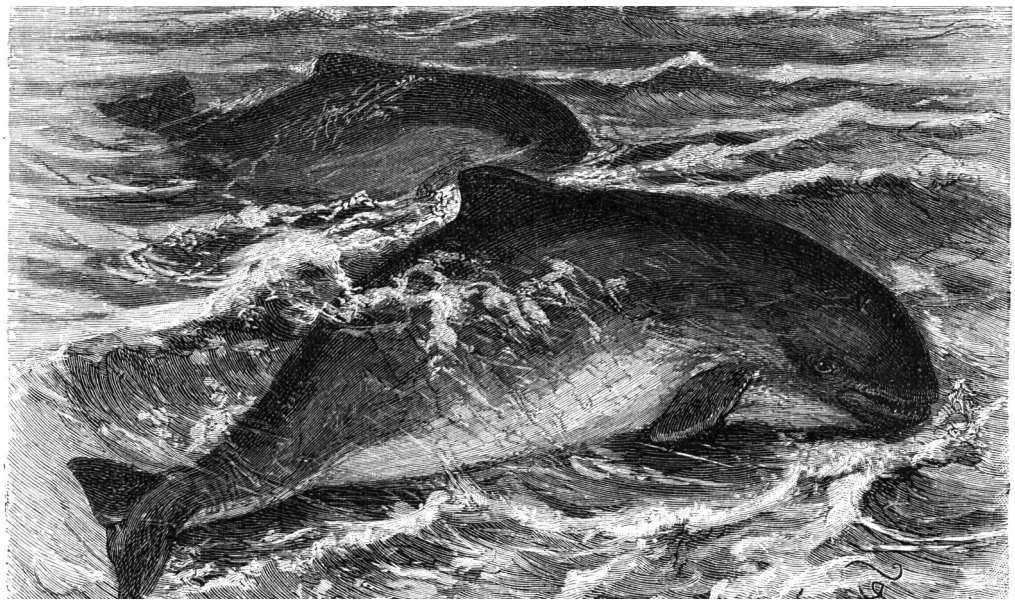
OSPAR COMMISSION

Background Document for Harbour porpoise

Phocoena phocoena



Biodiversity Series

2009

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l’Irlande, l’Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d’Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l’Espagne.

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OSPAR Background Document for Harbour porpoise *Phocoena phocoena*

Executive Summary

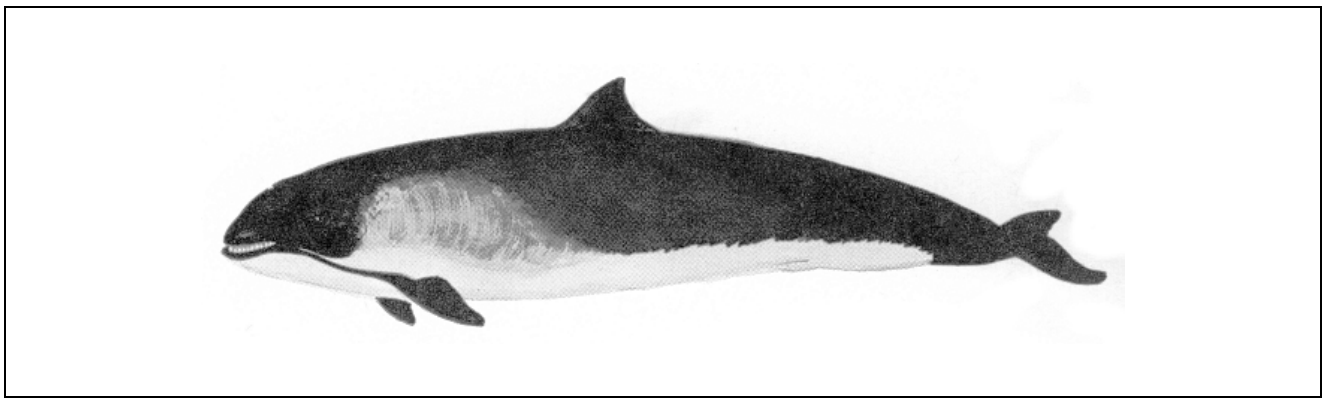
This Background Document for Harbour porpoise – *Phocoena phocoena* - has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2003. The original evaluation used to justify the inclusion of *Phocoena phocoena* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2009-2010. Chapter 7 provides proposals for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *Phocoena phocoena*, where necessary in cooperation with other competent organisations. This background document may be updated to reflect further developments or further information on the status of the species which becomes available.

