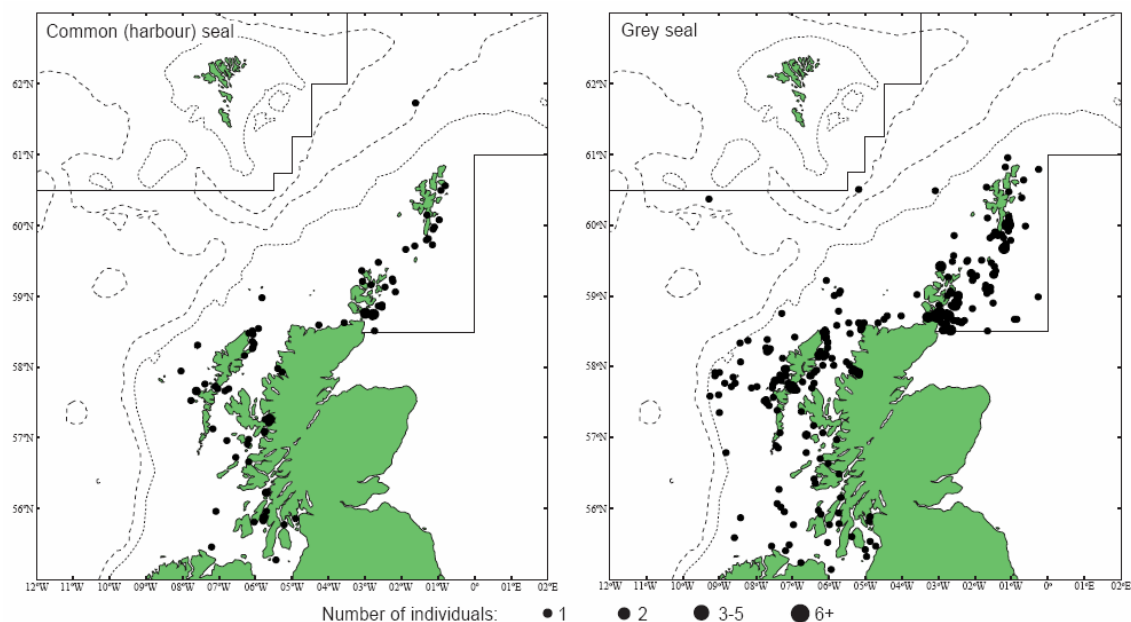
Seals

Over 90% of the UK population of grey seals breeds in Scotland, mostly on the west coast and Orkney. Among major colonies in the Regional Sea 8 area (including Shetland, Orkney and the Inner and Outer Hebrides), approximately 38,000 newborn pups were counted in 2006 (Shetland data from 2004), of which 80% were on Orkney and the Outer Hebrides (SCOS 2007). Many major and minor colonies are widely distributed along these coasts. Tagging studies show grey seals to utilise much of the coastal waters along with a considerable proportion of the adjacent offshore areas. Models of marine usage show activity throughout most shelf seas of Regional Sea 8, with greatest activity around Orkney, Shetland, North Rona, the north mainland and west and south of the Outer Hebrides; activity in these areas represents some of the highest in UK waters (Matthiopoulos *et al.* 2004). Sightings reported in Pollock *et al.* (2000) also show a wide distribution amongst shelf waters of this area (Figure A3a.7.22).

Harbour seals are widely distributed around most of the coasts of Orkney and Shetland and along the north and west coasts of Scotland. There are many important haul-out and breeding sites on these coastlines, several of which contain internationally important numbers; seals are abundant throughout coastal waters surrounding these colonies. Around 85% of the UK population of harbour seals are found in Scotland, with minimum numbers on Orkney, Shetland and the Outer Hebrides estimated at approximately 9,000 animals, with a further 12,000 estimated on the Inner Hebrides and western mainland (SCOS 2007). Models of marine usage show greatest activity around Orkney (particularly north), Shetland and west and south of the Outer Hebrides (Sharples *et al.* 2008); marine usage in these areas is among the highest in UK waters. Sightings reported in Pollock *et al.* (2000) also

show a wide distribution amongst coastal waters of this area, with only a few individuals observed in offshore shelf waters (Figure A3a.7.22).

Figure A3a.7.22 - Sightings of harbour and grey seals north and west of Scotland



Notes: Harbour seal (left) and grey seal (right); short dash = 200m isobath, long dash = 1,000m isobath.
Source: Pollock *et al.* (2000)

A3a.7.13 Key features of Regional Sea 9

The Faroe-Shetland Channel supports a rich diversity and high density of marine mammals. Cetaceans known to regularly occur include: Atlantic white-sided dolphin, bottlenose dolphin, killer whale, long-finned pilot whale, and sperm whale. Beaked whales, common dolphins, Risso's dolphins, and fin, sei and minke whales are also recorded to a lesser extent, while other species of baleen whale such as blue and humpback are occasionally observed. Hooded seals occur to a limited extent, particularly in the north; grey and harbour seals are very uncommon.

Cetaceans

Atlantic white-sided dolphins are the most numerous cetacean in the area; they have been observed in all months of the year, with the highest abundance from June to November and a large increase in numbers observed in August. Estimated abundance of white-sided dolphins in waters of the Faroe-Shetland Channel north and west of the Northern Isles during summer 1998 was 74,626 (CV = 0.72) (Macleod 2004a, cited in Murphy *et al.* 2008). Bottlenose dolphin sightings appear to be concentrated around the Wyville Thomson and Ymir Ridges, in the southwest of the Faroe-Shetland Channel. Risso's dolphins (*Grampus griseus*) are occasionally recorded in deeper waters off the shelf slope, including the Faroe-Shetland Channel; Pollock *et al.* (2000) recorded all deeper water sightings between July and December.

Killer whales have been observed widely distributed in shelf and deep waters north and west of Scotland throughout much of the year, although the greatest concentration of sightings are over the shelf slope to the north and northwest of Shetland. Sightings reported in

Pollock *et al.* (2000) were greatest in June and predominantly concentrated on the slope north of Shetland in May and June. They are often recorded in the vicinity of fishing vessels.

Long-finned pilot whales are fairly common in the area, particularly around the 1,000m isobath, and were the second most abundant species of cetacean north and west of Scotland observed by Pollock *et al.* (2000). High sighting rates have been recorded in the Faroe-Shetland Channel and the Rockall Trough. Acoustic monitoring northwest of the Outer Hebrides in the winter of 1997-1998 detected limited pilot whale presence over the continental slope in waters >600m depth (Lewis *et al.* 1998). Average group size appears to increase between June and September.

