Agenda Item 6.1

Project Funding through ASCOBANS
Progress of Supported Projects

Document 6-08 rev.2

Interim Project Report: Review of Trend Analyses in the ASCOBANS Area

Action Requested

- Take note of the report
- Comment

Submitted by

Secretariat

NOTE:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

Secretariat's Note

Comments received by the author during the 17th Meeting of the ACOBANS Advisory Committee were incorporated in this revision.

REVIEW OF CETACEAN TREND ANALYSES IN THE ASCOBANS AREA

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1. Introduction

The 16th Meeting of the Advisory Committee recommended that a review of trend analyses of stranding and other data on small cetaceans in the ASCOBANS area be carried out. The ultimate aim is to provide on an annual basis AC members with an accessible, readable and succinct overview of trends in status, distribution and impacts of small cetaceans within the ASCOBANS Agreement Area. This should combine data sets of different stakeholders and countries.

2. Terms of Reference

To achieve the above aim of the project, a three-staged process was proposed:

Step 1:

- Identify where data of interest (e.g. stranding data, but also data on overall status and abundance, range changes, by-catch levels, mass mortality incidents, acoustic monitoring, fishing effort, sightings and species occurrence) exist and where analysis has already been conducted in Europe;
- Produce an overview of the sources and locations of the existing data;
- Identify major data gaps;
- Use the existing data sets that have already been analysed from different countries to make a synthesis to serve as a baseline review and summary for the Advisory Committee, containing appropriate references

Step 2:

- Conduct an appraisal of trends based on the existing data;
- Review the different formats of data existing in the different countries;
- Investigate the feasibility of standardising the reporting format;
- Investigate the options for developing a series of common databases

Step 3:

- Advise on the best format for data submitted by Parties;
- Propose a future project, which would include other data sources possibly with online real-time entry options

This present document addresses the objectives in Step 1.

3. Introduction to the Cetacean Fauna of the ASCOBANS Area

Thirty-five cetacean species have been recorded within the ASCOBANS Agreement Area. Of these, twenty-six species are small cetaceans within the sub-order Odontoceti for which the Agreement currently applies. A list of all species is given in Appendix 1. Seventeen species occur regularly (marked in bold in the Appendix), of which twelve are small cetaceans. Those are:

- Harbour porpoise
- Bottlenose dolphin
- Short-beaked common dolphin
- Striped dolphin
- White-beaked dolphin
- Atlantic white-sided dolphin
- Risso's dolphin
- Long-finned pilot whale
- Killer whale
- Northern bottlenose whale
- Sowerby's beaked whale
- Cuvier's beaked whale

They will form the focus of this trends review, although comments on other species will be made where appropriate. The number of species occurring in any particular ASCOBANS Range State varies, with increasing biodiversity from east to west as the influence of the Atlantic increases (see Appendix 2). Thus, Baltic countries have only one species, the harbour porpoise, occurring, and except in the westernmost part, this is now a rare, casual visitor whereas France and the British Isles have 9 and 11 regular species respectively (and 31 and 26 respectively, in total). A list of all species and their status is summarized by country in Appendix 3.

4. Sources & Locations of Existing Data

A great many organizations and institutes collect data on strandings, sightings, causes of mortality including by-catch, etc, although the diversity and quantity of effort varies between countries. The following is a brief summary of sources and locations of existing data, and the type of information collected, along with a review of the time periods those data cover. A list of references to every regional study would be exhaustive and so only the major ones from projects operating on a broader geographical scale are cited. Data sources are summarised by country in the following sections, with Parties (rather than Range States) covered. Major gaps in data collection are identified.

Over the last twenty years there has been a synthesis of sightings data involving collaboration from a number of countries within the ASCOBANS agreement area, from which distribution maps were produced to form an atlas (Reid *et al*., 2003). There has also been three international abundance surveys – SCANS in July 1994 covering the western Baltic, inner Danish waters, North Sea, Channel and Celtic Sea (Hammond *et al.*,

1995, 2002), and SCANS II in July 2005 covering the same areas but extending also to the waters west of the British Isles and Ireland, the Irish Sea, and shelf waters of France, Spain and Portugal (Hammond, 2008). In July 2007, the CODA survey covering European Atlantic offshore waters beyond the continental shelf from 61^{o} to 42^{o} N and 1^{o} to 8^{o} W (MacLeod & Hammond, 2008). Since these projects spanned several countries, they will not be referred to each time in the country summaries of information sources presented below.

4. Sources & Locations of Existing Data

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4.1 Belgium

Strandings & Post Mortem Studies In the 1960s to 1970s Wim De Smet undertook a literature study of historical records of strandings along the Flemish coasts (i.e. from Calais in France to the mouth of the river Scheldt in The Netherlands), and from the 1960s to 1980s routinely collected strandings data, in conjunction with the University of Antwerp and later with the Fisheries Research Station and a local veterinarian (Dr. John van Gompel). He undertook a series of reviews, which included records dating back to the Middle Ages (De Smet, 1974, 1979, 1981). From the 1970s onwards, strandings data in Belgium were collected by Van Gompel in collaboration with the Royal Belgian Institute of Natural Sciences (RBINS) and later with the University of Liège (Van Gompel, 1991, 1996).

In 1992, a government supported multidisciplinary research network was established (referred to as Marine Animals Research & Intervention Network or MARIN), coordinated by the Management Unit of the North Sea Mathematical Models (MUMM), a Department of the Royal Belgian Institute of Natural Sciences (RBINS). MUMM maintains a strandings database part of which can be consulted online (http://www.mumm.ac.be). A summary of strandings, sightings and by-catches of harbour porpoises is contained in Haelters & Camphysen (2009). Currently, post mortem studies are carried out on a selection of stranded animals, coordinated by Thierry Jauniaux from the Dept. of Veterinary Pathology at the University of Liège.

Sightings & Surveys Both De Smet and Van Gompel also collated sightings records, although cetaceans were rarely reported in Belgian waters between the 1960s and 1980s, and so records were few and anecdotal. No systematic surveys of Belgian waters have been conducted nationally, although since the 1990s, international surveys (e.g. SCANS

& SCANS II) as well as effort-based observations deriving from research groups operating out of neighbouring countries, have included Belgian waters, and observations of cetaceans were and are routinely recorded during seabird surveys performed by the Flemish Institute for Nature and Forest Research (INBO). More systematic and dedicated aerial surveys have been performed since 2008 in the framework of the monitoring of the effects of offshore windfarms.

Fishing Effort & By-catch Current fishing effort in Belgian waters in the context of by-catch is summarized by Haelters & Camphuysen (2009). An assessment of the proportion of stranded animals whose cause of death can be determined is attributable to by-catch, is made as part of the MARIN project. A very small-scale independent observer scheme is being performed in 2009 and 2010, in the framework of a project comparing environmental effects of beam trawl and static gear fisheries ('WAKO II').

4.2 Denmark

Strandings & Post Mortem Studies Effort in reporting of strandings has varied over the years. A major compilation of records of stranded, killed or by-caught cetaceans dating from 1575 to 1991 was published by Carl Kinze in 1995 (Kinze, 1995b), followed by periodic reviews for 1992-.97 (Kinze *et al*., 1998), and 1998-2007 (Kinze *et al*., 2010). Strandings are usually reported either to the Fisheries and Maritime Museum in Esbjerg, the Zoological Museum of the University of Copenhagen or the nearest forest dristricts of the Danish Nature and Forest Agency. Most strandings are just recorded and during the most recent years, only a limited number of specimens have been collected and necropsies only conducted on a handful of indivduals. Annual reports provide an overview of all reported marine mammal strandings.

Sightings & Surveys A sighting scheme (Projekt Marsvin) was first established in 1983, making use particularly of Danish ferry lines, run by Carl Kinze from the Zoological Museum, University of Copenhagen, in association with Danish Animal Welfare Society and WWF Denmark (Kinze, 1984; Kinze & Sørensen, 1984). It persisted until 1990, after which there was a gap before a new project (Fokus på Hvaler) started with Thyge Jensen and Carl Kinze from 2000 to 2003, from the Zoological Museum in Copenhagen and the Fisheries and Maritime Museum, Esbjerg. Since 2003, all sightings of non-phocoenid species and notable sightings of harbour porpoises have been registrered by Thyge Jensen and Carl Kinze through the homepage www.hvaler.dk.

The first systematic surveys were aerial ones conducted in the summers of 1991 and 1992 in the western Baltic and in the Danish North Sea (north of Sylt) in summer 1993 (Heide-Jørgensen *et al*., 1992, 1993). During the late 1980's and the 1990's, Ornis Consult undertook a number of seabird and cetacean surveys in Danish waters (Skov *et al*., 1994, 1995). Since 1999, several regional surveys from ship and airplane have been undertaken along with acoustic monitoring using T-PODs as part of the baseline and effect monitoring in relation to offshore energy installations at Horns Rev, Rødsand and Anholt (Carstensen *et al*., 2006; Tougaard *et al*., 2006a, b; Skov & Parnas, 2009). These wind farm studies have involved a number of organizations: Ornis Consult, The Fisheries and

Maritime Museum (Esbjerg), Zoological Museum (Copenhagen), DHI, Orbicon, and The Natural Environmental Research Institute (NERI) of Aarhus University.

Fishing Effort & By-catch The first reviews of incidental catches in fishing gear set within Danish waters were made by Clausen & Andersen (1988) and Kinze (1994), covering two periods: 1980-81 and 1986-89. The Danish Institute for Fisheries Research (DIFRES) undertook an independent observer scheme to monitor by-catch levels in the Danish North Sea set gillnet fishery between 1992 and 1998 (Vinther, 1999; Vinther & Larsen, 2002, 2004). In 2007-08, an independent observer scheme was instigated in the pelagic trawl fishery in the Danish Baltic and North Sea. In 2010, CCTVs were installed onboard six gillnet vessels in order to monitor bycatch of marine mammals and birds. The CCTV system will be covering the vessels 24 hours a day for one year, which will hopefully contribute to a more updated bycatch estimate (Lotte Kindt-Larsen, *pers. comm.*).

4.3 Finland

Strandings & Post Mortem Studies There is no formalized scheme reporting strandings. However, a compilation of porpoise strandings and by-catch (as well as sightings), forms a harbour porpoise registry, maintained by the Finnish Environment Institute. Most strandings have been recorded by the Finnish Museum of Natural History.

Sightings & Surveys In 2001, the Finnish Ministry of the Environment launched a campaign to improve awareness of the harbour porpoise, and encourage people to inform about any observations they had made. In 2006 the Finnish harbour porpoise working group finished its work and published "The harbour porpoise in Finland Suggested actions for the protection of the harbour porpoise in Finland" as a result of the work. One of this work was the compilation by University of Helsinki of 217 porpoise sightings of 314 animals from the years 1815 to 2005, with 21 since 2000 (Kujala, 2006). An earlier survey, covering the period 1870–1989, had 255 records of 423 animals (Määttänen, 1990). No systematic survey has been conducted in Finnish waters, but Finland is a participant in the EU LIFE+ funded Baltic porpoise acoustic monitoring project, SAMBAH, proposed for 2010-14.

Fishing Effort & By-catch The project compiling information on porpoises from Finnish waters resulted in records of 72 by-caught porpoises between 1850 and 2000 (Kujala, 2006). Earlier, Määttänen (1990) had found 87 cases of by-caught animals between 1870 and 1989. An independent observer scheme was implemented in 2006-07, and the result was a zero by-catch.

4.4 France

Strandings & Post Mortem Studies A national stranding scheme was first started by Raymond Duguy from the Musée Océanographique in La Rochelle in 1970, and has been run from La Rochelle ever since (the stranding network is known as Réseau National d'Echouages or RNE). When the Musée Océanographique was integrated within the

University of La Rochelle, RNE was coordinated by the Centre de Recherche sur les Mammifères Marins (CRMM). Currently it involves about 250 contributors from 50 different organizations. Stranding reports were produced annually for the years 1971 to 1991 (Duguy, 1972-92) and then from 1997 to the present (Van Canneyt et al., 1998b; Collet *et al.*, 1999, Van Canneyt, 2000-02; Van Canneyt & Doremus, 2003; Van Canneyt et al., 2004; Van Canneyt 2005, Van Canneyt & Peltier, 2006; Van Canneyt & Chauvel, 2007; Van Canneyt *et al*., 2008, 2009), with a review of the intervening period, 1992-97 (Van Canneyt *et al*., 1998a). Post-mortem studies are conducted by CRMM on a sample of fresh specimens.

Sightings & Surveys From 1976 onwards, the Muséum National d'Histoire Naturelle (MNHN) in Biarritz working with the Centre de la Mer Côte Basque (CMCB) have monitored seabird and cetacean relative abundance and distribution in coastal waters of the Bay of Biscay from ships of the French customs used as platforms of opportunity, following a line transect procedure.

Since 1990, incidental sightings in various parts of French waters have been collected by a number of organizations: Océanopolis (LEMM), CRMM, GECC (Groupe d'Etude des Cétacés du Cotentin, Cherbourg-Octeville), and GEFMA (Groupe d'Etude de la Faune Marine Atlantique, Capbreton).

Systematic summer and winter surveys of coastal bottlenose dolphins have been carried out along the coast of western Brittany by LEMM (Laboratoire d'Etude des Mammifères Marins, Océanopolis, Brest) since 1992, although effort has varied between years. Since 1995, GECC have been carrying out year-round surveys of cetaceans along the coasts of Normandy and across to the Channel Islands.

Aerial surveys (ROMER survey) have been conducted by CEBC-CNRS (Centre d'Etudes Biologiques de Chizé, CNRS, Chizé) from October 2001 to March 2002, in May 2003 and July 2004. In August 2002, an aerial survey (ATLANCET) of the coastal waters of the Bay of Biscay was also undertaken. In 2008, aerial surveys were carried out in west Brittany by LEMM in partnership with the Iroise Marine National Park (Parc Naturel Marin de l'Iroise, PNMI) using line transect protocols, to determine seasonal patterns of small cetaceans.

Since 2004, year-round systematic land-based observations of cetaceans have been collected from the eastern English Channel and Southern Bight of the North Sea by OCEAMM (Observatoire pour la Conservation et l'Etude des Animal et Milieux Marine).

CRMM and LIENS (Littoral, Environnement et Sociétés, CNRS, University of La Rochelle) have conducted vessel surveys over the shelf of the Bay of Biscay (May) since 2003 (PELGAS survey), and in the English Channel (January) since 2007 (IBTS survey) in conjunction with fish surveys by IFREMER (Institut Français pour l'Exploitation de la Mer, Brest) and IEO (Centro Oceanográfico de Vigo). From 2007 onwards, CRMM and IEO have collaborated to collect cetacean distribution data in April and September pelagic fish surveys in the south of the Bay of Biscay (PELACUS survey).

Fishing Effort & By-catch The first review of cetacean incidental capture by French fishing fleets, was made by Duguy & Hussenot (1982) covering the period 1971-81. However, it was ten years before any independent observer scheme was established. This was undertaken by IFREMER in the French drift gillnet fishery for albacore tuna and the gillnet fishery targeting monkfish in the western Channel and Celtic Sea during 1992 and 1993 (Morizur *et a*l., 1996). Since 2004, several observer schemes have been in place within the pelagic trawl fishery targeting anchovy, tuna and bass in the Bay of Biscay, Celtic Sea and English Channel (PETRACET & PROCET surveys, 2004-06). Since 2006, set gillnets in the Bay of Biscay as well as pelagic trawls in the Celtic Sea and Channel, are monitored with observers (OBSMAM survey 2006-2008 and OBSMER survey, 2009-2010). An observer programme (FilManCet) started in November 2008 in the English Channel, for set gillnet fisheries which are outside the monitoring driven by the EC regulation. Thus cetacean bycatch is now recorded for all gears and fisheries when observers are on board.

4.5 Germany

Strandings & Post Mortem Studies Reviews of information on cetaceans, particularly the harbour porpoise, in German waters, have been carried out by Schultz (1970), Kremer (1987), Schulze (1991, 1996), Benke *et al*. (1998), and Siebert *et al*. (2006).

Following the seal epidemic in 1988, a stranding network (including a year-round observer scheme) was established on the German coast of Schleswig-Holstein and Mecklenburg-Western Pomerania in 1990, involving beach patrols by members of several organizations. The scheme is described in detail by Benke *et al*. (1998). Animals are collected and necropsied by the Research and Technology Centre West Coast (FTZ) in Büsum, for Schleswig-Holstein, and by the German Oceanographic Museum, Stralsund, for Mecklenburg-Western Pomerania. Recording of strandings from Lower Saxony is more incidental than in the other two regions.

Sightings & Surveys In the late 1980s, FTZ initiated a sighting scheme, collecting incidental records from platforms of opportunity (for example, yachts, customs vessels, coastguards and passengers aboard ferries). Most of these were harbour porpoises, and records for the period 1990-2002 were used in a review of the status of the species (Siebert *et al*., 2006). Earlier reviews (Kremer, 1987; Schulze, 1996; Benke *et al*., 1998) also included some incidental sighting data.

Vessel surveys took place in the German North and Baltic Seas between 1990 and 1993 (Heide-Jørgensen *et al*., 1992, 1993), and between 2002 and 2006 in the North Sea (Rye *et al*., 2008). This was followed by aerial surveys in both seas in 1995 and 1996 (Siebert *et al*., 2006). Further aerial surveys of the German North Sea and southwestern Baltic were carried out between May and August 2002 (Berggren *et al*., 2004; Scheidat *et al*., 2004), and then at different seasons between 2002 and 2006 (Scheidat *et al*., 2008; Gilles *et al*., 2009). Aerial surveys are continued on a regular basis in both seas as part of a national monitoring scheme (U. Siebert, *pers. comm.*).