Récapitulatif

Le présent document de fond sur le *marsouin commun* a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2003. L'évaluation d'origine permettant de justifier l'inclusion du *marsouin commun* dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2009-2010. Le chapitre 7 fournit des propositions d'actions et de mesures qui pourraient être prises afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection du *marsouin commun*, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond pourra être actualisé pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.

1. Background Information

Phocoena phocoena (Linnaeus, 1767); harbour porpoise, also known as common porpoise; marsouin commun (Fr), marsopa común (Es), schweinswal (De).



P.phocoena is generally a continental shelf species distributed in cold temperate and subarctic waters in the Northern Hemisphere (Klinowska, 1991). It is characterised by a blunt short-beaked head and a low wide-based triangular dorsal fin. Adults are usually less than 1.8 m long and weigh from 45 to 70 kg. Generally, *P.phocoena* occurs singly or in small groups of less than eight individuals. Occasionally, larger schools of up to several hundred animals have been reported (ASCOBANS nd). Their prey consists of a wide variety of fish and cephalopods, with regional variation of their main prey items. Although small schooling fish (for example herring) are important, demersal foraging is characteristic in many areas (Hammond *et al*., 2008).

In the eastern North Atlantic, *P. phocoena* is common and widely distributed on the continental shelf from the Barents Sea and Iceland south to the coasts of France and Spain. It is the most abundant cetacean species in north-western European shelf waters and extends southward along the African coast to Mauritania (Boisseau *et al*., 2007).

2. Original Evaluation against the Texel-Faial Selection Criteria

OSPAR Regions and Dinter Biogeographic Provinces where the species occurs

OSPAR Regions:	All
Dinter Biogeographic Provinces:	Warm-temperate waters, Cold-temperate waters, Cold-Arctic waters, Warm-temperate pelagic waters, Azores shelf, Lusitanean (Cold/Warm) , Lusitanean-boreal, Cold-temperate pelagic waters, Boreal-lusitanean, Boreal Norwegian Coast (Finnmark), Norwegian Coast (Westnorwegian), Norwegian Coast (Skagerrak), South Iceland - Faroe Shelf.

OSPAR Regions and Dinter Biogeographic Provinces where the species is under threat and/or in decline

OSPAR Regions:	II, III
Dinter Biogeographic Provinces:	Warm-temperate waters, Cold-temperate waters, Warm-temperate pelagic waters, Lusitanean-boreal, Cold-temperate pelagic waters, Boreal-lusitanean, Boreal, Norwegian Coast (Westnorwegian), Norwegian Coast (Skagerrak).

Original Evaluation against the Texel-Faial criteria for which the species was included on the OSPAR List

There were five nominations for *P.phocoena* to be included in the OSPAR List of Threatened and/or Declining Species and Habitats. The criteria common to all of these were *decline* and *sensitivity*, with information also provided on *threat*.

Global/Regional Importance: The OSPAR Maritime Area in general and the North Sea in particular hosts the largest number of *P.phocoena* individuals in their global distribution pattern across temperate and subarctic waters.

Decline: Declines in abundance of *P.phocoena* have been reported since the 1940s as well as in more recent studies in various parts of its range. *P.phocoena* has become scarce in the southernmost North Sea, English Channel and Bay of Biscay for example (Evans, 2000) and has declined in the Skagerrak and Kattegat (Berggren & Arrhenius, 1995 a & b). It was considered to be one of the most common cetaceans in Region IV of the OSPAR Maritime Area but sightings and strandings are now only common in certain areas for example, western Galician and northern Portuguese coasts (OSPAR, 2000).