Sperm whales are widely distributed and frequently observed in the Faroe-Shetland Channel. Sightings are highest over the 1000m isobath, with animals either on or beyond the shelf slope. Acoustic monitoring northwest of the Outer Hebrides in the winter of 1997-1998 detected sperm whales over a wide area of the continental slope, primarily in waters >500m depth (Lewis *et al.* 1998). Sightings in this area have occurred in most months of the year, with a peak in June. Pollock *et al.* (2000) did not record any sperm whales in February and March; survey effort was limited during these months, although similarly low effort in November and December did record sperm whales. It can be assumed that these waters represent a migratory route for some portion of the northeast Atlantic population at certain times of the year.

Beaked whales, including northern bottlenose whale and *Mesoploddon* spp., have been recorded throughout much of the Faroe-Shetland Channel; this area may represent an important part of their habitat, but its significance is unknown due to the infrequency of encounters and small numbers of animals observed. *Mesoplodon* spp. have been sighted in most months of the year, with a distinct peak in August. Average group size was approximately 3 individuals. Northern bottlenose whales are thought to migrate north from lower latitudes in spring and return south from polar waters in autumn (Benjamin & Christensen 1979, cited in Pollock *et al.* 2000); peak numbers north and west of Scotland were observed in April and August. However, they have been recorded around the Faroe Islands throughout the year, so some individuals may not migrate. Average group size is approximately 2 individuals.

Pollock *et al.* (2000) observed fin whales in the Faroe-Shetland Channel only between May and October, with a peak in sightings in August. However, acoustic investigations have detected fin whale calls in all months of the year, with whale counts and vocal activity greatest from October to April (Charif & Clark 2000).

Seals

Grey seals appear to have only a very limited presence in deeper waters off the shelf edge, with deep-water occurrence limited to satellite fixes from just one individual to the west of Scotland; no seals were recorded in the Faroe-Shetland Channel (Matthiopoulos *et al.* 2004). At-sea sightings reported in Pollock *et al.* (2000) show a similar distribution, although three sightings of individual grey seals were recorded in the Faroe-Shetland Channel. McConnell *et al.* (1999) observed a female grey seal tagged on the Farne Islands moving north to Orkney, Shetland, then the Faroe Islands before moving south through deep-waters west of Britain. Animals present in the Faroe-Shetland Channel are likely to be undertaking targeted long-distance movements between haul-out sites, with foraging activity highly unlikely.

Harbour seals tagged on Orkney and Shetland have been occasionally recorded in deeper water beyond the shelf edge northwest of Scotland, including the Faroe-Shetland Channel

(Hammond *et al.* 2004); however, their presence in this area is very limited in comparison to adjacent coastal and offshore shelf waters. Pollock *et al.* (2000) only recorded one observation of a common seal in the Faroe-Shetland Channel; several unidentified seals were also recorded in this area. Models of marine usage show very low activity in the Regional Sea 9 area, suggesting that this is not an important foraging area for harbour seal.

Hooded seals tagged at Jan Mayern, east of Greenland, were recorded making post-breeding trips of an average of 7 weeks duration over large areas of the Greenland and Norwegian Seas, around the Faroe Islands, and deeper waters to the north and west of Scotland (Folkow *et al.* 1996). Pollock *et al.* (2000) recorded several observations of hooded seals in the Faroe-Shetland Channel. Studies of diving behaviour have shown this species to spend the majority of its time in open water diving to depths of 100-600m, although dives in excess of 1000m depth have been recorded (Folkow & Blix 1999).

A3a.7.14 Key features of Regional Sea 10 and 11

Knowledge of marine mammal occurrence in the deep waters beyond the shelf slope to the west of Scotland is poor relative to other areas in UK waters. However, available information suggests that this is an important area for cetaceans, with a variety of species and high densities recorded.

Cetaceans

These waters are beyond the scope of the SCANS surveys, and while other survey effort is moderate in the northeast corner of Regional Sea 10 the majority of the area has historically poor coverage to approximately 12°W and very little west of that. The most recent and extensive information on cetaceans in this area is provided by the CODA survey, providing a snapshot of the distribution in summer 2007 in offshore waters west of the UK, Ireland, France and northern Spain. Figure A3a.7.23 shows the distribution of survey strata, effort and sightings of three of the most frequently encountered species.

Sightings during the CODA survey amounted to almost 1,500 encounters of seventeen species from all ships combined (Macleod & Hammond 2008). Across the entire survey area, fin whales and common dolphins were the most frequently encountered species. Fin whale observations were greatest in the western Bay of Biscay, while common dolphin observations generally increased towards the south. In waters west of the UK and Ireland, long-finned pilot whales were frequently recorded. Whilst widespread, a greater number of pilot whale encounters were recorded in the Rockall Trough over the southeastern slope of Rockall Bank. Sperm whales were widespread in this area, while many other species were also observed including common dolphin, bottlenose dolphin, Atlantic white-sided dolphin, striped dolphin, beaked whales, minke whale, fin whale and blue whale (Macleod & Hammond 2008). Additionally, acoustic observations from survey vessels detected dolphin click trains throughout the area.

Abundance estimates for summer 2007 derived from the CODA survey for stratum 1 are as follows: bottlenose dolphin 5,709 (CV = 0.35), minke whale 5,547 (CV = 1.03), common dolphin 3,546 (CV = 0.76), beaked whale 3,512 (CV = 0.33), striped dolphin 519 (CV = 1.05), sperm whale 363 (CV = 0.46), fin whale 247 (CV = 0.45) (Murphy *et al.* 2008). Additionally, abundance of large baleen whales (fin, sei and “fin or sei” whales) was estimated as 249 (CV = 0.44).