Acoustic monitoring of porpoises using T-PODs has been in operation in the North Sea by the FTZ from 2002 to 2006 (Rye *et al*., 2008) and by BioConsult from 2005 to 2006 (Diederichs *et al*., 2008), and from 2002 to 2007 in the Southwestern Baltic (Verfuß *et al*., 2007, 2008; Diederichs *et al*., 2008), both in connection with offshore wind farm developments (at Horns Reef and Nysted respectively). Germany is a participant in the EU funded Baltic porpoise acoustic monitoring project, SAMBAH, proposed for 2010-14. There has also been an acoustic study (using three C-PODs) by BioConsult in the Lister basin, Inner Wadden Sea area east of Sylt since August 2009 (Germany Annual National Report to ASCOBANS, 2010).

Fishing Effort & By-catch Investigations on harbour porpoise by-catch (mainly from the North Sea set gillnet fishery) by the University of Kiel began in the late 1980s, with a reporting and collection scheme and has continued ever since (Benke, 1994; Kock & Benke, 1996; Flores & Kock, 2003). The organizations GSM, GRD and NABU have also recently reviewed by-catch of harbour porpoises in the Baltic coastal waters of Angeln and Schwansen (Schleswig-Holstein) (Koschinski & Pfander, 2009). No independent observer scheme has ever been in place in German waters, but it is proposed that marine mammal observers will go aboard German fisheries from the fourth quarter of 2010 (K.-H. Kock, *pers. comm.*).

4.6 Lithuania

Strandings & Post Mortem Studies Cetaceans only very rarely strand (two records of porpoise in the last ten years, both between 2000 and 2005, were by-caught – Coalition Clean Baltic, 2006) on the Baltic coast of Lithuania so that a strandings scheme is clearly not appropriate. Information of strandings comes from the Lithuanian Sea Museum, Lkajpeda (Saulius Karalius & Arunas Grusas).

Sightings & Surveys There has been just one sighting record (of a porpoise during the 1980's) in Lithuanian waters (Coalition Clean Baltic, 2006). No dedicated sightings surveys have been undertaken. Six T-PODs were deployed along the coast of Lithuania at different pre-selected locations since 2007, but so far no porpoises have been detected (Lithuania Annual National Report to ASCOBANS, 2010). Lithuania is a participant in the EU funded Baltic porpoise acoustic monitoring project, SAMBAH, proposed for 2010-14.

Fishing Effort & By-catch There has never been an observer schemes in place in Lithuanian waters, although clearly cetacean by-catch can take place, as evidenced from the two specimens that have been recovered, noted above.

4.7 The Netherlands

Strandings & Post Mortem Studies Annual reporting of strandings on the Dutch coast started in 1942 (not counting some earlier publications) by Antonius Boudewijn van Deinse and continued through to his death in 1965 (Van Deinse, 1931, 1946b, 1943-66).

However, he considered harbour porpoises too abundant to document, so actual numbers of that species stranding were not recorded. There followed a gap in systematic recording until 1970 when strandings reports were initiated again, first by P.J.H. van Bree and A.M. Husson of the Amsterdam and Leiden Museums, respectively, and then by Chris Smeenk from the National Museum of Natural History (now Netherlands Centre for Biodiversity [NCB] Naturalis) in Leiden (Husson & Van Bree, 1972, 1976; Van Bree & Husson, 1974; Van Bree & Smeenk, 1978, 1982; Smeenk, 1986, 1989, 1992, 1995, 2003; Bakker & Smeenk, 1990; Addink & Smeenk, 1999). After Smeenk's retirement in 2005, the strandings data were digitized by C.J. (Kees) Camphuysen, and are currently collected and stored by NCB Naturalis. They are available online (***http://www.walvisstrandingen.nl***), and published periodically (Camphuysen et al., 2008). Recent reviews that include graphs of strandings on the Dutch coast are contained in Camphuysen & Peet (2006), Camphuysen et al. (2008), and, specifically for the harbour porpoise, in Leopold & Camphuysen (2006) and Haelters & Camphuysen (2009).

Sightings & Surveys The first observations of live cetaceans in Dutch waters were made by Jan Verwey of the (now Royal) Netherlands Institute for Sea Research (NIOZ) in the Marsdiep region (Verwey, 1975) off Den Helder. Although not collected in a particularly systematic manner, they covered the period 1931-73, and though confined to land-based watching, they provided information on seasonal occurrence of harbour porpoise and bottlenose dolphin in this nearshore area. From the 1970s onwards, cetaceans were recorded during seabirds at sea surveys by Dutch ornithologists in the southern North Sea (Camphuysen & van Dijk, 1983; Camphuysen & Leopold, 1993; Camphuysen, 1994, 2004; Camphuysen & Peet, 2006). However, very few sightings of cetaceans were made between 1970 and the mid 1980s (Camphuysen, 1982; Camphuysen & Peet, 2006; Van der Meij & Camphuysen, 2006; Haelters & Camphuysen, 2009).

Aerial surveys of Dutch waters, targeting seabirds but also recording cetaceans, have been conducted by the Ministry of Agriculture, Nature and Food Quality (LNV) and the Ministry of Transport, Public Works and Water Management (Department of Rijkswaterstaat, RWS) since the 1980s (Baptist, 1987; Witte *et al*., 1998), but it has only been since 2008, that distance-sampling methodology has been applied on flights, to derive abundance estimates (Scheidat & Verdaat, 2009). Vessel acoustic surveys using towed hydrophones started in Dutch waters in 2006, to identify candidate Special Areas of Conservation (SACs) for the harbour porpoise. Both vessel surveys and the deployment of T-PODs undertaken by IMARES have been used to obtain baseline data from the vicinity of an operating offshore windfarm near Egmond aan Zee during 2008 and 2009 (The Netherlands Annual National Report to ASCOBANS, 2010).

Fishing Effort & By-catch Fishing effort in Dutch waters in the context of porpoise by-catch is summarized by Haelters & Camphuysen (2009). Post mortem studies identifying animals that were by-caught have been conducted since the 1990s (García Hartmann *et al*., 2004; Leopold & Camphuysen, 2006; Camphuysen *et al*., 2008; IMARES/NIOZ, unpubl. data). In 2008, a monitoring programme aboard vessels was initiated, financed by the Ministry of Agriculture, Nature and Food Quality (LNV), for

part of the set net fishery (mainly trammel nets for flatfish and cod, but also tangle nets for sole and gill nets for cod) in the southern North Sea and Channel as well as pelagic trawls for blue whiting along the shelf edfge (Couperus, 2009). Prior to that, there had been no such monitoring.

4.8 Poland

Strandings & Post Mortem Studies There is no official stranding scheme in Poland. Hel Marine Station collects opportunistic stranding reports. Between 1990 and 2009, 28 strandings were reported (at the same time there were 64 cases of bycatch and 16 sightings). A compilation of available opportunistic reports on bycatch, strandings and sightings has been made by the Hel Marine Station, University of Gdansk, covering the period 1950- 2005 (Skóra & Kuklik, 2003; Coalition Clean Baltic, 2006), and the Station currently collects records within the country. Of the 116 porpoises reported between 1950 and 2005, 87 have been reported since 1990 (Coalition Clean Baltic, 2006). There have been a further 14 between 2006 and 2009 (I. Pawliczka, pers. comm.). Of the 87 porpoises reported between 1950-2005, 63 were bycaught. Since 2006, a further twohave been reported as bycaught. Post mortem studies have been conducted on the majority of bycaught animals but full authopsies and analyses were conducted on only a limited number.

Sightings & Surveys A status review of porpoises in Polish waters was made by Skóra *et al*. (1988), whilst records of all cetaceans between 1979 and 1990 were summarised by Skóra (1991). Since the 1990s, Hel Marine Station has mounted a major public awareness campaign, which has resulted in increased reporting of animals. Although the great majority of these were dead (either stranded or by-caught), ten sightings were made between 1990 and 1999 (Skóra & Kuklik, 2003).

An aerial survey of the southwestern Baltic in the summer of 2002 had limited coverage of Polish waters, but did not sight any animals in this region (Berggren *et al*., 2004). A towed acoustic vessel survey was conducted in August and September 2001 but no porpoises were corded in the Polish sector (Gillespie *et al*., 2005). Polish waters were also included in the SCANS II survey in 2005. In this context, in Polish waters the effectiveness of an active hydroacoustic detection of porpoises in areas of low density was tested and no individual was recorded.

Following these surveys a method of passive acoustic surveys has been implemented in limited areas of the Polish Baltic. Since 2005, T-PODs have been deployed in Puck Bay to monitor the presence of porpoises in that area. From 2010 to 2014, Poland is participating in an EU LIFE+ co-funded project on static acoustic monitoringof Baltic porpoise, SAMBAH, which will cover the entire Baltic Sea proper within the depth range of 5-80m.

Fishing Effort & By-catch Reviews of by-caught animals reported to Hel Marine Station have been made by Skóra & Kuklik (2003) and Coalition Clean Baltic (2006). Of the 116

dead porpoises reported in Polish waters between 1950 and 2005, 79 (68%) were recorded as by-caught (Coalition Clean Baltic, 2006). This represents a minimum figure because the number covers only voluntary reported bycatch. At present, Poland has an observer scheme as prescribed by Regulation 812/2004. However, this observer scheme is not well targeted to those fisheries affecting harbour porpoises.

4.9 Sweden

Strandings & Post Mortem Studies A review of all records of harbour porpoises found in the period 1973-87, and collected by Swedish museums, was first made by Lindstedt & Lindstedt (1988). These involved the Museum of Natural History in Stockholm, the Museum of Natural History in Göteborg, and the Zoological Museum in Lund. In the summer of 1988, a project started with the aim of collecting all dead harbour porpoises found in Sweden, either from strandings or as by-catches from fishing gear (Lindstedt & Lindstedt, 1988). Material was collected by the Museum of Natural History in Göteborg. Since 1990, post mortem investigations have been carried out on all fresh stranded and by-caught small cetaceans in Swedish waters by the Swedish Museum of Natural History in Stockholm. Tissue samples are taken and stored in the Environmental Specimen Bank at the Swedish Museum of Natural History, although for the Swedish west coast, in most cases, only a piece of tissue from the dorsal fin is sampled.

Sightings & Surveys In 1987, the University of Stockholm designed a questionnaire survey to collect information on sightings covering the period 1950-80 (Berggren & Arrhenius, 1995a). An observer network reporting sightings was established by Per Berggren and Fredrik Arrhenius in summer 1988 and this ran until 1992 (Berggren & Arrhenius, 1995a). Dedicated vessel surveys were made along the west coast of Sweden in the summers of 1988 and 1989, and in 1989, an aerial survey also took place (Berggren & Arrhenius, 1995a). This was followed by a series of strip transect aerial surveys in the Skagerrak and Kattegat Seas between June and October 1991 (Berggren & Arrhenius, 1995b). In addition to the surveys of coastal waters off the west coast of Sweden during SCANS (July 1994) and SCANS II (July 2005), vessel surveys using acoustics were conducted in 2007 to identify high density areas for harbour porpoises (Teilmann *et al.* 2008). Aerial surveys covering the Baltic region off southern Sweden were undertaken in summer 1995 and 2002 (Hiby & Lovell, 1996; Berggren *et al.*, 2004). Acoustic surveys in the Baltic region were also conducted in 2001 and 2002 to determine harbour porpoise relative abundance in the Baltic region (Gillespie *et al.*, 2005).

Since 2006, Mats Amundin from Kolmårdens Djurpark has undertaken some acoustic monitoring for porpoises in Swedish Baltic waters, and is currently heading the EU funded Baltic porpoise acoustic monitoring project, SAMBAH, planned to cover coastal waters (5-50m depth) in the entire Baltic Sea proper between 2010 and 2014.

Fishing Effort & By-catch An evaluation of the impact of by-catch on porpoises in Swedish waters was first made by Lindstedt & Lindstedt (1988) from interviews with fishermen and collection of bodies, covering the period 1973-87. This was followed up with more detailed analyses by Berggren (1994) for the period 1973-93, and Berggren *et*

al. (2002) that calculated potential limits to anthropogenic mortality for porpoises in the Baltic region. To estimate the number of harbour porpoise bycaught in the Skagerrak and Kattegat Seas, an observer program operated in the Swedish bottom set gillnet fishery for cod (*Gadus morhua*) and pollack (*Pollachius pollachius*) in 1995–97 (Carlström, 2003). A field experiment using acoustic alarms (pingers) to reduce harbour porpoise by-catch in bottom set gill-nets was conducted in the Swedish Skagerrak Sea in 1997 (Carlström *et al.* 2002).

In 2001, an interview survey of by-catch was undertaken for the Swedish Skagerrak, Kattegat and Baltic by the Swedish Board of Fisheries (Lunneryd *et al*., 2004). Since August 2006, an independent observer scheme has been in place, operating on pelagic trawlers (exceeding 15 m length) in the North Sea, Skagerrak, Kattegat, southern, eastern and northern Baltic. This is run by the Swedish Board of Fisheries, who are also investigating by-catch in the recreational fisheries (set nets and traps) in Sweden.

4.10 United Kingdom

Strandings & Post Mortem Studies A stranding recording scheme was established in the UK in 1913 and has continued ever since, with records collated by the London Natural History Museum (Harmer, 1914-27; Fraser, 1934, 1946, 1953, 1974; Sheldrick, 1989; Sheldrick *et al*., 1992, 1994; Muir *et al*., 2000). Since 1990, the stranding scheme has formed part of a coordinated investigation funded by the then UK Department of the Environment that includes post mortem studies of causes of death. This has become known as the Cetacean Standings Investigation Programme (CSIP), and is currently coordinated by the Institute of Zoology (IoZ) in London. A series of reports have been produced from CSIP (Bennett *et al*., 2000; Scottish Agricultural College, 2000; Sabin *et al*., 2003-06; Jepson, 2005; Deaville and Jepson, 2007-09). Strandings coordinators exist for Scotland (Scottish Agricultural College, Inverness; contact: Bob Reid) and Wales (Marine Environmental Monitoring, Cardigan; contact: Rod Penrose), whilst the Institute of Zoology in London covers both England & Wales, and reviews all UK strandings information (contact: Rob Deaville).

Sightings & Surveys Live sightings of cetaceans in UK (and Irish) waters were first collated in the late 1960s by Peter Evans. A sightings observer network was established in 1973, taking advantage of sea-watching ornithologists, under the auspices of the Cetacean Group within the UK Mammal Society. This later developed into the Sea Watch Foundation (SWF) in 1991. Periodic reviews of sightings have been made since the 1970s (Evans, 1976, 1980, 1992; Evans *et al*., 1986, 2003). The first systematic survey for cetaceans in UK waters was conducted in summer 1980 (Evans, 1981). During the 1980s and 1990s, the UK Nature Conservancy (later to become the Joint Nature Conservation Committee) undertook wide-ranging surveys targeting seabirds but also recording cetaceans, largely using platforms of opportunity. These surveys were conducted in response to oil and gas exploration. Effort shifted between time periods from the North Sea to the West of Britain, then the Irish Sea and then offshore along the continental shelf slope, termed the Atlantic Frontier. From these surveys, a series of reviews were produced (Blake *et al*., 1984; Tasker *et al*., 1987; Webb *et al*., 1990;

Pollock *et al*., 1997, 2000). Offshore observations from MMOs employed by the seismic industry have also been collated for the years 1996-2002 (Stone, 1997, 1998, 2000, 2001, 2003a, b, 2006).

During the 1990s and 2000s, a number of regional surveys have been undertaken, in some cases over a period of years. These include the Shetland Isles and west of Scotland by SWF; the west of Scotland by Sea Life Surveys (SLS) and the Hebridean Whale & Dolphin Trust (HWDT); the Moray Firth by the University of Aberdeen, Conservation Research & Rescue Unit (CRRU) and Whale & Dolphin Conservation Society (WDCS); the Moray Firth and Grampian coast by Sea Watch Foundation (SWF), ferry routes in the North Sea by Organisation Cetacea (ORCA), MarineLife, the University of Aberdeen and SWF; the English Channel by Santander Ferry Survey, Biscay Dolphin Research Programme (BDRP)/MarineLife, Earthkind, Greenpeace UK, and SWF; and the Irish Sea by SWF, WDCS, Greenpeace UK, Sea Trust SW Wales, Marine Awareness North Wales (MANW), and Manx Whale & Dolphin Group (MWDW) (see Evans *et al*., 2008, for a review).

Fishing Effort & By-catch Information on by-caught cetaceans in UK waters was first collated in the late 1980s by Simon Northridge (Northridge, 1988), with additional records summarized by Evans (1993). The first efforts to record by-catch levels from an independent observer scheme started in the 1990s in the Celtic Sea (Tregenza *et al*., 1997a, b; Tregenza & Berrow, 1997; Tregenza & Collet, 1998; Northridge *et al*., 2000). Between 1996 and 2000, independent observers were employed to estimate porpoise by-catch rates in gillnet fisheries in the North Sea (Northridge & Hammond, 1999; Northridge *et al*., 2003). Since 2001, by-catch monitoring in set nets has been focused on the southwest of Britain, as has monitoring of the bass pelagic pair trawl fishery during the winter fishing seasons, although monitoring has taken place mainly of pelagic trawls targeting mackerel and herring in the northern North Sea (DEFRA, 2003, 2007; SMRU, 2007; ICES, 2008). Monitoring of by-catch from UK fisheries is coordinated by the Sea Mammal Research Unit (contact: Simon Northridge), based at the University of St Andrews, Scotland (Northridge & Thomas, 2003; SMRU, 2006, 2007, 2008, 2009).