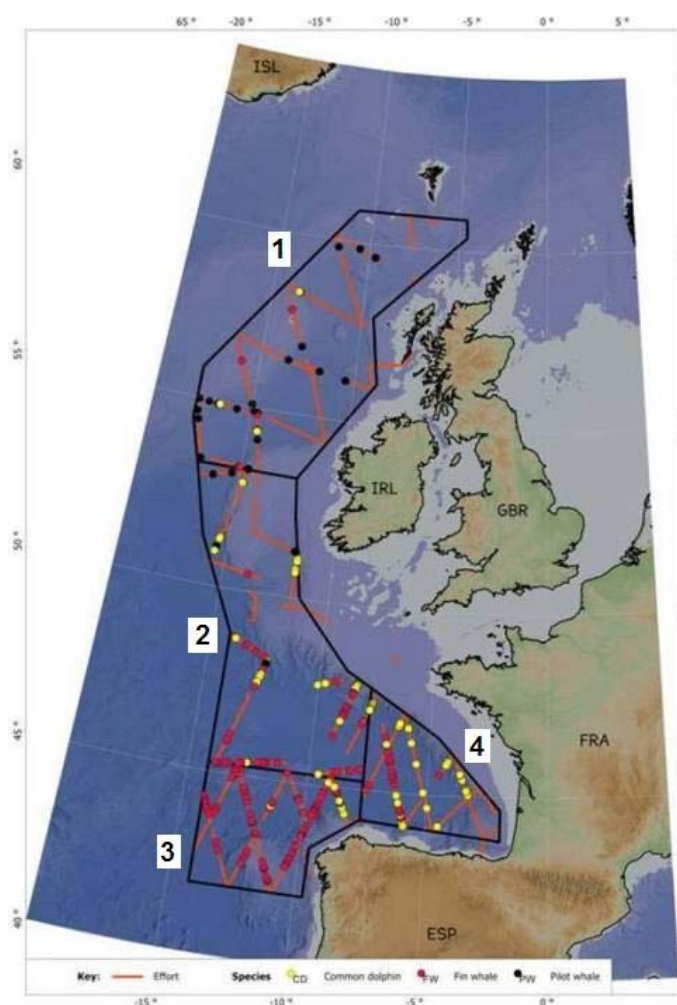


Figure A3a.7.23 - CODA survey sightings of the most frequently encountered species

Notes: Survey strata (black polygon); ship transects (orange lines); sightings of long-finned pilot whale (black dots), common dolphin (yellow) and fin whale (red). Source: SMRU, St. Andrews, UK.

Previous visual surveys have recorded similar results. Pollock *et al.* (2000) reported long-finned pilot whales to be fairly common in the area, particularly around the 1,000m isobath, while common dolphins and sperm whales were also frequently encountered. A notable difference in occurrence concerns Atlantic white-sided dolphins, which have been reported as widespread and abundant along the continental slope north and west of Scotland (e.g. Pollock *et al.* (2000), Macleod *et al.* 2003), but which were sighted a relatively low number of times in this area during the CODA survey; abundance was not estimated. However, survey conditions were poor during the CODA survey, particularly in the northern sector (Macleod *et al.* 2008), and therefore sightings are likely to have under-represented the true occurrence of white-sided dolphins during the survey. As mentioned previously, acoustic detections of dolphins were widespread and frequent throughout this area in summer 2007 (Macleod & Hammond 2008). Estimated abundance of white-sided dolphins in waters west of the Outer Hebrides (including an area on and beyond the shelf slope) during summer 1998 was 21,371 (CV = 0.54) (Macleod 2004a, cited in Murphy *et al.* 2008).

Acoustic monitoring of fin, humpback and blue whale calls on the shelf edge and deeper waters north and west of the UK and Ireland showed fin whales to be the most frequently recorded species (Charif & Clark 2008). Fin whale sounds were detected throughout the study area, with peak densities typically occurring in December and January before gradually declining to minimal levels in May and June before increasing again. Patterns of seasonal variation in detection were similar across the study area. Only small seasonal variation in the minimum number of fin whales was detected; there was no evidence of large-scale seasonal migratory movements, although it is noted that acoustic tracking of vocalising

individual fin whales is difficult. The highest detection densities occurred in the Rockall Bank area, where the maximum number of fin whales detected simultaneously was twelve.

Blue whales were recorded to a lesser extent in waters north and west of the UK and Ireland. Peak detections occurred between November and December followed by a gradual decline to minimal levels from April to June, before gradually increasing again. This seasonal pattern in detection was similar throughout the study area with the exception of Faroese waters and the central and northern Faroe-Shetland Channel, where detection densities (which were among the lowest recorded) dropped to zero in November and December in most years, when peak levels occurred elsewhere. The maximum number of blue whales detected simultaneously in any one region was nine, recorded in the Rockall Trough area in November 1999. Observations of individually tracked blue whales suggest that most individuals detected during the autumn to winter period are migrating to the south or southwest; the northward migratory route is believed to lie further west in the Atlantic (Charif & Clark 2008).

Humpback whales were the least frequently detected species in waters north and west of the UK and Ireland. Vocalisations were recorded only from mid-October to late March. While recorded throughout the study area, detections were rare in regions south of approximately 52°N. The maximum number of humpback whales detected simultaneously in any one region was six, recorded between the Faroe Islands and Iceland in December 1996. Groups of singing humpbacks were tracked moving into the study area from the north and travelling on generally south-westerly courses. No corresponding northward migration was detected (Charif & Clark 2008).

Seals

Extensive study of grey and harbour seal distribution at sea has revealed greatest activity to occur in coastal waters around colonies and offshore shelf areas suitable for foraging (Matthiopoulos *et al.* 2004; Sharples *et al.* 2008). Very few records exist of grey or harbour seal occurrence in deep waters west of the UK beyond the continental shelf. The deeper diving hooded seal is occasionally observed in the Faroe-Shetland Channel, although sightings further south are very rare.

A3a.7.15 Evolution of the baseline

Significant change has been documented in many aspects of the UK marine environment over the past few decades and beyond, likely due to an array of factors including climatic influences, nutrient inputs and anthropogenic factors such as fishing (Clark & Frid 2001). MCCIP (2008) and contributing reports provide up-to-date information on the influence of climate change on the UK marine environment. Some of the most notable and widespread trends observed include rising air and sea temperatures (Berry & Kent 2008, Holliday *et al.* 2008); increased phytoplankton abundance and an increase in the ratio of dinoflagellates to diatoms within the phytoplankton (e.g. Leterme *et al.* 2006); strong biogeographical shifts in many zooplankton assemblages, with a northward extension of warm-water species associated with a decrease in the number of colder-water species (Beaugrand *et al.* 2002); changes in spatial presence of many epibenthic species, particularly in the southern North Sea (Callaway *et al.* 2007); reduced abundance in many fish populations (particularly gadoids) (e.g. FRS 2008); increased occurrence and abundance of southern fish species (Beare *et al.* 2004), and increased abundance of scavenging seabirds (e.g. Camphuysen & Garthe 2000).

Such ecosystem-wide changes are likely to influence marine mammals in a variety of ways. Evans *et al.* (2008) provide an up-to-date review of the effects of climate change on marine mammals, with specific reference to the UK. They acknowledge that responses, both at individual and population levels, of marine mammals to climate change are currently poorly understood, while any predictions are largely speculative and unsubstantiated by unequivocal evidence. Potential impacts which have been suggested to date include range shifts, changes in physical habitat, changes to food webs and increased susceptibility to contaminants.

Range shifts in marine mammals have been reported in the Northeast Atlantic, and may reflect changes in prey availability and the distribution of favourable environmental conditions. While marine mammals are warm-blooded and generally target a wide range of prey, their distributions often fall between particular sea temperature boundaries which reflect the range preferences of their major prey organisms (Evans *et al.* 2008). Increasing temperatures and greater presence of southern fish species in the central and northern North Sea may lead to an increasing occurrence of southern marine mammal species. This could also cause species with affinities for cooler waters to undergo a northward shift in distribution (MacLeod *et al.* 2008). Additionally, prey distribution and abundance can show considerable variation in response to fisheries exploitation; this is likely to have knock-on effects on marine mammals which predate on the exploited fish populations.

A3a.7.15.1 Cetaceans

As data on cetaceans are typically few and often characterised by considerable uncertainty and both seasonal and spatial gaps, the identification of trends is very difficult. It is even more difficult to establish any causes of potential trends. While the widespread, systematic SCANS surveys are somewhat limited in their temporal coverage, they provide a useful comparison of abundance estimates for certain species from 1994 and 2005; major changes in abundance between the two decades should be identified to a certain extent.

Harbour porpoise abundance was estimated from the SCANS survey in summer 1994 as 341,366 (CV=0.14; 95% CI = 260,000-449,000) in an area of 1,030,063 km². Estimated abundance in summer 2005 is higher, although the survey area was greater (1,370,114 km²). An estimate for 2005 for the survey blocks that cover approximately the same area as surveyed in 1994 is approximately 335,000 (CV=0.21); this shows that there was no difference in the total abundance of harbour porpoises in 1994 and 2005 (SCANS-II 2008). However, in 2005 average density in survey blocks north of 56°N was approximately half the density estimated in 1994, and average density in survey blocks south of 56°N in 2005 was approximately twice the density estimated in 1994. Both these differences are significant at the 5% probability level.

This suggests a southerly shift in harbour porpoise distribution within the North Sea, at least for the months and years surveyed. There has been some speculation that the apparent shift in harbour porpoise abundance from the northern to southern North Sea may be due to a shortage of sandeels, a known prey item, with some suggestions of a recent increase in starvation observed amongst porpoises stranded in Scotland (MacLeod *et al.* 2007), although it is also argued that there is little evidence to support this (Thompson *et al.* 2007).

Estimated abundances for white-beaked dolphins and minke whales in 2005 are also higher than those estimated in 1994. White-beaked dolphin abundance in the North Sea (the area for which estimates were available in both years) was estimated at 7,856 (CV=0.30) in 1994 and 10,562 (0.29) in 2005. For minke whale, estimated abundance in the North Sea was 8,445 (CV=0.24) in 1994 and 10,541 (0.32) in 2005; these differences are not significant

(SCANS-II 2008). Minke whale also appeared to show a north-south shift between 1994 and 2005. Both white-beaked dolphin and *Lagenorhynchus* spp. appeared to more abundant in the central and northern North Sea in 2005 than 1994, and less abundant in the southern North Sea.

Other notable differences were higher densities of harbour porpoise in the Celtic Sea and waters southwest of England in 2005 compared to 1994, including the presence of porpoise in the western Channel - an area from which they were generally not observed in 1994 (SCANS-II 2008). Additionally, in 2005, minke whale were considerably more abundant in waters off the south coast of Ireland than in 1994, and were present in the western Channel approximately between Devon and northern France in 2005 but not recorded anywhere in the Channel in 1994.

Surveys during summer months from 2002-2004 at several study sites in coastal waters west of the UK have estimated relative abundances of harbour porpoises (Goodwin & Speedie 2008). Notable trends included a significant decrease in harbour porpoise density off southwest England (between south Devon and the Isles of Scilly) over the period, and a slight increase off western Scotland (between Oban and Gairloch). Significant inter-annual differences in relative abundance were also observed for the Firth of Clyde and coastal waters of Northern Ireland, although trends were not apparent.

There is greater understanding of trends in abundance and distribution for the populations of bottlenose dolphins occurring in Cardigan Bay (and wider Welsh coast) and the Moray Firth (and wider Scottish east coast), which have been the subject of targeted research and monitoring for many years. Estimates suggest the Cardigan Bay population to appear stable or increasing over the period 2001-2007 (Pesante *et al.* 2008a); for the Moray Firth population (across their entire range), abundance estimates over the period 1990-2002 showed no clear trend (Thompson *et al.* 2006). However, these abundance estimates are still subject to considerable uncertainty and highly variable between some years; long time-series are required to detect trends with any statistical confidence. There are currently no monitoring schemes for any offshore cetacean populations in UK waters that would be capable of detecting even large changes in population levels (Murphy *et al.* 2008).

From acoustic monitoring of fin, humpback and blue whale calls in deeper waters north and west of the UK and Ireland, considerable inter-annual variations were observed in the patterns of detection densities over the period 1996-2005 (Charif & Clark 2008). For blue and humpback whales, no clear trend was apparent over this period. Peak annual detection densities for fin whales showed a declining trend over the ten years throughout most of the study area; however, it is noted that the current analyses are preliminary and subject to several limitations which need to be addressed before statistically robust conclusions may be drawn (Charif & Clark 2008).

A3a.7.15.2 Seals

Due to the greater ease with which seals can be studied, data on their distribution and abundance are more complete. While, like cetaceans, abundance estimates are often subject to considerable uncertainty, data are of sufficient quality and temporal coverage for larger magnitude changes and trends to be identified and interpreted. Numbers of breeding grey seals in the UK as a whole are increasing, and have been for a number of years now. Average annual change in pup production from 2002-2006 for major colonies are provided in Table A3a.7.7. With the exception of some central North Sea colonies (including Donna Nook, Blakeney Point and Horsey), evidence from 2002-2006 suggests that populations are stabilising.