5. Review of Trends in Status, Distribution & Impacts

5.1 *Belgium*

The harbour porpoise is the most common species occurring regularly in Belgian waters, although regular sightings are made of white-beaked dolphins. Sightings of bottlenose dolphins are exceptional. Harbour porpoises were thought to be common during the first half of the 20th century but between the 1960s and 1980s, the species became scarce, with only 21 strandings recorded in a twenty-year period (1970-89) (De Smet, 1974, 1981; Van Gompel, 1991). From the mid 1990s, the number of stranded porpoises steadily increased from an average of 6/yr in the 1990s to 49/yr in the early 21st century (Van Gompel, 1996; MUMM database; Haelters & Camphuysen, 2009; see Fig. 1). Incidental sightings records also increased sharply from around 2000 (MUMM database; Haelters & Camphuysen, 2009; Fig. 2). Although this may have been partly due to increased public

awareness, sightings gathered from INBO also demonstrated an increase in Belgian waters over this period (Courtens *et al*., 2008).

Sightings (mainly from nearshore) show a strong seasonal peak between February and April, with very few sightings reported between May and December; strandings peak in March to May but also in August (Haelters & Camphuysen, 2009). However, strandings in the summer months are mainly newborn or very young animals or very decomposed animals that may have drifted in from further offshore (Haelters & Camphuysen, 2009).

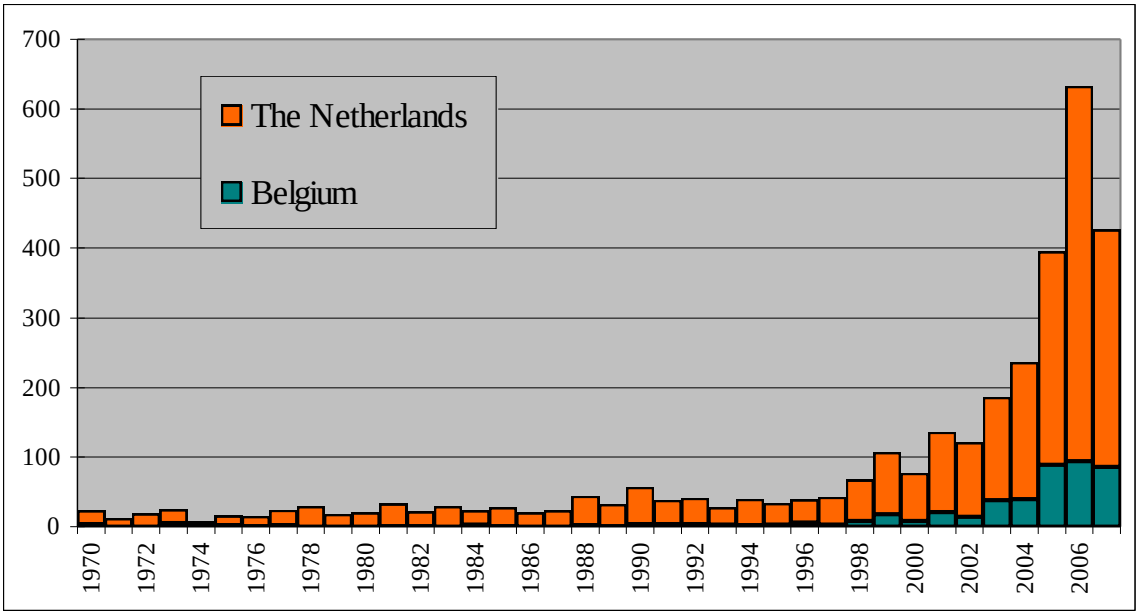

Fig. 1. Annual number of stranded harbour porpoises recorded in Belgium and the Netherlands from 1970 to 2007 (from Haelters & Camphuysen, 2009)

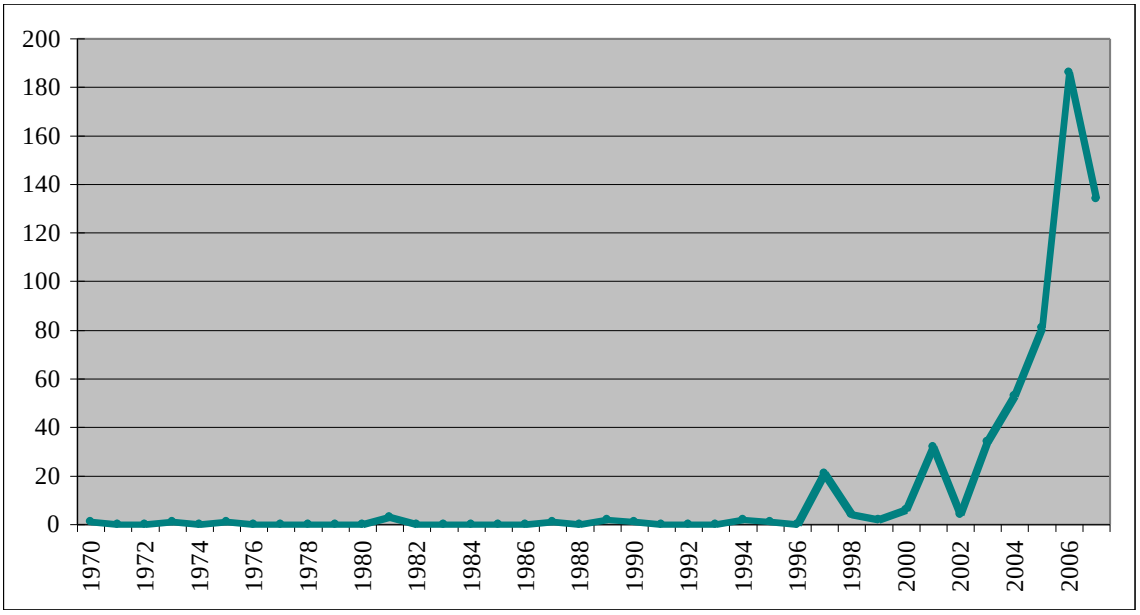

Fig. 2. Annual number of porpoises reported by the public from 1970 to 2007 in Belgian waters (anecdotal sightings only) (from Haelters & Camphuysen, 2009, derived from MUMM database)

Since the clear increase in stranded animals from 1999 onwards, by-catch has been identified as the cause of death in at least 97 cases (Jauniaux *et al*., 2008; Haelters & Camphuysen, 2009). Since 2003, the annual by-catch rate of porpoises for those animals where cause of death can be determined, has ranged from 19 to 63% (Fig. 3). By-caught animals show a strong seasonal peak in March and April. Occasionally, cetaceans are recovered with signs of ship strike. These include a fin whale in September 2009 (Belgium Annual Report to ASCOBANS, 2010).

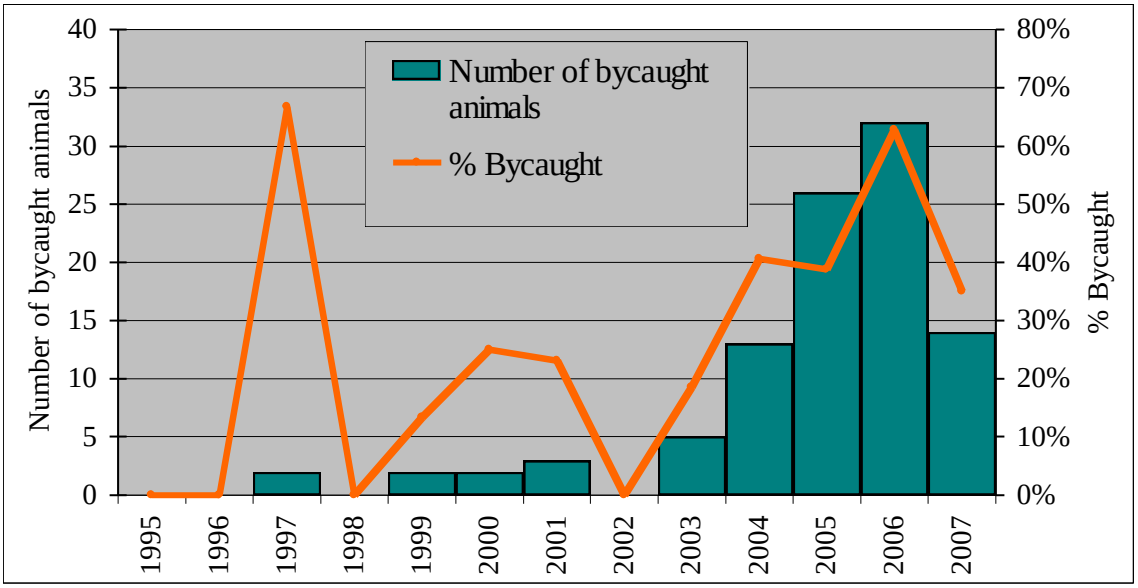

Fig. 3. Number and percentage of stranded cetaceans diagnosed as having been by-caught in Belgium between 1995 and 2007 (from Haelters & Camphuysen, 2009)

5.2 *Denmark*

The harbour porpoise is by far the commonest cetacean species in Danish waters. However, other species that occur regularly though in small numbers include the white-beaked dolphin and minke whale. White-beaked dolphins are quite common on Fisher Bank and Jutland Reef, and calves have been recorded here so they are likely breeding (H. Skøv, *pers. comm.*). A comparison of stranding rates for the last three decades showed a steady increase in white-beaked dolphin strandings (1.9/yr for 1978-87; 4.2/yr for 1988-97; and 7.6/yr for 1998-2007) (Kinze *et al*., 2010). Minke whale strandings also increased from 0.6/yr in the previous two decades to 1.8/yr between 1998-2007 (Kinze *et al*., 2007). The number of porpoise strandings in Denmark in 2007 was 94, 223 in 2008, and 137 in 2009 (Danish Annual Report to ASCOBANS, 2010).

First records for Danish waters included striped dolphin (January 1998) and Bryde's whale (September 2000), and Risso's dolphin was recorded for the first time since 1938. Atlantic white-sided dolphin (0.6/yr) and short-beaked common dolphin (0.8/yr) were recorded stranding at significantly increased rates compared with previous decades

(Kinze *et al*., 2010). The two SCANS surveys indicated a marked decline in numbers of harbour porpoises in Inner Danish waters between 1994 and 2005. For the Kattegat, Belt Sea and western Baltic Sea, the abundance estimate was 22,127 (CV=0.28) in 1994 and 13,600 (CV=0.33) in 2005, using density surface modeling (Teilmann *et al*., 2008). When Skagerrak is added to this area (area 1 in Hammond *et al*., 2002), the density surface modeled abundance estimate for 1994 is 31,715 (CV=0.25) porpoises and for 2005, 15,557 (CV=0.30) porpoises (Hammond, 2008). Due to large confidence limits, this 38-51% decrease was not statistically significant but nevertheless gave reason for concern (Teilmann *et al*., 2008). Porpoises occur year-round in inner Danish waters, and are considered a separate management unit to those in the North Sea and Baltic proper (Evans & Teilmann, 2009; Wiemann *et al*., 2010).

The most recent estimate of cetacean by-catch in Danish waters comes from the years up to 2001-02, presented by Vinther & Larsen (2004). They estimated an annual by-catch of 5,591-5,817 porpoises in the Danish bottom set gillnet fishery. The former figure is based on landings as used by Vinther (1999) and the latter is extrapolated from by-catch rates determined from observers between 1992 and 1998, accounting for fleet effort. By-catch may have been overestimated due to use of pingers in the cod wreck net fishery not being accounted for (Vinther & Larsen, 2004; Reijnders *et al*., 2009). Gillnet effort has changed substantially since 2002, with a decrease of c. 50% on exmination of the Danish official logbooks (Lotte Kindt-Larsen, *pers. comm.*).

5.3 *Finland*

The harbour porpoise was considered fairly common in Finnish waters before the 1940s, since when there has been a drastic decline (Määttänen, 1990). Pollution, by-catch, habitat degradation and harsh winters are all thought to have contributed to this decline.. Between 2000 and 2005, there were 21 sightings of harbour porpoise reported, with the introduction of a sightings scheme (Kujala, 2006). In 2006, there was just one sightings report, but in 2007 there were three sightings comprising eight animals, with a further two sightings totalling six individuals in 2008 (Finland Annual National Reports to ASCOBANS, 2006-08), and five in 2009 (Finland Annual National Report to ASCOBANS, 2010). No porpoise by-catch has been recorded in recent years, although this may be due to under-reporting by fishermen.

In July 2006, a humpback whale was observed in Bothnian Bay (Himanks), and in November 2006, a female common dolphin with her suckling calf were sighted off Korppo in the Archipelago Sea, but two weeks later were both found drowned in a salmon net (Finland Annual National Reports, 2006-08). Both species have been seen increasingly in the North Sea, extending into the Baltic, in recent years.

5.4 *France*

Between 1970 and 1986, the French national stranding scheme recorded 1,571 cetaceans, of which 1,496 were odontocetes (excluding sperm whale) (Collet, 1987). These included a small number from the French Mediterranean coast. The most common species

recorded were common dolphin (501+), striped dolphin (285+) and long-finned pilot whale (181 in descending order of frequency. 240 animals were identified only to the family Delphinidae. Strandings of bottlenose dolphin (79) and harbour porpoise (52) were comparatively rarely recorded.

Numbers of strandings along the French Channel coast fluctuated at a low level with no systematic trend until the start of the twenty-first century, when numbers increased markedly in 2002 (Van Canneyt, 2000-02, 2005; Van Canneyt & Doremus, 2003; Van Canneyt *et al*., 2004; Van Canneyt & Peltier, 2006; Van Canneyt & Chauvel, 2007; Canneyt *et al*., 1998a, 2004, 2008, 2009; see Fig. 4). Most of this increase was accounted for by a sharp increase in porpoise strandings over that period (Fig. 6), along with a mass stranding of 52 common dolphins in 2002 (Van Canneyt & Doremus, 2003; Fig. 8).

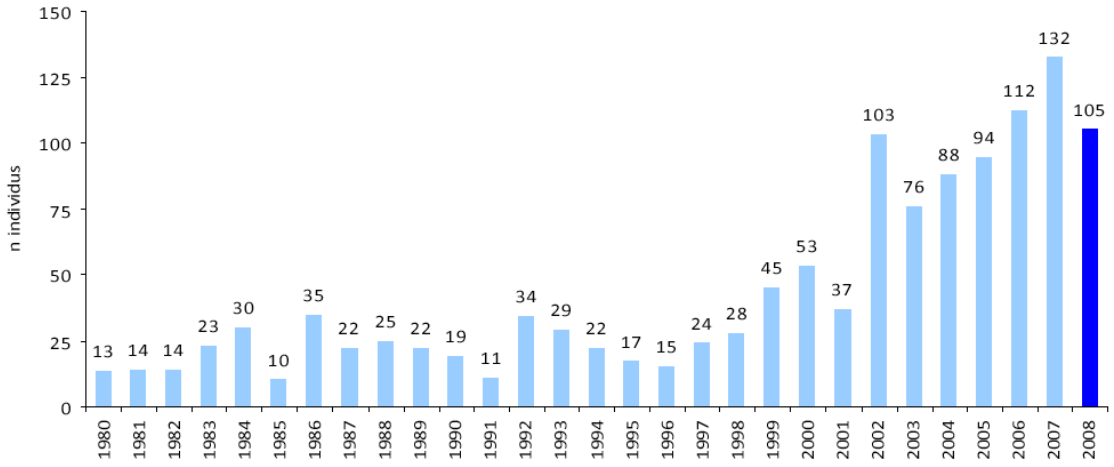

Fig. 4. Strtandings trends along the Channel coast of France (from Van Canneyt *et al.*, 2009)

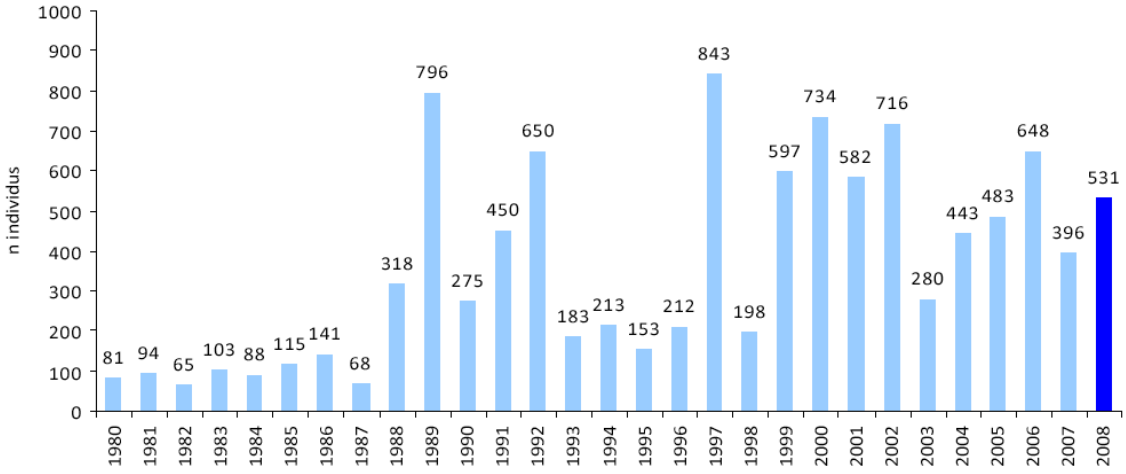

Fig. 5. Strtandings trends along the Atlantic coast of France (from Van Canneyt *et al.*, 2009)

Strandings of cetaceans along the Atlantic coast of France fluctuated, with strong peaks in 1989, 1992, 1997, 1999-2002, and 2006 (Fig. 5). Those peaks tended to coincide with high numbers of common dolphin strandings (Fig. 9), although in 2006, there were also unusually large numbers of porpoise strandings (Fig. 7).