Current and previous aerial survey counts of harbour seals by UK survey regions are provided in Table A3a.7.8. Declines in harbour seal populations have been experienced throughout most major colonies in Britain, including a decline of approximately 40% in Orkney and Shetland between 2001 and 2006. Outbreaks of PDV in 1988 and 2002 were responsible for considerable declines in harbour seals on the east coast of England (Thompson *et al.* 2005), but caused only low mortality in Scottish colonies in 1988 and virtually none in 2002 (SCOS 2007). In most colonies, declines have continued since 2002, with some colonies showing evidence of decline prior to 2002; a continued effect of PDV seems unlikely. The reasons behind such significant and widespread declines (and associated increased mortality and/or reproductive failure) are not clear (Lonergan *et al.* 2007). Modelling studies based on monitoring data from surveyed harbour seal colonies show far less of a decline on western Scotland, with populations on the Outer Hebrides and western mainland appearing more stable. Numbers on the Inner Hebrides appeared stable or increasing (Lonergan *et al.* 2007).

A3a.7.16 Environmental issues

A3a.7.16.1 Underwater noise

Marine mammals are sensitive to noise in the marine environment. Their extensive use of sound for communication, prey capture, predator avoidance and probably navigation, and the possession of large gas-filled organs make them vulnerable to both disturbance and physiological damage from underwater noise of sufficient magnitude. Identifying these effects, and the levels of sound which may induce them, has been the subject of considerable research; extensive reviews are provided by Richardson *et al.* (1995), Nowacek *et al.* (2007), Southall *et al.* (2007) and Weilgart (2007). Additionally, reviews of marine mammals in UK waters in contribution to previous SEAs have addressed the issue of noise (e.g. Hammond *et al.* 2006, 2008).

Many human activities introduce sound into the marine environment, e.g. shipping, ice breaking, oil and gas exploration and development, renewable energy development, sonars and explosions; some of these sounds are extremely intense. Anthropogenic noise is often of low to mid frequency and may propagate well to be detectable at substantial ranges from the source. Recent technological developments have introduced many new sources of noise in offshore waters. Those typically of greatest concern to marine mammals, and marine fauna in general, are those producing the most intense sound pressure levels: seismic exploration, underwater explosions, sonar (particularly naval), pile-driving and some acoustic harassment devices (AHDs). However, less intense noise sources such as shipping are also of concern due to their persistent nature and long-range of audibility. Shipping is the dominant noise source at low frequencies in most locations, and its contribution to increased ambient noise levels has been considerable in recent decades.

Several deep-diving species of marine mammal occur in the deeper waters on and beyond the continental shelf slope to the north and west of the UK and Ireland, including sperm whales, beaked whales and hooded seals. These are considered particularly sensitive to high-intensity anthropogenic sound such as mid-range sonar and seismic survey due to their behaviour: spending only limited periods of time at the surface makes their presence difficult to detect; seismic pulses are directed towards the seabed and are typically at greatest levels beneath the source; and, noise-induced rapid surfacing of marine mammals from depth may cause physiological damage characteristic of decompression sickness. Additionally, large baleen whales also occur in these deeper offshore waters; these are considered sensitive to

the low frequency noise characteristic of many anthropogenic sources due to the comparably low frequencies at which they are known to vocalise.

Information on the characteristics of underwater noises and their potential effects on marine mammals is provided in Section 5.

A3a.7.16.2 Contaminants

Marine mammals are exposed to a variety of anthropogenic contaminants, primarily through the consumption of prey. As top predators, they are at particular risk from contaminants which biomagnify through the food chain (i.e. are found at increasing concentrations at higher trophic levels). Most research has focussed on two main groups of contaminants: the persistent organic pollutants (POPs) and the heavy metals. However, there is some information on other contaminants including polyaromatic hydrocarbons (PAHs), butyl tins and perfluorinated chemicals (Hammond *et al.* 2006).

POPs accumulate in fatty tissues, are persistent and commonly resistant to metabolic degradation; they are often found in high concentrations in marine mammal blubber. They may affect the reproductive, immune and hormonal systems. Pierce *et al.* (2008) analysed concentrations of POPs in the blubber of female harbour porpoises stranded on the Atlantic coast of Europe from 2001-2003. Animals stranded on the Scottish coast showed lower concentrations of polychlorinated biphenyls (PCBs) than those from the southern North Sea coast, although were still above the threshold for effects on reproduction in a third of animals. The lowest levels of POPs were generally recorded in animals stranded on the Irish and Galician coasts. The same study showed porpoises which died from parasitic infection or disease to exhibit higher concentrations of POPs than those dying from other causes; in general, high concentrations of PCBs are thought to increase susceptibility to disease (Jepson *et al.* 2005) and parasite burdens (Bull *et al.* 2006) in harbour porpoise.

Cadmium, lead, zinc and mercury are the heavy metals of greatest importance in marine mammals (Hammond *et al.* 2006). They are frequently present in the highest concentrations in the liver, kidney and bone, with levels varying considerably with the geographic location of the species. Marine mammals are able to produce certain proteins (metallothioneins) which can sequester certain metal ions into less toxic complexes; this enables many species to cope with relatively high dietary exposures to certain metals. Whilst there are few studies that show major impacts of heavy metals, it is possible that they may have combined effects as they often co-occur with the persistent organic contaminants.

Fish are good metabolisers of PAHs, therefore fish-eating marine mammals commonly exhibit lower levels of PAHs than those feeding primarily on cephalopods, small crustaceans and plankton. Both cetaceans and seals contain enzyme systems which can detoxify PAHs, although this process itself may release new toxic substances within the animal. While short-term acute exposure to PAHs has been shown to cause damaging effects to marine mammals, little is known of the effects of long-term chronic exposure.

Limited sampling of bottlenose dolphins in the Moray Firth has shown levels of metal contaminants to be similar to those of other populations sampled worldwide. In the same population, organic contaminant levels were lower than those of coastal populations off the coast of Wales, Florida, Croatia, and Japan (Wilson *et al.* 1999b; Thompson *et al.* 2004).