The recent increase in strandings of harbour porpoises along both the Channel and Atlantic coasts of France since 2002 has been mirrored by increases in sightings particularly in northern parts of France (Kiszka *et al.*, 2004, 2007).

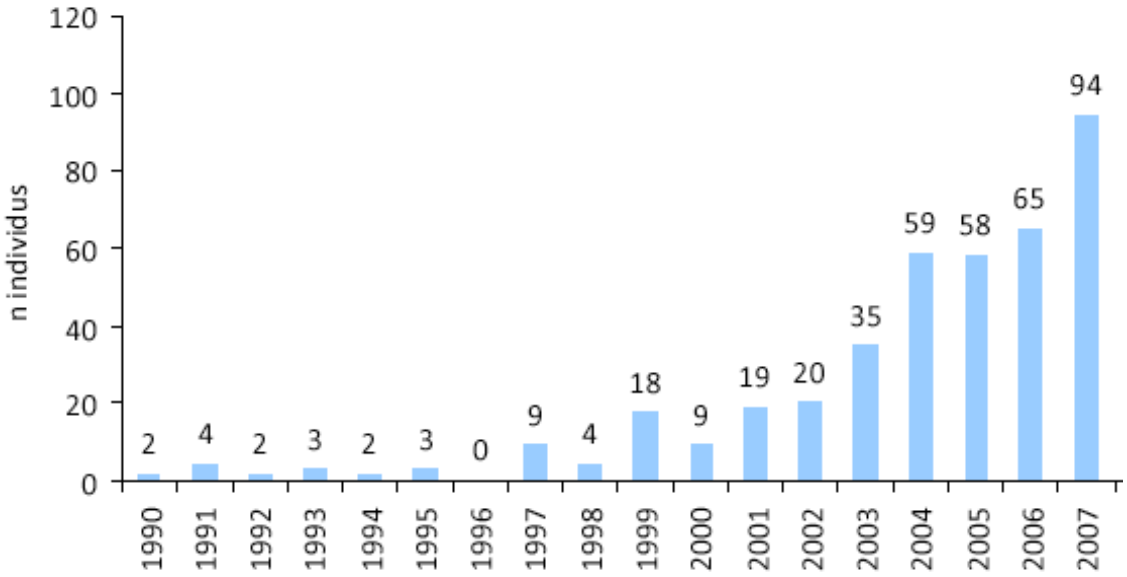

Fig. 6. Harbour Porpoise strtandings trends along the Channel coast of France (n=474) (from Van Canney *et al.*, 2009)

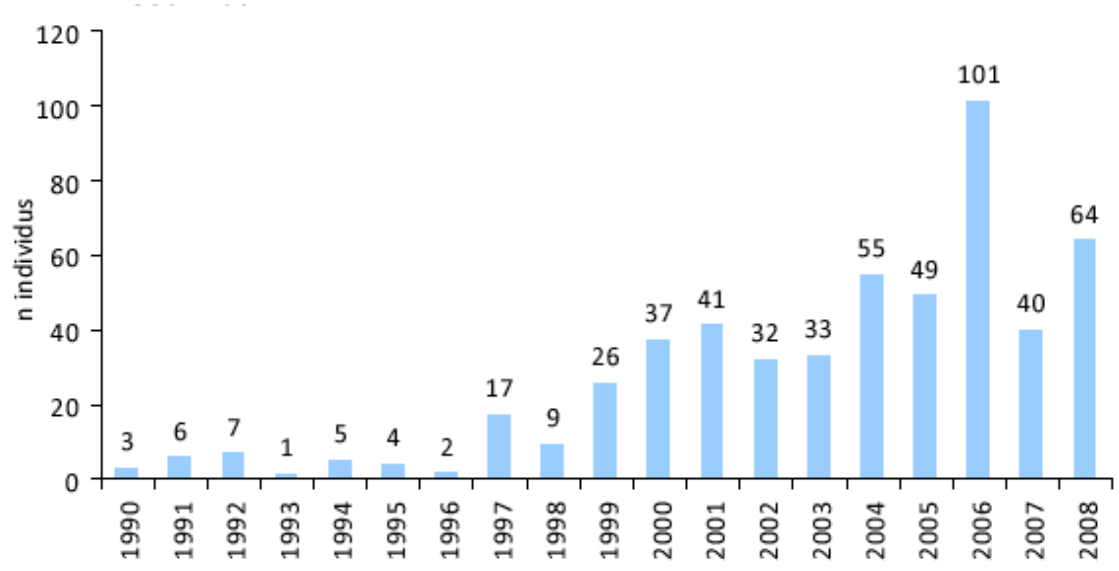

Fig.7. Harbour Porpoise strtandings trends along the Atlantic coast of France (n=532) (from Van Canneyt *et al.*, 2009)

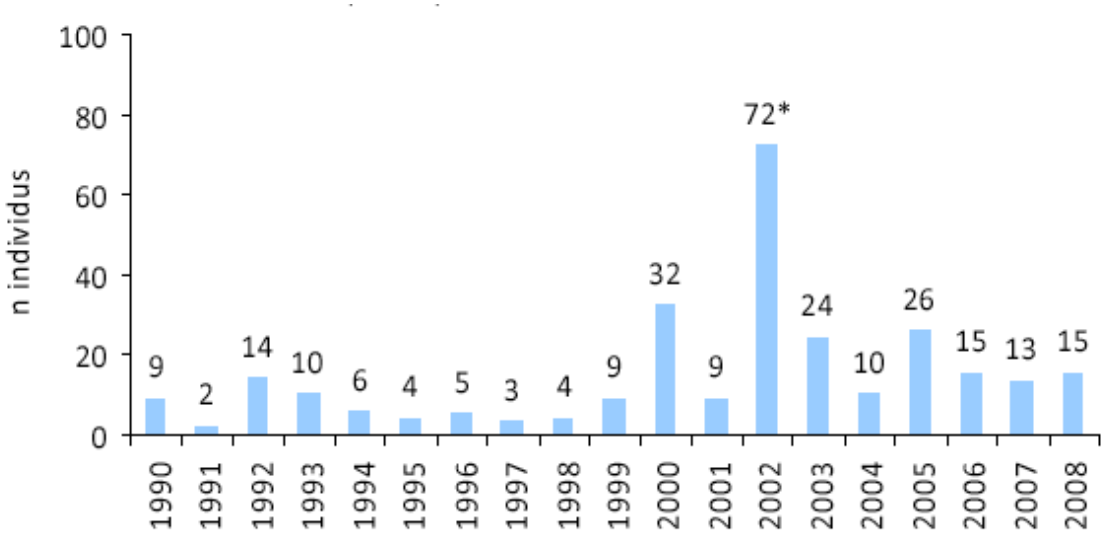

Fig. 8. Short-beaked Common Dolphin Strtandings trends along the Channel coast of France (n=282) (from Van Canneyt *et al.*, 2009)

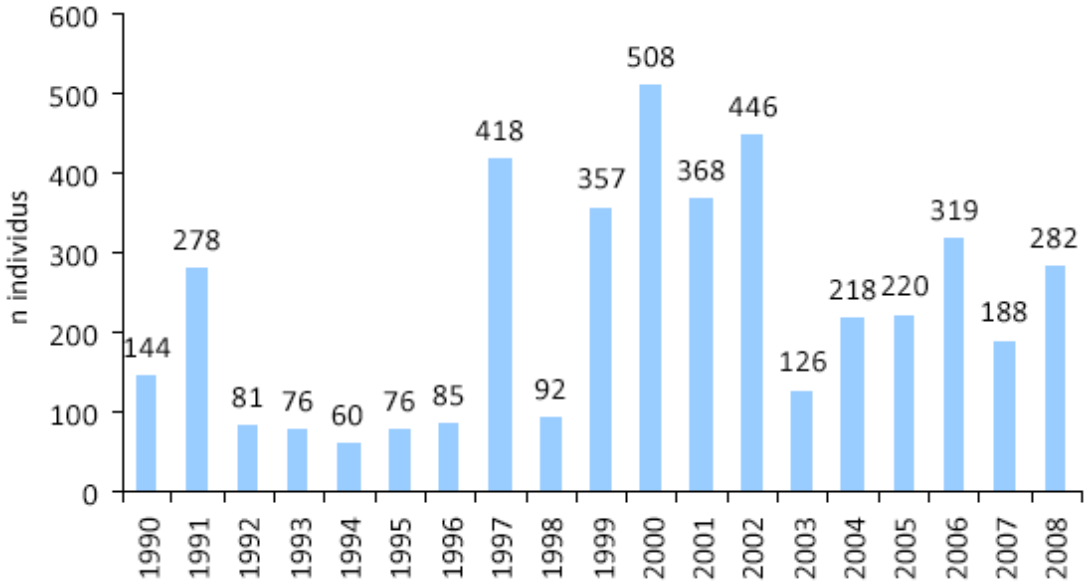

Fig. 9. Short-beaked Common Dolphin Strandings trends along the Atlantic coast of France (n=4342) (from Van Canneyt *et al.*, 2009)

Independent observer schemes targeting French tuna driftnet fisheries in the Celtic Shelf and Bay of Biscay during 1992-93 (Goujon *et al.*, 1993), and pelagic trawls in the mid-1990s (Morizur *et al.*, 1996, 1999; Tregenza & Collet, 1998). French coastal set net

fisheries in the western Channel were monitored for fish discards studies and no bycatch of cetaceans was observed in 410 km of nets during one year 1992-93. (Morizur et al. 1996 a). Following the introduction of EC Regulation 812/2004, observer schemes indicate annual by-catch estimates of c. 600 porpoises in bottom set gillnets and 240 common dolphins, 40 striped dolphins, 50 bottlenose dolphins, and 10 long-finned pilot whales in pelagic trawls for 2007 (French Annual National Report to ASCOBANS, 2008; see also Table 8, Anon, 2008), and 350 porpoises and 100 common dolphins in bottom set gillnets and 300 common dolphins, 50 striped dolphins, and c. 90 long-finned pilot whales in pelagic trawls for 2008 (French Annual National Report to ASCOBANS, 2010).

A Sowerby's beaked whale with signs of ship strike, stranded on the North French coast in September 2001 (Kiszka & Jauniaux, 2002).

5.5 *Germany*

The great majority (97%) of all cetacean strandings in Germany are harbour porpoise, whilst incidental sightings, aerial and shipboard surveys all show that the porpoise is by far the most common cetacean species in the German parts of the North and Baltic Seas (Benke *et al*., 1998; Hammond *et al*., 2002; Scheidat *et al*., 2004, 2008; Siebert *et al*., 2006; Gilles *et al*., 2009).

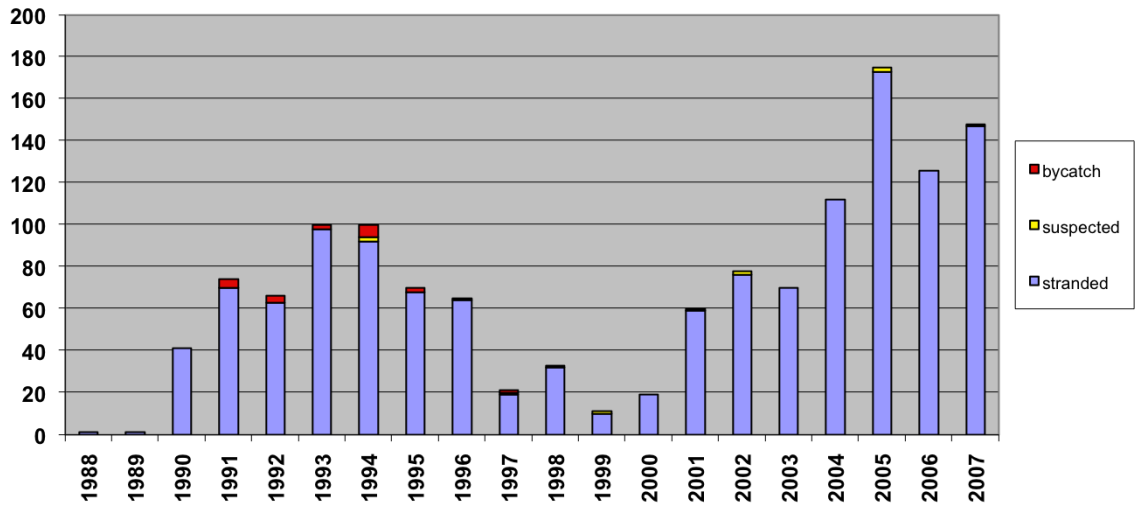

Fig. 10. Strandings of Harboiur Porpoise in German North Sea & Baltic waters, 1988-2007 (from U. Siebert, *pers. comm.*)

Since 1990, there has been a slight increase in strandings on the German North Sea coasts, most prominent in Lower Saxony (Siebert *et al*., 2006; U. Siebert, *pers. comm.*; Fig. 10). In the Baltic Sea, a strong increase in strandings has been observed over the last five years, especially for Schleswig-Holstein (Fig. 11). Contrary to the situation in the 1990s, very few animals are delivered as by-catch by fishermen because of a collapse in co-operation with the fishermen. In 2008, along the Baltic Coast of Schleswig-Holstein,

75% of the porpoise in a good state of preservation (i.e. scales 1-3) were either submitted as by-catch or identified as highly suspicious for by-catch based on pathological findings, although only single cases have been submitted as by-catches by fishermen (U. Siebert, *pers. comm.*). Other common causes of death are infectious disease (parasitic or bacterial origin) and perinatal death (Siebert *et al*., 2001, 2009; Wünschmann *et al*., 2001). There has been one case of morbillivirus in a white-beaked dolphin (Wohlsein *et al*., 2007).

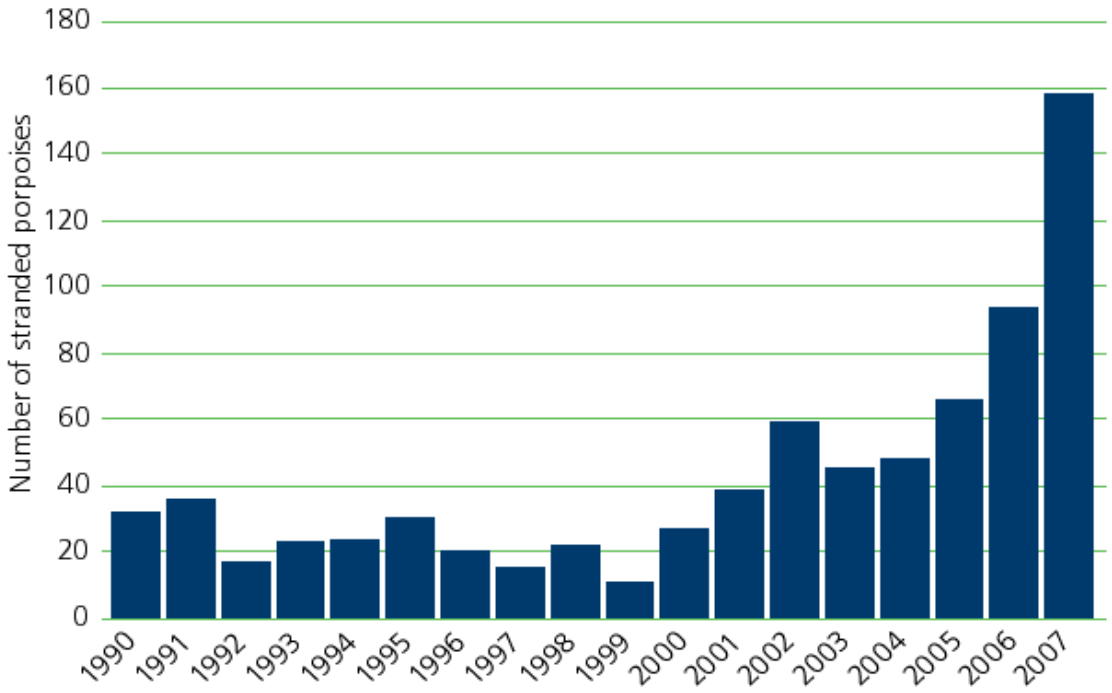

Fig. 11. Number of stranded (including by-caught) harbour porpoises along the German Baltic coast for the years 1990-2007 (from HELCOM, 2009, taken from Siebert *et al*., unpublished report to the Ministry of Agriculture, the Environment and Rural Areas (2008); as well as the database of the German Oceanographic Museum, Stralsund)

Aerial surveys conducted in 1995 and 1996 revealed a mean porpoise abundance of 4,288 (in 1995) and 7,356 (in 1996) in a small coastal area of the German North Sea (Siebert *et al*., 2006).). Further aerial surveys were conducted during various seasons between 2002 and 2006 in the entire German EEZ and 12 nm zone of the North Sea (Gilles *et al*., 2009). Abundance estimates were highest in spring (55,048 animals; 95% CI: 32,395 to 101,671) and summer (49,687 animals; 95% CI: 29,009 to 96,385) and lowest in autumn with 15,394 animals (95% CI: 8,906 to 29,470) (Gilles *et al*., 2009).