Direct mortality of marine mammals from exposure to oil spills has rarely been reported, and has usually only been observed in major oil spills such as the *Exxon Valdez* in Alaska in 1989 (Hammond *et al.* 2006). Unlike seabirds, they generally rely on blubber for insulation,

so are less vulnerable to fouling from oil. Grey seal pups are the most vulnerable to oil fouling, as these rely on their thicker fur for insulation during the first few weeks of their life before developing blubber and moulting into a sea-going coat; they are also restricted to their breeding colony until they are weaned. A direct threat to marine mammals from oil slicks is the hydrocarbons and other chemicals that may evaporate from the surface of a slick at sea within the first few days. Both seals and cetaceans typically inhale just above the surface of the water, so any animal surfacing in a fresh slick is likely to inhale vapours. Symptoms from acute exposure to volatile hydrocarbons include irritation to the eyes and lungs, lethargy, poor coordination and difficulty with breathing; individuals may then drown as a result of these symptoms (Hammond *et al.* 2006).

The rapid and catastrophic decline of otters across much of the UK and Europe from the 1950s-1970s has been linked with, among other factors, an increase in the levels of certain contaminants, especially organochlorine pesticides (e.g. Jefferies 1989). Sufficient levels of such contaminants in vertebrates cause lethal and sub-lethal detrimental effects; contaminants entered water systems and accumulated in the tissues and organs of otters through the consumption of contaminated prey. The most significant declines in otters were observed in the southeast of England and the Midlands. Coastal otter populations are generally exposed to lower levels of contaminants, and have not experienced such catastrophic declines.

A3a.7.16.3 Disease

It is well known that marine mammals harbour large numbers of macroparasites, such as nematodes and cestodes as well as various ectoparasites (Hammond *et al.* 2006). However, these parasites do not usually cause severe harm unless the animals are suffering from an underlying primary disease or are stressed for other reasons. Outbreaks of viral and bacterial disease epidemics have occurred among seals and cetaceans worldwide; these appear to have increased in frequency in recent years, particularly in the U.S. (Harvell *et al.* 1999). In addition to high profile, large-scale epidemic diseases, marine mammals are also known to suffer from a range of viral and bacterial infectious diseases. A range of organisms has been cultured from healthy and sick marine mammals; many are secondary infections in malnourished and starving animals, particularly juveniles.

In UK and European waters, harbour seals suffered from major epidemics of PDV, a morbillivirus, in 1988 and again in 2002. The greatest mortality was observed on the English east coast, with 50% and 22% population declines respectively (Thompson *et al.* 2005); mortality in most Scottish colonies was low in 1988 and virtually zero in 2002 (SCOS 2007). The main cause of death from PDV is often secondary bacterial infection due to a weakening of the immune system; in the 1988 outbreak, *Bordetella* organisms were isolated from a large proportion of the sick animals but not found in healthy individuals (Munro *et al.* 1992, cited in Hammond *et al.* 2006). While PDV infection has been observed in grey seals, no substantiated fatal cases have been observed; it is believed that grey seals may act as carriers of the virus (Pomeroy *et al.* 2005, Hall *et al.* 2006).

Morbilliviruses (MV) are also observed in cetaceans, including harbour porpoises and dolphins where they are commonly referred to as PMV and DMV respectively. DMV caused mass mortality in Mediterranean striped dolphins in 1990 and US bottlenose dolphins in 1987. A survey of stranded animals of different cetacean species in Europe indicated that infections with DMV and PMV-like morbilliviruses are not uncommon among these mammals (Visser *et al.* 1993).

Post-mortem investigations of 89 porpoises found dead along the coasts of England and Wales revealed 37 individuals to have died of infectious diseases caused by parasitic, bacterial, fungal and viral pathogens (most frequently pneumonia caused by lungworm and bacterial infections) (Bennet *et al.* 2001). The remaining 49 animals were described as healthy before having suffered some form of physical trauma, most commonly entrapment in fishing gear.

Bottlenose dolphins occurring in the Moray Firth show a high prevalence of skin lesions (Wilson *et al.* 1997b). This has been suggested to be caused by environmental conditions impacting skin integrity or increasing physiological stress, potentially making animals more vulnerable to natural infections or anthropogenic factors (Wilson *et al.* 1999b).

Anthropogenic pathogens are largely found in marine mammals from effluents of untreated sewage or from facilities which contain domestic animals. For example, up to 11.8% of grey and harbour seals taken into rehabilitation centres on the east coast of England tested positive for *Salmonella* (Baker *et al.* 1995 cited in Hammond *et al.* 2006).

A3a.7.16.4 Bycatch

The accidental capture of marine mammals in fishing gear (bycatch) is an issue of current concern throughout European waters and beyond. Since 1993, the SMRU have been carrying out work towards determining bycatch rates of marine mammals in several fisheries in UK waters. The primary gear types that have been associated with marine mammal bycatch in the North Sea are set nets such as gill and tangle nets (Hammond *et al.* 2002a). These have been recorded ensnaring bottom feeding seals and cetaceans almost wherever they are used, and are most likely the primary anthropogenic source of marine mammal mortality in the marine environment.

Harbour porpoises are predominantly bottom feeding, and therefore particularly vulnerable to set bottom nets. Bycatch is recorded for gill and tangle nets, with the highest rates (animals per net km.hour) observed in the short nets that are set around wrecks in the central North Sea (Hammond *et al.* 2002a). The major fishing fleets involved in bottom set gillnetting and tangle netting in the North Sea are from Denmark, the UK and Norway, with lesser effort from Belgium and Germany.

At least approximately 5,000-6,000 porpoises per year are estimated to be killed as a result of bycatch in the North Sea; this is thought to exceed sustainable levels. The most recent estimates available suggest the vast majority of this bycatch to occur in Danish gill and tangle net fisheries of the North Sea (primarily southern and central North Sea), with around 5,500 animals killed annually (Vinther & Larsen 2002, cited in Hammond *et al.* 2006). While effort from these fisheries is concentrated in the Danish sector of the North Sea, some may still occur in UK waters. The much smaller UK fleet is estimated to take around 500 porpoises per year (ASCOBANS 2004). UK gill and tangle net fisheries operate predominantly in coastal waters, in the central southern North Sea and to the west of Shetland. Bycatch in the North Sea associated with German, Dutch and other states' fisheries have not been adequately documented; this lack of detailed information on the activities hinders assessment of the overall scale of bycatch in this area.

Bycatch of other small cetacean species in the North Sea have been recorded very rarely; information suggests that bycatch rates in the North Sea are unsustainable only for harbour porpoises (Hammond *et al.* 2002a). Some by-catch mortality of bottlenose dolphins associated with illegal salmon nets has been observed in Scotland (Thompson *et al.* 2004).