Mean abundances in the German Baltic, divided into a western (corresponding to waters off Schleswig-Holstein) and eastern block (corresponding to waters off Mecklenburg-Western Pomerania, and a small portion of Schleswig-Holstein) gave estimates of 980 (1995) and 1,830 (1996) in the western block, and 601 (1995) and 0 (1996) in the eastern block, and much lower densities than in the North Sea (Siebert *et al*., 2006). Further aerial surveys in the German Baltic were conducted during various seasons between 2002

and 2006 (Scheidat *et al*., 2008). Overall abundance estimates varied between surveys from 457 (March 2003) to 4,610 (May 2005), the remaining being in the range from 1,352 to 2,905, but with largely overlapping confidence limits. Rubsch and Kock (2004) estimated porpoise annual by-catch along the German Baltic coast to average 82 animals, resulting in an estimated percentage of the total population ranging from 1.78 - 17.94 (Scheidat *et al*., 2008).

From both aerial surveys (Heide-Jørgensen *et al*., 1992, 1993; Hammond *et al*., 2002; Scheidat *et al*., 2004, 2008) and acoustic monitoring (Verfuß *et al*., 2007, 2008), porpoise densities in the German Baltic were found to decline from west to east. Although porpoises are apparently present in the region throughout the year, there are seasonal peaks in spring to summer and a decline from autumn to winter, with a suggestion of an eastwards migration in spring (Verfuß *et al*., 2007, 2008). Both sightings and strandings data indicated a summer peak between July and September (Siebert *et al*., 2006). Seasonal occurrence n the German North Sea also showed a pronounced seasonal pattern, with both sightings and strandings peaking in the summer months (July for sightings; June – August for strandings) (Siebert *et al*., 2006).

Prior to 2000, the porpoise by-catch from gillnets in the North Sea was thought to be substantial, with several thousand reported in the Danish gillnet fishery (Vinther & Larsen, 2004), 400-800/yr in the British gillnet fishery, and 30-50/yr from the small German fleet (Kock & Flores, 2003). Although there have been no recent estimates, the by-catch has probably declined since 2000 when the activities in the Danish and British gillnet fleets declined (Northridge *et al*., 2003; Vinther & Larsen, 2004). The proportion of strandings attributable to by-catch along the German North Sea coasts is also significantly lower than in the German Baltic (Siebert *et al*., 2006; U. Siebert, *pers. comm.*).

5.6 *Lithuania*

There have been just three records of cetaceans in Lithuanian waters since the 1980s, a porpoise sighting in the mid-1980s and two by-caught porpoises recovered since 2000 (see Table. 1).

Table 1. Numbers of dead porpoises reported from the Baltic Sea by member countries to ASCOBANS in 1950-2005. Numbers reported as by-catch are given in brackets. (from HELCOM, 2009, adapted from Coalition Clean Baltic, 2006)

Years	Sweden	Germany	Poland	Russia	Lithuania	Latvia	Estonia	Finland
1950–1959		7 (2)	8 (5)				5 (?)	
1960–1969	50 (50)	14 (?)	8 (2)			1 (1)	6 (?)	25 (?)
1970–1979	7 (6)	13 (2)	6 (3)			1 (1)		10 (6)
1980–1989	35 (27)	36 (2)	7 (6)	1 (1)	1 (0)		3 (3)	1 (?)
1990–1999	17 (14)	49 (2)	62 (45)			1 (1)		
2000–2005	16 (0)	40 (5)	25 (18)		2 (2)	1 (1)		17 (0)
Total	125 (97)	159 (139)	116 (79)	1 (1)	3 (2)	4 (4)	14 (?)	53 (?)

5.7 *The Netherlands*

In the early part of the twentieth century, porpoises were said to be common along the Dutch coast including the Zuiderzee (Weber, 1922; Van Deinse, 1925). Shortly after the closing of the Zuiderzee in 1932 (which thereby became the fresh-water Ijsselmeer), its entire surface froze during the severe winter of 1932/33, and all enclosed porpoises died (J.P. Strijbos in De Stoppelaar *et al*., 1936; Van Deinse, 1946b; Haelters & Camphuysen, 2009). Before the Second World War, Jan Verwey reported seeing porpoises almost daily in the Marsdiep area (though with peaks between December and February) (Verwey, 1975). But then during the 1950s and 1960s, the species gradually disappeared from coastal Dutch waters, with very few reported in the 1960s and 1970s, both from sightings and strandings (Smeenk, 1987; Addink & Smeenk, 1999; Camphuysen & Peet, 2006). Between 1970 and 1985, Dutch seawatchers recorded only 20 porpoises during 40,000 hours of observations (Camphuysen, 1994, 2004; Haelters & Camphuysen, 2009; see Fig. 12).

An increase in porpoise sightings in the Dutch sector of the North Sea was reported from systematic aerial surveys between 1985 and 1997 by Witte *et al*. (1998); this was confirmed by a later analysis of aerial survey data from 1991 to 2003 by Osinga (2005). Land-based sightings on the Dutch coast increased again during the late 1980s, rising to a spectacular peak during the first years of the 21st century (Camphuysen, 1994, 2004; Haelters & Camphuysen, 2009). The increase in sightings reported from the southwest of the country (Zeeland) occurred after 2000, about 12 years after the observation of an increase in the northern part of Dutch waters (Camphuysen & Heijboer, 2008; Haelters & Camphuysen, 2009). In 2007, however, the number of coastal sightings dropped again, indicating a major decline in porpoise abundance in nearshore waters (Haelters & Camphuysen, 2009; see Fig. 12).

The pattern of strandings showed a similar trend, with a slight increase in the late 1980s and early 1990s, from then rising sharply to an unprecedented peak in 2006 (n=539), followed by a decline in 2007 (Camphuysen *et al*., 2008; Haelters & Camphuysen, 2009; Fig. 1). Strandings remained relatively low (n=311) in 2008 but showed an increase again (n=478) in 2009 (www.walvisstrandingen.nl).

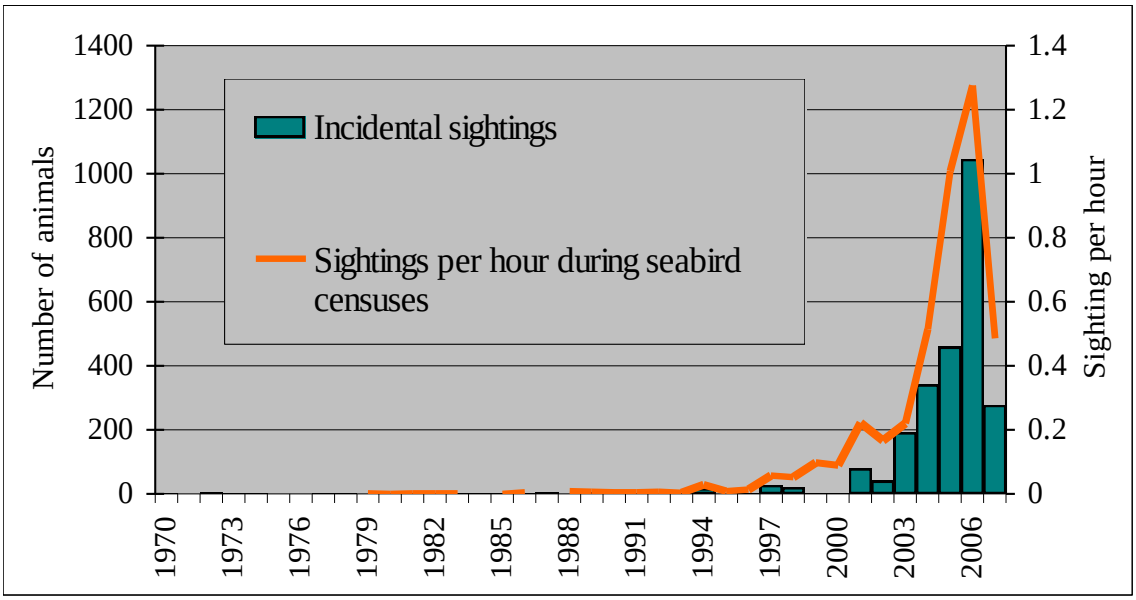

Fig. 12. Annual sightings of harbour porpoises in Dutch waters (coastal observations only), including effort-corrected sightings from seawatchers (animals/hour) (from Haelters & Camphuysen, 2009)

Between 1990 and 2000, 130 porpoises stranded in the Netherlands were investigated by the National Museum of Natural History (Naturalis) in Leiden. The cause of death of at least 58.4% of the animals was identified as by-catch (García Hartmann *et al*., 2004). Autopsies of stranded porpoises in 2006 and 2007 gave similar results: 64% by-catch in 2006, and a preliminary figure of c. 50% in 2007 (Leopold & Camphuysen, 2006; NIOZ/IMARES, unpubl. data for 2007; Camphuysen et al., 2008). A recent post-mortem analysis of 92 stranded porpoises by the University of Utrecht in 2009 indicated that 41% of the animals had signs of possible or probable by-catch (M. Siemensma, *pers. comm.*).

Although the harbour porpoise is the most common cetacean sighted and stranded in Dutch waters, other small cetacean species that occur, or have occurred, regularly include bottlenose dolphin, white-beaked dolphin and short-beaked common dolphin.

During the twentieth century up to the 1950s, bottlenose dolphins were seen regularly off the Dutch coast including the Delta area and the Wadden Sea, with strandings also in the Zuiderzee. It was the most common cetacean in Dutch coastal waters after the harbour porpoise (Van Deinse, 1931, 1946b; [keep 1946a for his strandings records over 1945] Verwey, 1975; Camphuysen & Peet, 2006). Verwey (1975), in particular, noted the appearance of the species in the Marsdiep area off Den Helder in spring (March-May), coinciding with the migration of the Zuiderzee herring. However, with the building of the Afsluitdijk (IJsselmeer Dam) which was completed in 1932, the Zuiderzee (from then onwards IJsselmeer) became inaccessible to both herring and dolphins, which disappeared from the Marsdiep region. Elsewhere in Dutch waters, the bottlenose dolphin continued to occur regularly between the 1940s and 1960s, as evidenced from the annual strandings reports (Van Deinse, 1943-66). The species then became scarce and has remained so ever since, with only occasional visits (several of them by solitary, sociable animals, but occasionally by groups that numbered tens of dolphins), and with strandings

decreasing to one each in the 1990s and the first decade of the 21st century (both of solitary animals that had been seen for some time and were eventually found dead) (Van Bree & Husson, 1974; Van Bree & Smeenk, 1978, 1982; Smeenk, 1986, 1989, 1992, 1995, 2003; Kompanje, 2001; Van der Meij & Camphuysen, 2006; Camphuysen & Peet, 2006; Camphuysen *et al*., 2008).

The white-beaked dolphin appears to have been rare in Dutch coastal waters in the first half of the twentieth century, although perhaps under-recorded (Verwey, 1975; Camphuysen & Peet, 2006). From 1970 onwards, the number of strandings increased markedly and remained high between 1990 and the present (Van Bree & Husson, 1974; Van Bree & Smeenk, 1978, 1982; Smeenk, 1986, 1989, 1992, 1995, 2003; Kinze *et al*., 1997; Camphuysen *et al*., 2008), and when at sea observations started in the 1980s, the species was seen regularly offshore, although numbers varied greatly between years (Camphuysen & Peet, 2006; Van der Meij & Camphuysen, 2006). It is now the most common cetacean in Dutch waters after the harbour porpoise, though mainly occurring offshore. Most sightings were in winter (November-December) and in spring and early summer (March-June), with lowest numbers in late summer (September) (Van der Meij & Camphuysen, 2006; Camphuysen & Peet, 2006). In the UK sector of the North Sea, the species is reported in greatest numbers in early summer (May-June) in southern Britain, and in late summer (July–September) in northern Britain (Evans *et al*., 2003). This seasonal trend northwards may reflect more general movements of the population within the North Sea. Strandings records on the Dutch coast are not entirely in line with Dutch sightings data, however, with a peak occurring in winter (December-January) and a smaller increase in spring (April-May) and early summer (July) (Jansen *et al.*, submitted).

The presence of short-beaked common dolphins in the southern North Sea has fluctuated greatly over the last one hundred years. For the most part, the species has been rare in Dutch waters, but during the mid-1920s to mid-1950s, strandings of common dolphins became more frequent (max. 37 per decade during the 1940s), before declining again to between 0 and 5 per decade from 1960 onwards (Van Deinse, 1946b, 1951b, 1952-66; Van Bree & Husson, 1974; Van Bree & Smeenk, 1978, 1982; Smeenk, 1986, 1989, 1992, 1995, 2003; Kompanje, 2005; Van der Meij & Camphuysen, 2006; Camphuysen & Peet, 2006; Camphuysen *et al*., 2008). There have been a few sightings in Dutch waters, mainly offshore (Camphuysen & Peet, 2006)

The independent observer scheme aboard Dutch vessels in set nets in the southern North Sea and Channel indicated a by-catch of somewhere between 2 and 31 harbour porpoises for the period mid February to end of May 2008 (Couperus, 2009). Observers aboard pelagic trawls along the shelf edge recorded no cetacean by-catch in the winter of 2007-08, similar to the previous two winters whereas, as noted earlier, during the 1990s a dolphin by-catch was observed (Couperus, 1997, 2009). Couperus (2009) attributed this in part to a shift from targeting horse mackerel and mackerel west of Ireland in February and March to that of blue whiting over winter. For all Dutch fisheries, however, the high number of hauls without bycatches made it impossible to estimate bycatch rates with any accuracy with the current observer effort (Couperus, 2009).

5.8 *Poland*

The harbour porpoise is the only species of cetacean inhabiting Polish waters, accounting for more than 90% of all records (Skóra, 1991). The species was apparently abundant in the Polish sector of the Baltic until the 1940s (Ropelewski, 1952a, b). A drastic decline is thought to have occurred since then. This is clearly documented by the fact that the area in which Polish fishermen were operating prior to World War II was much smaller than the area they currently fish, yet the number of porpoises by-caught was much higher. Pollution, by-catch and harsh winters are thought to have contributed to this decline. Numbers remain very low, with recovery having been prevented by incidental mortality in driftnets in the past and set gillnets for salmonids and cod in recent years (Rupelewski, 1952; Skóra *et al*., 1988; Skóra & Kuklik, 2003; Kuklik, 2007).

Polish records of porpoises from 1922-35 are derived from fishery statistics of caught porpoises, which ranged annually from 16-250 between 1922-32 (av. 56/yr in 1920-29, and 26.9/yr in 1930-39), except for 1933-35 when it was said to amount to "hundreds per year" (Skóra & Kuklik, 2003). Between 1950 and 1989, the records of porpoises came from voluntary reports on bycatch and the average annual number per decade remained constant at between 0.6 and 1.1 (Skóra & Kuklik, 2003). Since then, it has increased slightly to 4.4/yr in 1990-99 and 2.1/yr in 2000-09 (Skóra & Kuklik, 2003; Kuklik, 2007; I. Pawliczka, unpubl. data).

A major concern is that since the introduction of EC Council Regulation 812/2004 on 26 April 2004, many fishermen have refused to report by-catch, The number of bycatch reports has decreased and strandings occurring annually has increased (Skóra *et al*., 2010; Fig. 13

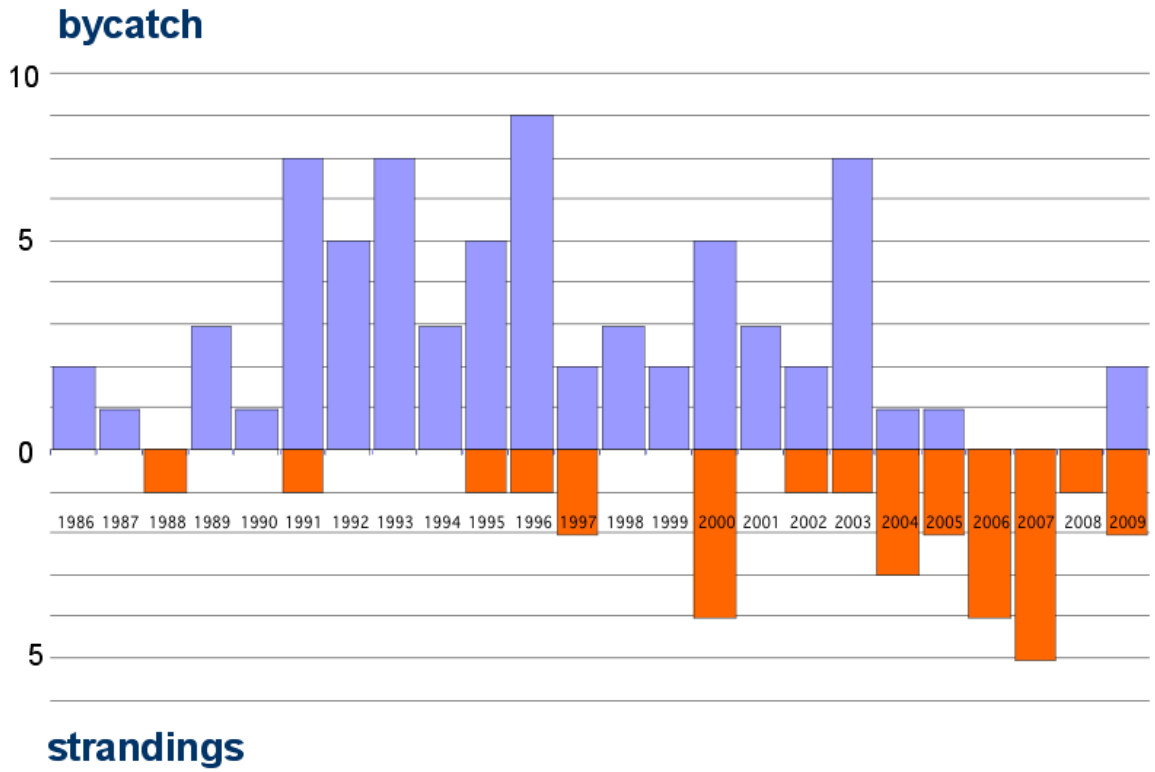

Fig. 13. Number of strandings & by-caught porpoises in Polish waters, 1986-2009 (from K. Skóra & I. Pawliczka, unpubl. data)

5.9 Sweden

The harbour porpoise is the only cetacean species that regularly inhabits Swedish waters (Berggren & Arrhenius, 1995a). Questionnaire surveys, by-catch and stranding statistics all indicated a decline in porpoises in Swedish waters between the 1950s and 1980s (Lindstedt & Lindstedt, 1988, 1989; Berggren & Arrhenius, 1995a; see also Fig. 14). Reasons suggested for this decline included prey depletion (in particular, the collapse of herring stocks during the 1960s), by-catch, habitat degradation and pollution (Berggren, 1994; Berggren & Arrhenius, 1995a). In the period 1973-87, 239 porpoise specimens were collected by Swedish Museums; 149 animals were found in fishing gear and 65 on beaches or drifting in the water. An increase in the number of animals found in fishing gear was observed, from an average of 5/yr in the period 1973-79 to 16/yr in the period 1980-87 (Lindstedt & Lindstedt, 1989; see Fig. 15). Of the 149 animals found in fishing gear, 128 (86%) were taken in gillnets, the rest mainly in trawls (Lindstedt & Lindstedt, 1989). Similar findings were obtained in a follow-up study by Berggren (1994) with gillnet fisheries being responsible for more than 80% of all incidental takes, half of which occurred during the months of March-May, and surface driftnets for salmon responsible for 54% of by-catches in the Swedish Baltic.

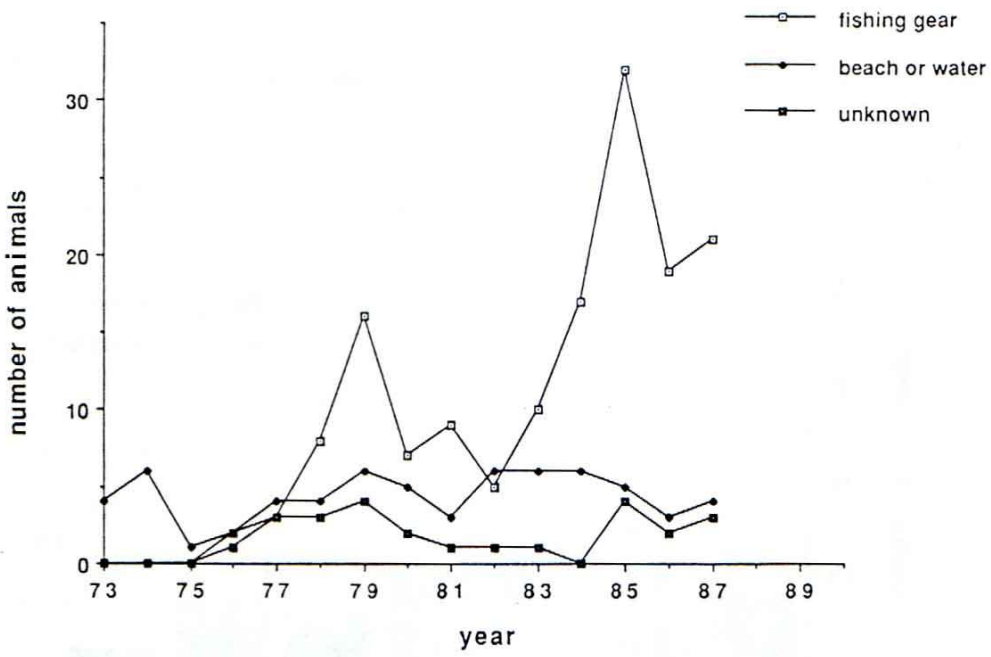

Fig. 14. Porpoises collected by Swedish museums in the years 1973-87 (from Lindstedt & Lindstedt, 1989)

Only one porpoise sighting came from the Swedish Baltic (Areas 4 & 5) during the 1960s-1980s (Fig. 15), and aerial surveys since then have also revealed very low numbers (Berggren & Aarhenius, 1995b; Berggren, 1996; Berggren *et al*., 2004).

An interview survey, conducted in 2001, estimated a by-catch of c. 25/yr in bottom trawls in the Swedish Skagerrak, and c. 89/yr in gillnets, trammel nets and pelagic trawls in the Swedish Kattegat (Swedish Annual Report to ASCOBANS, 2008). An unknown number of porpoises are by-caught in small boat recreational fisheries. An observer programme corresponding to 4.6% of the Swedish pelagic trawl and set net fisheries recorded no porpoise by-catch in 2007-09 (Swedish Annual National Reports to ASCOBANS, 2008, 2009, 2010).

In April 2009, a harbour porpoise was recovered from the Swedish Baltic with signs of boat propeller damage (Swedish Annual National report to ASCOBANS, 2010).

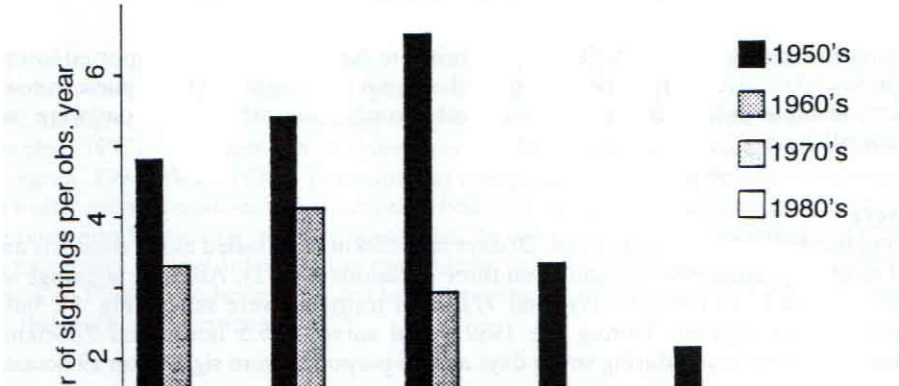

Fig. 15. Mean number of porpoise sightings in Swedish waters per observer year for each decade, as determined from questionnaire returns; Area 1 = Skagerrak; Area 2 = Kattegat; Area 3 = Øresund; Area 4 = South Sweden; Area 5 = East Sweden (from Berggren & Arrhenius, 1995a)

5.10 United Kingdom

Since at least the 1970s, the commonest and most widely distributed cetacean in UK waters has been the harbour porpoise (Evans, 1976,1980; 1992; Evans *et al*., 2003; Reid *et al*., 2003; Hammond *et al.,* 2002; Hammond 2008).

Between 1913 and 1986, 860 strandings of porpoises were reported to the Natural History Museum for both UK and Ireland (Harmer, 1914-27; Fraser, 1934, 1946, 1953, 1974; Sheldrick, 1989). Strandings rates per year varied between 6 and 25, for each of the decades, 1910s-1980s, with no particular temporal pattern. With various initiatives to improve the reporting scheme for small cetaceans in Britain, the number of strandings since 1990 increased markedly, with an average of 156 per year in UK during the 1990s and 325 per year between 2000 and 2008 (Bennett *et al*., 2000; Scottish Agricultural College, 2000; Jepson, 2005; Sabin *et al*., 2006; Deaville & Jepson, 2007, 2008; Jepson & Deaville, 2009). More than for any other species, strandings of harbour porpoise are likely to be under-reported and so be affected by changes in effort. It is probably unwise therefore to infer much from any longterm variation in the frequency of strandings.

Mainly from the mid-1970s onwards, effort-related sightings data were collected from coastal land-based sites and offshore vessels all around the Britidh Isles (Evans, 1980, 1992; Evans *et al*., 1986, 2003; Northridge et *al.,* 1995; Reid *et al*., 2003). Geographical comparisons of abundance indices showed declines in porpoise sightings frequency and numbers of individuals at most locations regularly watched during the late 1970s, with relatively low numbers remaining through most of the 1980s, particularly within the North Sea area (Evans, 1990, 1992), increasing only in the mid-1990s (Evans *et al*., 2003). Along Channel and Irish Sea coasts, the frequency of porpoise sightings remained low from at least the 1960s, although towards the end of the 1980s sightings increased in SW Wales, and remained high since, and in the Channel, increases were observed from around 2000 (Evans, 1992; Evans *et al*., 2003). On Atlantic coasts, sightings frequency

and numbers observed fluctuated during the 1980s but with no evidence for a sustained trend in any particular direction (Evans, 1992).

The status changes noted above since the 1990s in southern Britain were confirmed also from the results of the two large-scale surveys, SCANS & SCANS II, which suggest a major re-distribution of porpoises with, for example, numbers in the Northern North Sea changing from an estimated 239,000 in July 1994 to 120,000 in July 2005, whereas in the southern North Sea, numbers changed from 102,000 to 215,000 between the 1994 and 2005 surveys (Hammond *et al*., 2002; Hammond, 2008). Major increases in abundance were also observed in Channel between the two SCANS surveys, mirroring the above findings as well as those found in adjacent Belgian and French waters.

Of the two main coastal populations of bottlenose dolphin in UK waters, the Moray Firth population has remained stable but with an expansion of range since the mid-1990s southwards as far as North-east England (Wilson *et al*., 1999, 2003; Sea Watch, unpubl. data); and the Cardigan Bay population has remained stable or possibly slightly increased since 2001 (Pesante *et al*., 2008). Bottlenose dolphins that returned to Southwest English coasts during the early 1990s (Tregenza, 1992) then became less common from the mid-1990s onwards (Evans *et al*., 2003).

It is not possible to draw inferences of long-term trends in abundance for the other two common small cetacean species, short-beaked common dolphin and white-beaked dolphin either from the effort-based monitoring of mainly coastal seas nor from the larger scale SCANS surveys (Hammond *et al*., 2002; Evans *et al*., 2003; Hammond, 2008). However, there are indications of range changes with common dolphins observed regularly off North Scotland and in the North Sea since 2000, and white-beaked dolphins (along wth Atlantic white-sided dolphins) also apparently shifting northwards ovr the same period (Hammond *et al*., 1995; Evans *et al*., 2003; MacLeod *et al*., 2005; Hammond, 2008; MacLeod & Hammond, 2008; Canning *et al*., 2008). Risso's dolphins have also become regular in the northern North Sea since 2000 whereas previous to that they were only occasional (Evans *et al*., 2003; Sea Watch, unpubl. data).

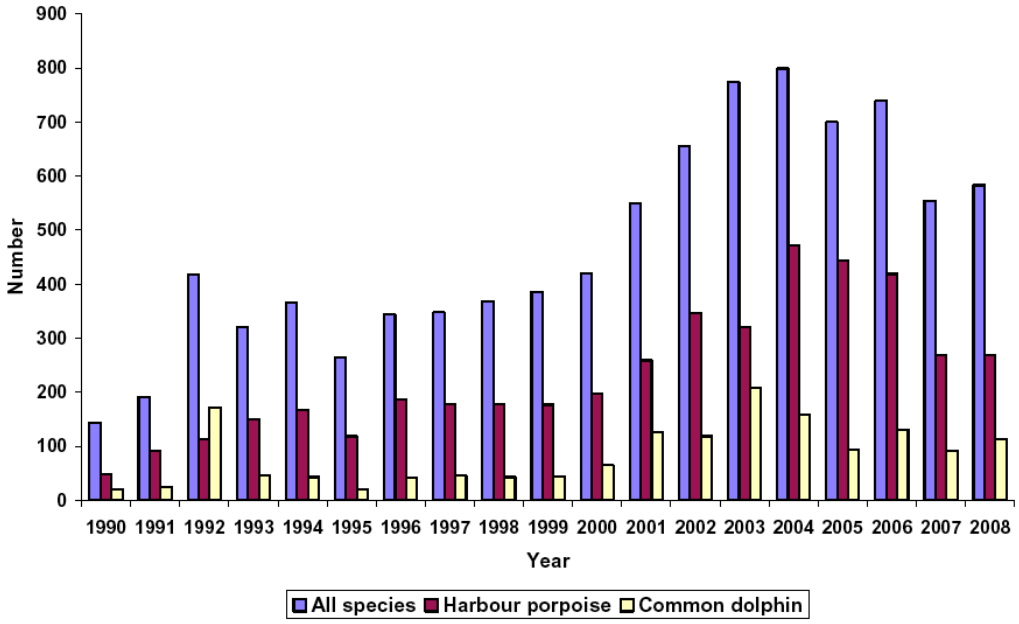

Fig. 16. Trends in strandings of cetaceans in the UK, 1990-2008

The UK Cetacean Strandings Investigation Programme started in 1990 and has provided relatively consistent coverage ever since. The trend in total number of strandings is indicated in Figure 16, along with the numbers of the two most commonly stranding species, harbour porpoise and common dolphin.

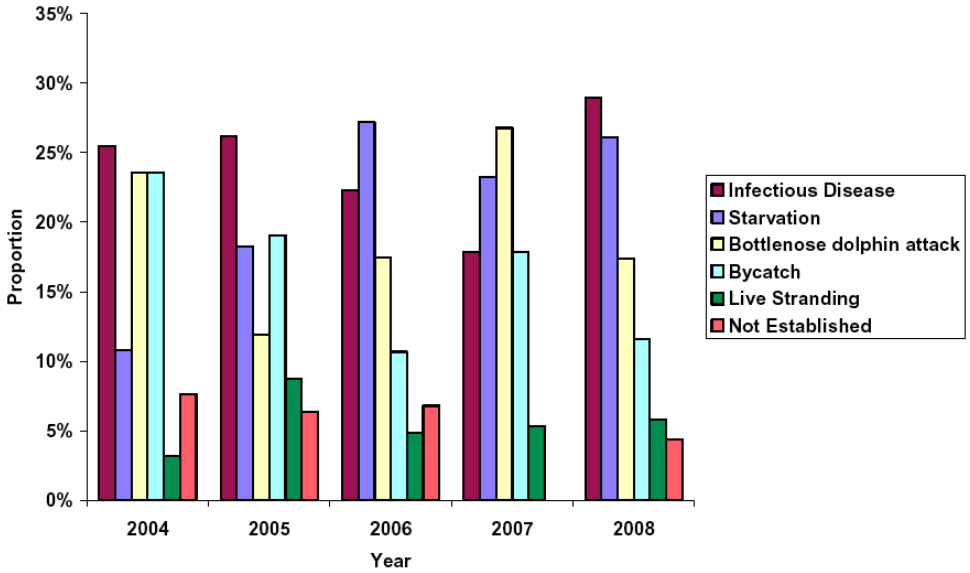

Fig. 17. Causes of death for cetaceans stranding in the UK, 2004-08
(from Deaville & Jepson, 2009)

For both species, the number of strandings increased from 2001 to 2004 then remained stable until 2006, declining again in 2007 and 2008. For many specimens, a full post-mortem was conducted so that cause of death could be determined (Bennett *et al*., 2000; Jepson, 2005; CSIP unpubl. data). The relative frequency of different causes of death for all cetacean species examined are shown for the most recent period, 2004-08 in Fig. 17, for porpoises in Fig. 18, and for common dolphins in Fig. 19 (from Deaville & Jepson, 2009). For harbour porpoise, infectious disease was the most common cause of death identified, whereas for common dolphin, it was by-catch (see Figs. 18 & 19). A link was established between PCB levels and infectious disease in harbour porpoise, with 17mg/kg total CH levels being identified as a threshold for toxicity (Jepson *et al*., 2005a; Hall *et al*., 2006).