Bycatch levels in the Celtic Sea and Channel area are relatively high in comparison to other areas around the UK, due to the presence of large amounts of gillnetting, significant levels of pelagic trawling during the winter and high densities of harbour porpoise and common dolphin (Hammond *et al.* 2008). The number of porpoises currently caught in static nets in the region annually is unknown but is likely to be in the hundreds at least. In the western Channel, common dolphins seem particularly vulnerable to bycatch in pelagic pair trawls targeting bass in the winter months, when common dolphin densities are at a peak. Total mortalities in UK bass pair teams peaked at over 400 animals in the 2003-2004 winter, but have since declined to less than 100 in 2005-2006.

Since 2005, in accordance with European Council Regulation (EC) 812/2004, it has been mandatory for vessels over 12m involved in specified fixed gear fisheries (bottom-set gillnet or entangling net) in the North Sea to use acoustic devices ("pingers") attached to fishing gears. These are designed to deter cetaceans with a view to reducing bycatch. The regulation also requires the monitoring of by-catch of vessels $\geq 15\text{m}$ by on board observers in specified fisheries.

Hall *et al.* (2001) used the SMRU seal tagging database to estimate the minimum level of seal mortality from tags returned from seals found in fishing gear. They estimated that a minimum of around 2% of all seals tagged were subsequently killed in fishing gear, and it is thought that most of this mortality is in gill and tangle nets. While not strictly bycatch, fishery-related mortality of seals occurs due to the shooting of seals which interfere with fishing and aquaculture operations. Within the Moray Firth region, 2,804 seals were reported as shot over the period 1994-2002 - an average of 312 per year. Shootings dropped considerably in the latter half of 2002 with the introduction of a Conservation Order prohibiting the killing, injuring or taking of seals in Scottish waters. Subsequent legislation (see Section 3a.7.17.2) in 2004 and 2007 has further acted to reduce the shooting of seals, particularly harbour seals, on Orkney, Shetland and the east coast of Scotland. SEERAD currently maintain records of seals shot under licence in Scotland, although this is likely to represent only a small proportion of total anthropogenic mortality (SCOS 2007).

A3a.7.16.5 Other issues

Another potential source of mortality to marine mammals, primarily cetaceans, may be through collisions with vessels. In other parts of the world, whales are occasionally reported to be struck and killed, especially by fast-moving ferries. Smaller cetaceans can also be impacted by propeller strikes from smaller vessels. In areas cetacean numbers are depleted and vessels are numerous, ship-strike mortality can be a serious cause for concern. There are very few data with which to estimate the frequency of such events, and consequently this has not been identified as a significant source of additional mortality in UK waters; however, certain areas experience very high densities of commercial and recreational shipping traffic, some of which may be frequented by large numbers of marine mammals (Hammond *et al.* 2008).

On land, collisions between otters and motor vehicles can be a cause of considerable mortality (e.g. Kruuk & Conroy 1991, Philcox *et al.* 1999). In a study of patterns of otter road mortality in Britain, Philcox *et al.* (1999) identified coastal roads and those running alongside rivers in steep valleys a particular problem; especially coastal roads in the vicinity of freshwater streams. However, investigations of otter mortality in Shetland suggested food shortage to be the most common cause of death; high proportions of recorded deaths attributable to road mortality was believed to be an artefact of sampling methods (Kruuk & Conroy 1991).

Bat mortality has been reported around terrestrial wind turbines worldwide (e.g. Barclay *et al.* 2007, Arnett *et al.* 2008), with mortality most commonly associated with species migrating long distances (Kunz *et al.* 2007). Due to their excellent ability to detect moving objects through echolocation, their relatively high mortality at wind farms is surprising, and possible reasons for this have been the topic of much debate (Kunz *et al.* 2007, Baerwald *et al.* 2008). While direct collisions do occur, recent evidence has suggested barotrauma resulting from exposure to pressure differences in the vicinity of turbine blades to be a significant cause of death (Baerwald *et al.* 2008). Information on interactions between bats and offshore wind turbines is almost completely lacking. Ahlen *et al.* (2007) monitored bat behaviour around offshore wind farms in the Baltic and Kattegat; bats were observed foraging in close proximity to the turbines, feeding on accumulations of flying insects. However, no mention is made of observed collisions between bats and turbines.

A3a.7.17 Conservation frameworks

A3a.7.17.1 International

All species of cetacean, the European otter (*L. lutra*) and bats are listed on Annex IV (Animal and Plant Species of Community Interest in Need of Strict Protection) of the EU Habitats Directive⁴. Under Annex IV, the keeping, sale or exchange of such species is banned as well as deliberate capture, killing or disturbance⁵.

The harbour porpoise, bottlenose dolphin, grey seal, harbour seal and otter are also listed in Annex II of the Habitats Directive. Member countries of the EU are required to consider the establishment of Special Areas of Conservation (SACs) for Annex II species. In the UK, SACs have been established for the bottlenose dolphin in the Moray Firth, Scotland and in Cardigan Bay, Wales. No SACs have been established or formally suggested for the harbour porpoise at present. There are currently no exclusively marine SACs for grey or harbour seals in the UK, although a number of terrestrial SACs (with intertidal and/or marine components) have been established for these species around the coast. Numerous SACs have been established for otters throughout the UK, several of which contain marine components. Table A3a.7.9 lists these sites by each Regional Sea; maps showing the locations of these sites are provided in Section A3a.8.

Table A3a.7.9 - Special Areas of Conservation for Annex II marine mammals and otters by Regional Sea

Special Area of Conservation	RS	Bottlenose dolphin	Grey seal	Harbour seal	Otter
Yell Sound Coast	1, 8			●	●
Mousa	1			●	
Dornoch Firth and Morrich More	1			●	●
Moray Firth	1	●			
Firth of Tay and Eden Estuary	1			●	
Isle of May	1		●		
Berwickshire and North Northumberland Coast	1		●		
Humber Estuary	2		○		
The Wash and North Norfolk Coast	2			●	○
Isles of Scilly Complex	4		○		

⁴ Council Directive 92/43/EEC on the conservation of natural habitats of wild flora and fauna

⁵ See JNCC (in consultation) for information regarding the definition of disturbance.