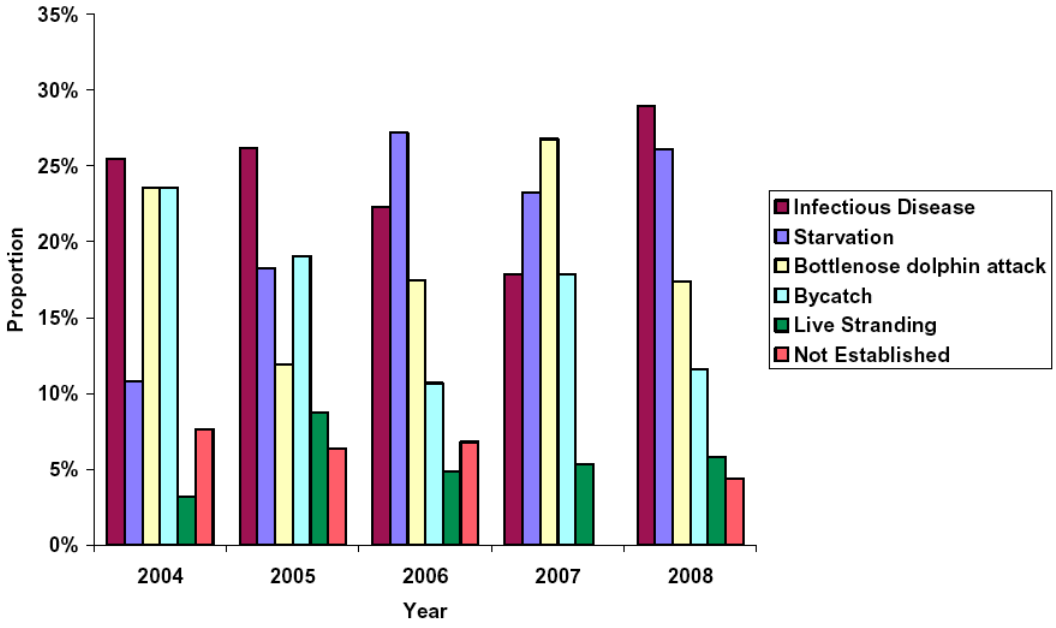

Fig. 18. Causes of death for harbour porpoises stranding in the UK, 2004-08 (from Deaville & Jepson, 2009)

For the period 1990-99, by-catch was identified as the cause of death for 39% of the 305 stranded harbour porpoises and 71% of the 166 stranded common dolphins, where a cause of death could be established (Bennett *et al*., 2000). Between 2000-04, by-catch was identified as cause of death in 16.5% of the 563 stranded harbour porpoises and 61% of the 190 stranded common dolphins, where cause of death could be established (Jepson, 2005). For both periods, the greatest numbers of harbour porpoises and common dolphins diagnosed as by-catch regularly stranded in SW England (Cornwall and Devon, the area with historically the highest fisheries effort). This high rate of strandings in SW England diagnosed as by-catches has declined in the last couple of years (P.D. Jepson, *pers. comm.*). Many of these porpoise and common dolphin by-catches were probably gillnets

set relatively close to shore although unspecified trawl fisheries have been suspected for some of the common dolphins in the past.

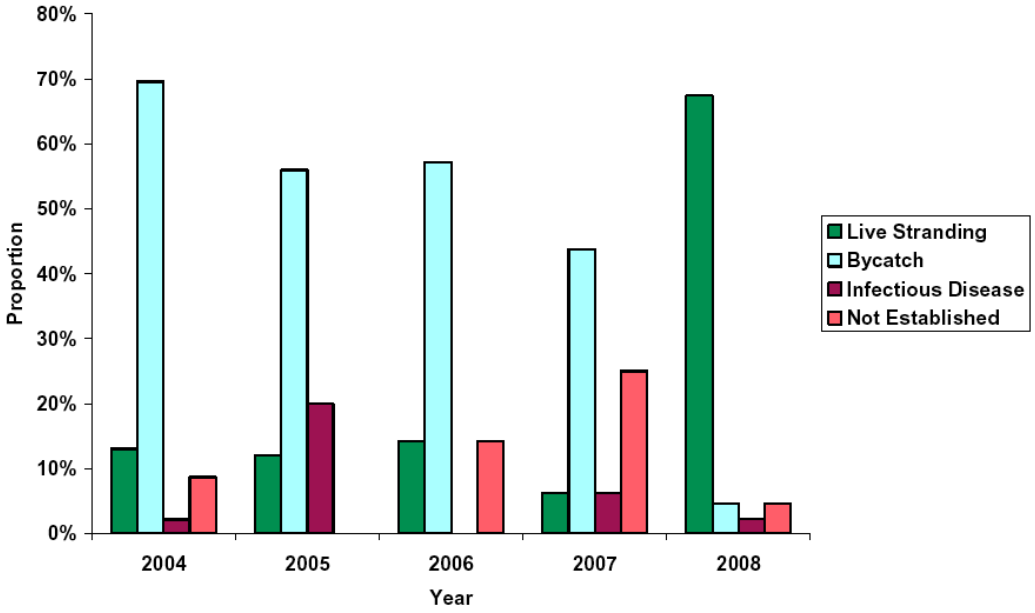

Fig. 19. Causes of death for short-beaked common dolphins stranding in the UK, 2004-08 (from Deaville & Jepson, 2009)

Other speces with evidence of by-catch during the period 2000-04 have included striped dolphin (15.2% of 33), Atlantic white-sided dolphin (3.7% of 27), Risso's dolphin (8.3% of 12), as well as six minke whales (Jepson, 2005). The relatively high number of minke whale entanglements (in creel lines and discarded netting), mainly in Scotland, gives some cause for concern (see Northridge *et al*., 2010).

Amongst 2,095 stranded cetaceans examined between 1990 and 2004, 13 were found to have *in vivo* bubble disease, caused by gas emboli (Jepson, 2005; Jepson *et al*., 2005b). Of those, two were harbour porpoise, one Sowerby's beaked whale, one Blainville's beaked whale, five were common dolphin, and four were Risso's dolphin. There have been no new gas embolism cases in the UK since 2004, apart from one Risso's dolphin in 2009 on Anglesey (North Wales).

The other major cause of death identified has been of harbour porpoises thought to be killed by bottlenose dolphins (Ross & Wilson, 1996; Jepson & Baker, 1998). The main arreas of mortality coincide with those where the main coastal populations of bottlenose dolphins exist, i.e. North-east Scotland and Wales) (Bennett *et al*., 2000; Jepson, 2005). For Wales, it is the most common identifiable cause of death for harbour porpoise.

Of some concern are the relatively low strandings rates of particular top predator species - mainly inshore bottlenose dolphins and killer whales, compared with population sizes (P.D. Jepson, *pers. comm.*). Although PCBs in UK waters are slowly declining over time

(Law *et al*., 2010), the few bottlenose dolphin and killer whales that do strand in the UK all have PCBs levels that greatly exceed all proposed thresholds for PCB toxicity in mammals, including the levels associated with infectious disease mortality in harbour porpoises (Jepson *et al*., 2005a; Hall *et al*., 2006).

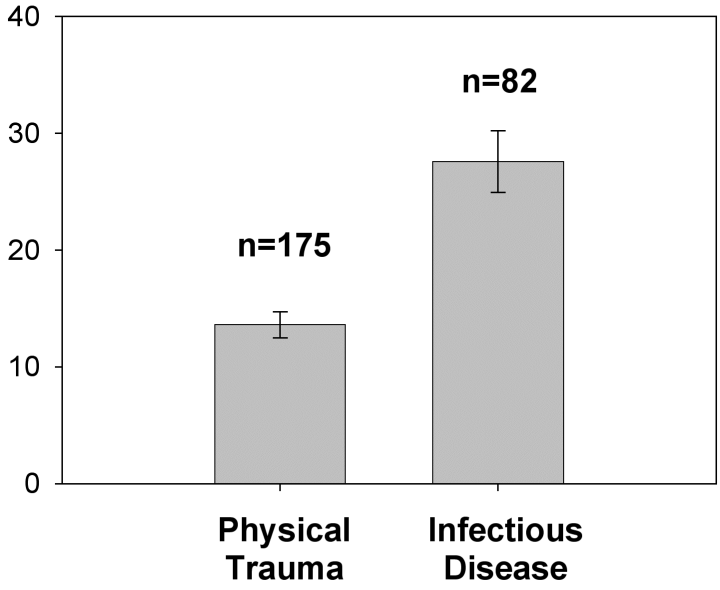

Fig. 20. Comparison of the sum of 25CH levels in UK harbour porpoises for animals dying of physical trauma and those with infectious diseases (from Jepson *et al*., 2005a)

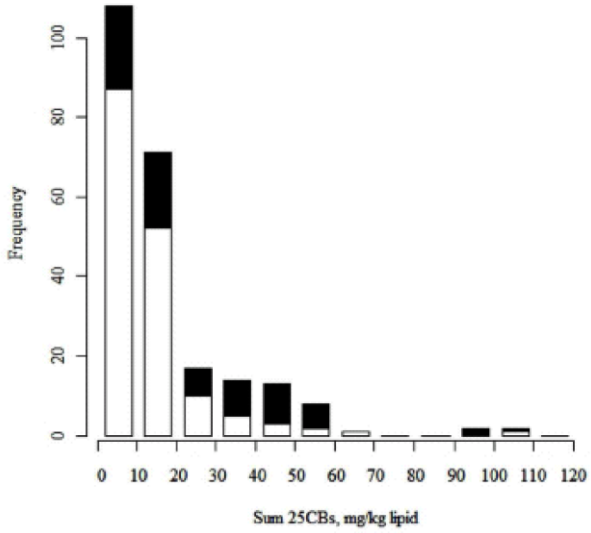

Fig. 21. Comparison of sum of 25CH levels in UK harbour porpoises for animals dying of physical trauma and those with infectious diseases (from Hall *et al*., 2006)

Taking all published and unpublished data from the Institute of Zoology, the means for summed 25PCB congeners for harbour porpoises that died from trauma (mean = 13mg/kg, n=255) and infectious disease (mean = 26mg/kg, n=182) are shown in Figs. 20 and 21. The levels for bottlenose dolphin (mean = 98 mg/kg, n=15) are much higher (Jepson *et al*., 2008; see Fig. 22) and for killer whale (mean = 225mg/kg, n=5) even higher ((Law et al 2006; CEFAS, unpublished data).

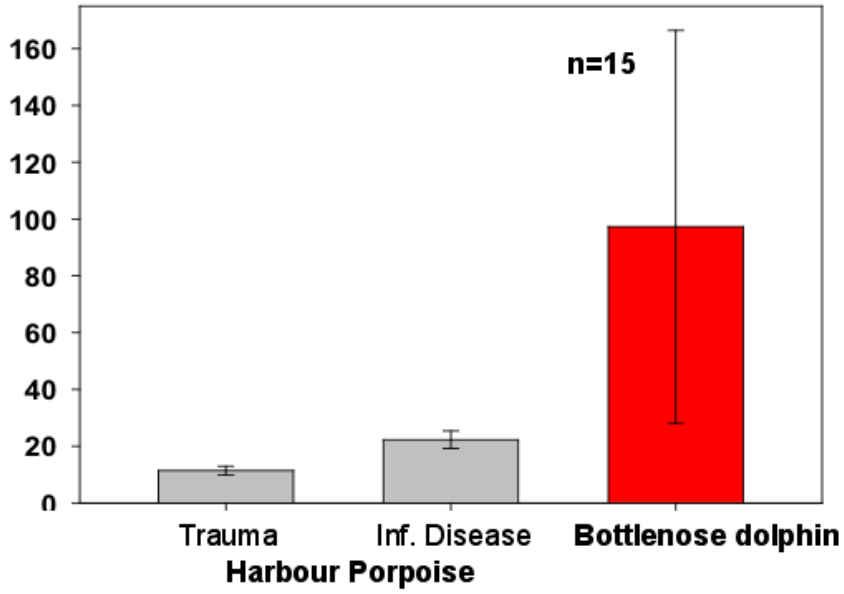

Fig. 22. Comparison of sum of 25CB levels for UK harbour porpoises and bottlenose dolphins (from Jepson *et al.*, 2008)

Two mass strandings have been reported recently. Between 13 January and 14 April 2008, 14 Cuvier's beaked whales, five Sowerby's beaked whales, four unidentified beaked whales, and 22 long-finned pilot whales were reported stranded around the coasts of Scotland, Ireland and Wales (Dolman *et al*., 2010). The geographic range of the event was very wide whilst the period over which they came ashore was prolonged. Since most specimens were already decomposed when they came ashore, it was not possible to determine cause of death.

Twenty-six common dolphins stranded and died on 9 June 2008 in the Fal Estuary, Cornwall, with a similar number re-floated live (Jepson & Deaville, 2009). All animals examind were in good nutritive condition but empty stomachs. There was no evidence of significant infectious disease or acute physical injury, no signs of harmful algal toxins, and reltively low levels of organochlorines, trace metals and butytins. A definitive cause of death could not be established, but the large naval exercise in very close proximity was

the only known cause of cetacean mass stranding events that could not be excluded (Jepson & Deaville 2009).

Since the 1990s, the UK has had a series of independent observer schemes to estimate levels of by-catch aboard various fisheries (notably the bottom set gillnet fisheries in the North Sea and Celtic Sea; and the pelagic trawl fisheries in the Celtic Sea and Southwest Approaches to the English Channel (DEFRA, 2003). UK gillnets (15m+ length) targeting hake were estimated to take around 740 harbour porpoises (range 383-1,097) annually in the Celtic Sea between 1992-94 (Tregenza *et al*., 1997a). Between 1995 and 2002, set nets (gill and tangle nets) for cod, skate, turbot, sole, monkfish and dogfish in the North Sea, extended in 1997 to cover Scottish vessels fishing on the Scottish west coast. The observer programme estimated the porpoise by-catch in ICES Divisions IVa, b and c, and VIa at approximately 1,000 animals in 1995, reducing to around 600 in 2000 (Northridge & Hammond, 1999; Northridge *et al*., 2003; DEFRA, 2003). The reduction was primarily associated with an overall decline in gillnet fishing effort.

In the 1990s, there was an extensive by-catch of common dolphins by multi-national tuna driftnet fisheries in the Celtic Sea, Western English Channel and Bay of Biscay (Harwood *et al*., 1999), which led to the closure of these fisheries in 2002. The recent EU funded PETRACET project estimated total by-catch of common dolphins in UK, Irish, French, Dutch and Danish pelagic trawls, for the period December 2003 to May 2005. Incidental captures were only reported in the bass and tuna fisheries, with an annual by-catch of a little under c. 1,000 dolphins, of which about 95% were identified as common dolphins (Northridge *et al*., 2006). Common dolphin by-catch was also reported in: French, Irish and UK hake fisheries (Tregenza *et al*., 1997b; Morizur *et al*., 1999); the Dutch horse mackerel fishery (Couperus, 1997a, b); and also in Spanish trawls, gillnets, and seine nets (López *et al*., 2003]; and Portuguese gill, beach seine and trawl nets (Silva and Sequeira, 2003), although the resultant mortality from by-catch was not determined.

Since Regulation 812/2004 came into force, for four years running (2005-08 inclusive), there have been no observations of cetacean bycatch in any of the fleet segments listed for compulsory monitoring. Additional monitoring of pelagic trawl and static net fisheries was also undertaken for the purposes of Article 12 uinder the Habitats Directive and 'Scientific Studies' under Regulation 812/2004 (UK National Annual Report to ASCOBANS, 2010; SMRU, 2006, 2007, 2008, 2009).

Published estimates for 2006 and 2007 based on 1996-2000 observations and 2005 effort, yielded an estimated number of by-caught animals for harbour porpoise in all UK set net fisheries (from vessels 15m or longer) of 386 (2006) in ICES Area IVabc, and 592 (2007) in ICES Area VIIadefghj (UK National Annual Reports to ASCOBANS, 2009; SMRU, 2006, 2007, 2008). The equivalent by-catch estimates for common dolphins in the UK bass pelagic pair trawl fishery were 84 (2005-06) in ICES Area VIIe, and 114 (2006-07) in ICES Area VIIadefghi (UK National Annual Reports to ASCOBANS, 2009; SMRU, 2006, 2007, 2008). For 2008, the bycatch estimates of harbour porpoise in gillnet and tangle net fisheries in the Irish and Celtic Sea areas were 498-1409 and for common dolphins, 279-1019 (SMRU, 2009; UK National Annual Report to ASCOBANS, 2010).

6. Conclusions & Future Recommendations

Twenty-six small cetacean species have been recorded in the ASCOBANS Agreement Area, of which twelve species occur regularly. For many ASCOBANS Parties, the only small cetacean occurring regularly is the harbour porpoise, and therefore efforts and reporting have focused upon this species.

Systematic stranding schemes vary greatly in their coverage between countries. The longest running and more comprehensive schemes occur in the UK, Netherlands, Belgium and France; less comprehensive are the ones in Denmark, Sweden and Finland. In the last case, however, very few cetaceans occur in the region, and the same applies to most other Baltic States. A number of countries operate incidental sighting schemes. These include in particular the UK, Netherlands, and Germany although several other countries have had similar schemes operating more intensively over certain periods.

Besides the large-scale international systematic sightings surveys of SCANS, SCANS II and CODA, there have been smaller surveys using vessels and/or planes in most countries within the Agreement Area. Coverage has increased markedly since 1990. However, they remain largely short-term surveys for a particular purpose (e.g. to identify SACs or establish the distribution and abundance of particular species in relation to offshore energy developments), rather than sustained surveillance in a systematic and coordinated manner. The use of acoustic monitoring (mainly with PODs) has inc.reased greatly since around 2000, although for the most part they have had very limited spatial coverage. An exception has been the German efforts in the SW Baltic, and the SAMBAH Project proposed to cover all of the Baltic Sea. Telemetry has been applied effectively on harbour porpoises in Danish waters to identify areas of high usage.

Since around 1990, causes of mortality from strandings have been routinely investigated in a number of countries. This is best demonstrated in the UK, although in Germany, the Netherlands, Belgium and France, there have also been a substantial number of animals examined. Post mortem protocols have been standardised for many years through the efforts of the Pathology Working Group of the European Cetacean Society.

By-catch observer schemes started operating in the 1990s but have not been sustained on an annual basis to the same degree for several ASCOBANS Parties, and some have never had such schemes operating. The issue of monitoring by-catch in vessels of less than 15m lngth remains a problem. EC Regulation 812/2004 resulted in monitoring of target fisheries over a wider scale but for various reasons has not led to full compliance.