Special Area of Conservation	RS	Bottlenose dolphin	Grey seal	Harbour seal	Otter
Lundy	4		○		
Camarthen Bay and Estuaries	4				○
Pembrokeshire Marine	4, 6		●		○
Cardigan Bay	6	●	○		
Lleyn Peninsula and the Sarnau	6	○	○		○
Murlough	6			○	
Strangford Lough	6			○	
South East Islay Skerries	7			●	
Mòine Mhór	7				○
Eileanan agus Sgeiran Lios mór	7			●	
Treshnish Isles	7		●		
Sunart	7				●
Loch Moidart and Loch Shiel Woods	7				○
Ascrib, Islay and Dunvegan	7			●	
South Uist Machair	7, 8				○
Loch nam Madadh	7, 8				●
Monach Islands	8		●		
North Rona	8		●		
Faray and Holm of Faray	8		●		
Sanday	8			●	

Notes: ● = species that are a primary reason for site selection, ○ = species that are present as a qualifying feature, but not a primary reason for site selection. RS = Regional Sea within which the site lies. Sites listed above featuring otter are those where otter have an association with the marine environment within the SAC, as defined by the JNCC. Source: JNCC website a

The UK has been a signatory to the Convention on the Conservation of Migratory Species (The Bonn Convention) since 1985. States are required to enter into agreement to protect migratory species throughout their entire range. ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas) was set up under the auspices of The Bonn Convention and came into force in March 1994. Under ASCOBANS, provision is made for protection of specific areas, monitoring, research, information exchange, pollution control and heightening public awareness. Measures cover the monitoring of fisheries interactions and disturbance, resolutions for the reduction of bycatch in fishing operations, and recommendations for the establishment of specific protected areas for cetaceans. Additionally, an agreement on the Conservation of Bats in Europe (EUROBATS) under the auspices of the Bonn Convention is in force, and all European bats are listed under Appendix II of the Convention.

Minke, fin, humpback, blue and northern bottlenose whales, along with otters (*L. lutra*) are all listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). These animals are classified as threatened with extinction; CITES prohibits international trade in specimens of these species for commercial purposes. Additionally, all cetaceans are listed under Appendix II of CITES; these animals are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. However, all cetaceans and otter (*L. lutra*) are listed on Annex A of the EU Wildlife Trade Regulations⁶ and are therefore treated by the EU as if they were on CITES Appendix I, thus prohibiting commercial trade (Murphy *et al.* 2008).

⁶ Council Regulation (EC) 338/97 on the protection of species of wild fauna and flora by regulating trade therein

The International Union for Conservation of Nature (IUCN)'s Red List of Threatened Species 2008 provides assessments of the conservation status of animals that have been globally evaluated using the IUCN Red List Categories and Criteria, with the aim of determining their relative risk of extinction. Where sufficient information exists, the majority of marine mammal species occurring in UK waters fall into the lowest category of 'least concern'. The Nathusius' pipistrelle bat is also described as 'least concern'. Otters (*L. lutra*) are in the next higher category of 'near threatened'. Of higher extinction risk are the 'threatened' categories: 'vulnerable', 'endangered' and 'critically endangered'. Sperm whale and hooded seal are described as 'vulnerable', while fin, sei and blue whales are listed as 'endangered'. 'Data deficient' species where assessment is precluded by insufficient information include killer whale, long-finned pilot whale, northern bottlenose whale and beaked whales of the genus *Mesoplodon*.

A3a.7.17.2 United Kingdom

In the UK, all species of cetaceans, bats and otter (*L. lutra*) are protected under Schedule 5 of the Wildlife and Countryside Act 1981⁷ (WCA 1981) and the Wildlife (Northern Ireland) Order 1985. Under WCA 1981, it is an offence (subject to exceptions) to intentionally kill, injure, or take, possess, or trade in any wild animal listed under Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. Amendments to the WCA 1981 in Scotland by the Nature Conservation (Scotland) Act 2004 made it an offence to intentionally or recklessly disturb a cetacean. The WCA 1981 is complimented by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), which implement the EU Habitats Directive in the UK. Amendments to the Conservation Regulations in England and Wales, and the introduction of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007⁸ (implementing the Habitats Directive beyond 12nm), have revised the definition of deliberate disturbance of European Protected Species (those listed on Annex IV of the Habitats Directive). Draft guidance on the implementation of these regulations has recently undergone consultation, with revised guidance expected in 2009 (see JNCC in consultation and JNCC website a). Additionally, whaling is illegal under the Fisheries Act 1981.

The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended) implement the EU Habitats Directive for all oil and gas activities within the UK Continental Shelf. Under these regulations, any company wishing to carry out a seismic survey must apply for consent, which, if granted, must be carried out in accordance with the JNCC guidelines for minimising acoustic disturbance to marine mammals from seismic surveys (JNCC 2004a).

The Conservation of Seals Act 1970 prohibits the killing or taking of seals by certain methods and during specified close seasons (breeding seasons); these are September to December for grey seals and June to August for harbour seals. The Conservation of Seals (England) Order 1999 extends this protection to any time of year for the counties of England bordering the North Sea, from Northumberland to East Sussex, and adjacent territorial waters. However, licences to kill seals may be granted for any time of the year for specific listed purposes (e.g. science and education; fisheries, seal, or conservation management; zoological collections). Additionally, seals may be killed at any time of the year, without licence, to prevent damage to fishing equipment or to fish held in a net, providing the seal is in the vicinity of the equipment at the time.

⁷ The Wildlife and Countryside Act (as amended) implements the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) which entered into force in 1982.

⁸ Currently only applicable in England and Wales.

Within the Moray Firth, a Conservation Order introduced in 2004 extended the close season to provide year-round protection for grey and harbour seals in this area. This Order formed the legal basis of the Moray Firth Seal Management Plan, which aims to manage both seal and salmon populations of conservation importance in the Moray Firth (Butler 2005). The Conservation of Seals (Scotland) Order 2007 was introduced in response to declining harbour seal populations in Scotland. Under this legislation, the killing, injuring or taking of harbour seals is prohibited throughout the year in territorial waters surrounding Orkney, Shetland and along the east coast from Garron Point (near Stonehaven) south to Torness Point (Firth of Forth).

UK Biodiversity Action Plan (UK BAP) was published in response to the Convention on Biological Diversity (Rio de Janeiro, 1992). It includes a number of specific plans for 1149 species and 65 habitats that have been listed as priorities for conservation action, in addition to numerous Local Biodiversity Action Plans (LBAPs) where partnerships identify local priorities and determine the contribution they can make to the delivery of the national species and habitat BAP targets (UK BAP website). Blue, fin, sei, and minke whale, in addition to otter, are all UK BAP priority species.