The various efforts outlined above have provided trends for a number of cetacean species. Information from years prior to 1990 is less good than since then. However, several lines of evidence indicate that harbour porpoises underwent major declines in the Baltic since the 1940s, and particularly in the southern North Sea and English Channel between the 1960s and 1980s. Since the mid-1990s, porpoises appear to have increased in the southern North Sea, English Channel and adjacent areas within the Bay of Biscay, whilst declining in parts of the northern North Sea and inner Danish waters. By-catch appears to be a widespread cause of mortality although with the declines in various fishing activites

(and possibly the application of mitigation measures like pingers), this may have decreased in some areas (one exception being the southern North Sea). It should be noted that it is much easier to establish by-catch as cause of death than many other activities, such as prey depletion, pollution, and noise disturbance. Even physical damage from vessel strikes may not be easily distinguished from damage post mortem.

During the 1960s – 1980s, bottlenose dolphins also became scarce in the southern North Sea and English Channel. They have remained so in the southern North Sea but in southern Britain, a small population occurred regularly during the 1990s, becoming scarcer again since around 2000.

A number of species have shown range shifts in recent years that may be at least partly related to sea temperature changes. These include the increased frequency of strandings and sightings of striped dolphin aroud the British Isles; common dolphins occurring regularly in the northern, cerntral and eastern North Sea (even extending into the Baltic); white-beaked and white-sided dolphins possibly becoming scarcer in the northern North Sea and Hebrides, although white-beaked dolphin occurrence in Dutch waters increased from 1990 onwards; Risso's dolphins becoming regular in the northern North Sea; and general increases around the British Isles of minke whale and humpback whale.

The following recommendations are made:

- Common databases should be developed (or established where they do not exist already) for sightings, strandings, and causes of death for all the cetacean species regularly occurring in the ASCOBANS Area.
- Information on material available for other studies (genetics, diet, reproductive physiology, estimation of life history paramters) should be compiled in a common meta-database for all cetacean species.
- Greater effort with more systematic coverage should be applied in those countries that currently do not have well-developed strandings schemes (where this is practicable).
- Adequate surveillance schemes using sighting surveys (vessel & plane) as well as acoustics should be developed across the ASCOBANS Agreement Area. Power analysis shold be conducted to establish the frequency and extent of coverage necessary to detect changes.

The next phase of this project will examine current reporting systems and how they might be enhanced, and further investigate the options for developing a series of common databases

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APPENDIX 1: List of 35 European Cetacean Species and their Latin Names

ORDER CETACEA

SUB-ORDER MYSTICETI, the Baleen Whales

Family Balaenidae (right whales)

Balaena mysticetus	Bowhead whale
Eubalaena glacialis	North Atlantic right whale

Family Balaenopteridae (rorquals)

Balaenoptera acutorostrata	**Minke whale**
B. borealis	**Sei whale**
B. edeni	Bryde's whale
B. musculus	Blue whale
B. physalus	**Fin whale**
Megaptera novaeangliae	**Humpback whale**

SUB-ORDER ODONTOCETI, the Toothed Whales

Family Physeteridae

Physeter macrocephalus	**Sperm whale**

Family Kogiidae

Kogia breviceps	Pygmy sperm whale
K. sima	Dwarf sperm whale

Family Ziphiidae

Hyperoodon ampullatus	**Northern bottlenose whale**
M. bidens	**Sowerby's beaked whale**
M. densirostris	Blainville's beaked whale
M. europaeus	Gervais' beaked whale
M. grayi	Gray's beaked whale
M. mirus	True's beaked whale
Ziphius cavirostris	**Cuvier's beaked whale**

Family Monodontidae

Delphinapterus leucas	White whale, beluga
Monodon monoceros	Narwhal

Family Delphinidae

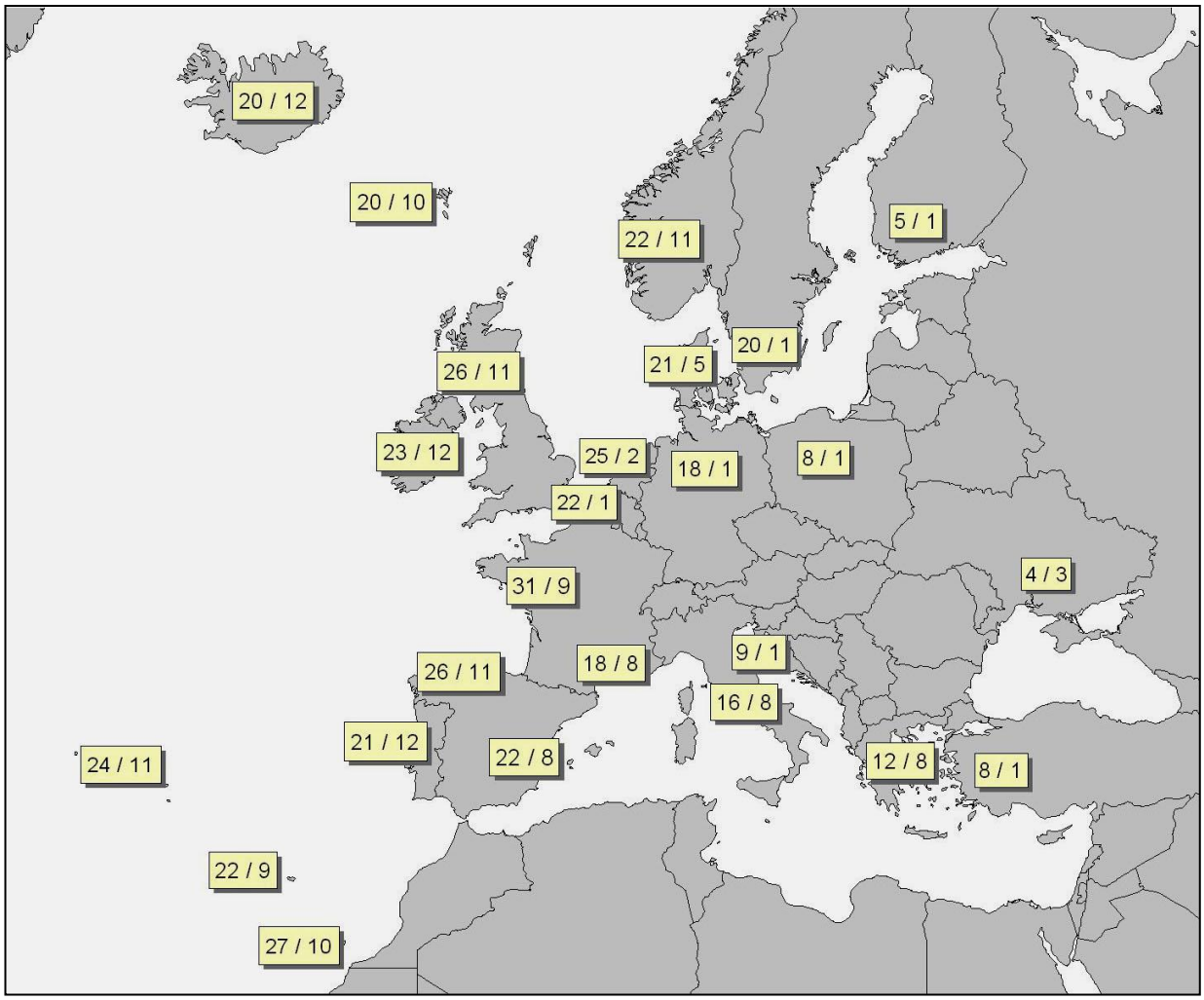
Delphinus delphis	**Short-beaked common dolphin**
Feresa attenuata	Pygmy killer whale
Globicephala macrorhynchus	Short-finned pilot whale
G. melas	**Long-finned pilot whale**
Grampus griseus	**Risso's dolphin**
Lagenodelphis hosei	Fraser's dolphin
Lagenorhynchus acutus	**Atlantic white-sided dolphin**
L. albirostris	**White-beaked dolphin**
Orcinus orca	**Killer whale**
Peponocephala electra	Melon-headed whale
Pseudorca crassidens	False killer whale
Stenella coeruleoalba	**Striped dolphin**
S. frontalis	Atlantic spotted dolphin
Tursiops truncatus	**Common bottlenose dolphin**

Family Phocoenidae (porpoises)

Phocoena phocoena	**Harbour porpoise**

NOTE: Species in **bold** occur regularly in the ASCOBANS Agreement Area

APPENDIX 2: Map of Cetacean Species Diversity in Europe by Country



NOTE: The first value relates to the total number of species recorded in that country; the second values relates to the number of species occurring there regularly

APPENDIX 3: Status of Cetacean Species Occurring in ASCOBANS Agreement Area, by Country

	COUNTRY													
CETACEAN SPECIES	**NO**	**DK**	**SE**	**FI**	**PO**	**LI**	**DE**	**NL**	**BE**	**UK**	**IE**	**FR**	**ES**	**PT**
a) baleen whales & large toothed whales														
Bowhead whale	RAR[1]	-	-	-	-	-	-	-	-	-	-	-	-	-
N. Atlantic right whale	VAG	-*	-	-	-	-	-	VAG	-*	VAG	VAG	-*	VAG	VAG
Minke whale	COM	COM[2]	RAR	-*	-	-	RAR	RAR	VAG	COM[3]	REG[4]	REG	REG	COM
Sei whale	RAR	VAG	RAR	-	-	-	VAG	VAG	VAG	RAR	REG	RAR	RAR	REG
Bryde's whale	-	VAG	-	-	-	-	-	-	-	-	-	-	-	-
Blue whale	RAR	-*	-	-	-	-	-	-*	-*	RAR	RAR	VAG	RAR	VAG
Fin whale	REG	VAG	RAR	-	-	-	VAG	VAG	VAG	REG	REG	RAR	REG	REG
Humpback whale	COM	VAG	VAG	VAG	-*	-	VAG	VAG	-*	RAR	RAR	VAG	RAR	RAR
Sperm whale	REG	RAR	RAR	-	VAG	-	VAG	VAG	VAG	RAR	RAR	REG	REG	REG
b) small cetaceans														
Pygmy sperm whale	-	-	-	-	-	-	-	-*	-	VAG	VAG	RAR	VAG	VAG
Dwarf sperm whale	-	-	-	-	-	-	-	-	-	-	-	VAG	VAG	-
Northern bottlenose whale	REG	VAG	RAR	-	-*	-	VAG	VAG	-*	REG	REG	RAR	REG	-
Sowerby's beaked whale	RAR	VAG	RAR	-	-	-	VAG	VAG	-*	RAR	RAR	RAR	RAR	RAR
Blainville's beaked whale	-	-	-	-	-	-	-	VAG	-	VAG	-	VAG	VAG	VAG
Gervais' beaked whale	-	-	-	-	-	-	-	-	-	-	VAG	VAG	-	RAR
Gray's beaked whale	-	-	-	-	-	-	-	-*	-	-*	-	-*	-	-
True's beaked whale	-	-	-	-	-	-	-	-	-	-	VAG	VAG	VAG	-
Cuvier's beaked whale	-	-	RAR	-	-	-	-	VAG	VAG	RAR	RAR	REG	REG	RAR
Beluga	RAR	VAG[5]	RAR	VAG	-*	VAG	VAG	VAG	VAG	VAG	-	-	-	-
Narwhal	RAR	-	VAG	-	-	-	-	-*	-	-*	-	-	-	-
Short-beaked common dolphin	VAG	REG	RAR	VAG	VAG	-	VAG	RAR	VAG	COM	COM	COM	COM	COM
Pygmy killer whale	-	-	-	-	-	-	-	-	-	-	-	VAG	VAG	-
Short-finned pilot whale	-	-	-	-	-	-	-	-	-	-	-	VAG	VAG	-
Long-finned pilot whale	COM[6]	RAR	RAR	-	-	-	VAG	VAG	VAG	COM	COM	COM	COM	COM
Risso's dolphin	VAG	-*	RAR	-	-	-	VAG	VAG	RAR	REG	REG	REG	REG	COM
Fraser's dolphin	-	-	-	-	-	-	-	-	-	VAG	-	VAG	-	VAG
Atlantic white-sided dolphin	COM	RAR	RAR	-	-	-	VAG	RAR	VAG	COM	COM	RAR	RAR	RAR
White-beaked dolphin	COM	COM[7]	RAR	RAR	RAR	-	RAR	REG	RAR	COM	REG	RAR	VAG	-
Killer whale	REG	REG[8]	VAG	-	-	-	VAG	VAG	VAG	REG	REG	RAR	RAR	REG
Melon-headed whale	-	-	-	-	-	-	-	-	-*	-*	-	VAG	-	-
False killer whale	VAG	-*	-*	-	-	-	-*	-*	-	VAG	VAG	VAG	VAG	RAR
Striped dolphin	VAG	VAG	VAG	-	VAG	-	VAG	VAG	VAG	RAR	RAR	COM	COM	COM
Atlantic spotted dolphin	-	-	-	-	-	-	-	-	-	-	-	VAG	-	-
Bottlenose dolphin	VAG	VAG	VAG	-*	-	VAG	VAG	RAR	RAR	COM	COM	COM	COM	COM

Harbour porpoise	COM	COM	COM	RAR	RAR	VAG	COM	COM	COM	COM	COM	REG	COM	COM

NOTES

Countries: NO = Norway; DE = Denmark; SE = Sweden; FI = Finland; PL = Poland; LI = Lithuania; DE = Germany; NL = Netherlands; BE = Belgium, UK = United Kingdom; IE = Ireland; FR = (Atlantic) France; ES = (Atlantic) Spain (excl. Canaries); PT = (Atlantic) Portugal (excl. Azores & Madeira)

For Latvia and Estonia, there is insufficient information on status of most species, although no species is regular, and harbour porpoise occurs at best as a vagrant

Cetacean Status (based on records since 1980): VAG = Vagrant; RAR = Rare; REG = Regular (but Uncommon); COM = Common; - = Not Recorded; * = Record(s) before 1980

Despite frequent references to it in handbooks, rough-toothed dolphin, *Steno bredanensis*, has not been recorded with certainty from the ASCOBANS region. There are two nineteenth century records ascribed to *Steno* from the Netherlands, one based only upon a description and drawing, and the other on a skull found in a ditch, but no skeletal evidence of the former has been found, and the origins of the latter are uncertain and may derive from a sailor's travels elsewhere in the world.

[1] VAG in northern Norway only, [2] REG in Kattegat/Baltic, [3] but REG in Channel & Southern North Sea, [4] but COM in Southwest; [5] but annual, periodically, [6] but periodic, at other times RAR, [7] REG in Kattegat/Baltic, [8] RAR in Kattegat/Baltic

APPENDIX 4: List of Main Contacts for Strandings Schemes

Belgium
Marine Animals Research & Intervention Network (MARIN), Department of Veterinary Pathology, University of Liège, Liège (Thierry Jauniaux T.Jauniaux@ulg.ac.be)

Denmark
Fishery and Maritime Museum (Fiskeri- & Søfartsmuseet), Tarphagevej 2, 6710 Esbjerg (Lasse Fast Jensen lfj@fimus.dk)

Finland
No stranding scheme

France
Centre de Recherche sur les Mammifères Marins (CRMM), Université de La Rochelle, Pôle Analytique, 5 allée de l'Océan, F-17000 La Rochelle / Littoral Environnement et Sociétés (LIEN) (UMR 6250), Fédération de Recherche en Environnement et Développement Durable, Université de La Rochelle, Institut du Littoral et de l'Environnement (ILE), 2 rue Olympe de Gouges, 17 042 La Rochelle cedex 1 (Olivier van Canneyt olivier.van-canneyt@univ-lr.fr)

Germany
Research and Technology Center Westcoast, Christian-Albrechts-University Kiel, Werftstr. 6, 25761 Büsum (Ursula Siebert ursula.siebert@ftz-west.uni-kiel.de)

Veterinary Institute for Fish and Fishery Products, Lower Saxony State Office for Consumer Protection and Food Safety, Schleusenstr. 1, D-27472 Cuxhaven (Michael Stede & Sven Ramdohr)

German Oceanographic Museum (Deutsches Meeresmuseum), Museum für Meereskunde und Fischerei – Aquarium, Stiftung des bürgerlichen Rechts, Katharinenberg 14-20, 18439 Stralsund (Harald Benke Harald.Benke@meeresmuseum.de)

Lithuania
No stranding scheme

The Netherlands
National Museum of Natural History (Naturalis), Leiden (Steven van der Mije@Naturalis.nl & Kees Camphuysen kees.camphuysen@wxs.nl) - web address for strandings: www.walvisstrandingen.nl)

Poland
Hel Marine Station, University of Gdansk, Morska 2, 84-150 Hel (Krzysztof Skóra skora@univ.gda.pl & Iwona Pawliczka oceik@univ.gda.pl)

Sweden
Swedish Museum of Natural History (Naturhistoriska Riksmuseet), Frescativägen 40, Stockholm (for Swedish Baltic)

Gothenburg Natural History Museum (Goteborgs Naturhistoriska Museum), Slottsskogen vid Linnéplatsen, Box 7283, SE-402 35 Göteborg (for Swedish North Sea)

United Kingdom
Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY (UK strandings coordinator: Rob Deaville Rob.Deaville@ioz.ac.uk; UK post mortem analyses: Paul Jepson Paul.Jepson@ioz.ac.uk)

Wildlife Unit, Scottish Agricultural College Veterinary Services, Drummondhill, Stratherrick Road, Inverness IV2 4JZ (Scottish strandings coordinator: Bob Reid Bob.Reid@sac.co.uk)

Marine Environmental Monitoring, Penwalk, Llechryd, Cardigan, Ceredigion SA43 2PS (Welsh strandings coordinator: Rod Penrose rodpenrose@strandings.demon.co.uk)