P.phocoena is listed on Appendix II of the Bern Convention and Annexes II and IV of the Bonn Convention. In 2008, IUCN has assessed the global status of the harbour porpoise as being of *Least Concern* [Ver 3.1] (Hammond *et al*., 2008).

Sensitivity: *P.phocoena* is known to be sensitive to poor water quality, including toxic contaminants which bio-accumulate over time. It has been shown that organochlorines impair the immune and endocrine systems (Beineke *et al*., 2005; Jepson *et al*., 2005; Das *et al*., 2006). A strong increase in infectious disease mortality was shown in British harbour porpoises to correlate with PCB levels above 17 mg/kg lipid (Jepson *et al*., 2005). Beineke *et al*., (2005) also found indications for contaminant-induced immunosuppression in harbour porpoises stranded on the German Baltic coast.

Like all odontocetes, *P.phocoena* uses sound for navigation, finding food and communication and is therefore sensitive to acoustic pollution. *P.phocoena* is amongst the fastest reproducing cetacean but depleted populations are nevertheless likely to take decades rather than years to recover (Read & Hohn, 1995).

As a relatively small marine mammal, *P.phocoena* has a tight energy budget and needs to feed very frequently. It is therefore highly sensitive to changes in food availability, for example, caused by overfishing or other changes in environmental conditions (Read & Hohn, 1995).

Threats: Small cetaceans, including *P.phocoena* were taken for human consumption from the OSPAR Maritime Area until this was made illegal in 1970 (Klinowska, 1991).

The main threat to this species in the OSPAR Maritime Area today is incidental capture and drowning in fishing nets. For example, the Danish gillnet fishery has been estimated to take more than 4600 animals a year (IWC, 1996). In the Celtic Sea, by-catch rates have been estimated at more than 6% of the population per year (Tregenza *et al*., 1997), while in the Swedish Kattegat surveys in 1996 & 1997 calculated by-catch levels of 1.2% and 2.4% of the population in the set net fishery for cod and pollock. The International Whaling Commission (IWC)/ASCOBANS working group on *P.phocoena* advised a maximum annual anthropogenic removal (including by-catch), assuming no uncertainty in any parameter, of 1.7% of the population size per year if the population is to be non-declining (ASCOBANS, 2000). This has subsequently been developed as an OSPAR Ecological Quality Objective (EcoQO), which is currently being assessed.

Other threats to this species are marine pollution, for example from toxic substances that bio-accumulate and are known to reduce reproductive fitness (Jepson *et al*., 1999; Siebert *et al*. 1999; Das *et al*. 2004; Jepson *et al*., 2005), as well as acoustic disturbance (from shipping traffic, oil exploration, military activities, etc.) that may reduce available habitat. Single or multiple exposures to intense sound, especially from seismic surveys, pile driving and underwater explosions, may also lead directly to impaired hearing.

A reduction in prey species may also be a threat as the diet of *P.phocoena* includes herring, mackerel and sand eel that are also targeted by commercial fisheries in the North Sea.

Furthermore, all these threats mentioned may impact *P.phocoena* singularly or may lead to cumulative effects and thus need to be studied accordingly.

Relevant additional considerations

Sufficiency of Data: Data on the status and trends of *P.phocoena* have come from sighting programmes and from observers at sea. This includes information on by-catch that has been used to estimate the impact on the population of *P.phocoena* in the Greater North Sea (Region II of the OSPAR Maritime Area). However, for many areas insufficient information is available to adequately assess the extent of P.phocoena by-catch.

Changes in Relation to Natural Variability: Little is known about the natural variability of *P.phocoena* populations or whether such variability has played a role in the decline of this species in particular areas.

Expert Judgement: There is a good understanding of the potential and actual threats to *P.phocoena* throughout the OSPAR Maritime Area but less comprehensive information on the impact of these threats on the population status of *P.phocoena*. The most comprehensive studies have been in OSPAR Region II where there is good evidence for a change in distribution in recent years. There is least information on population trends in Region I with the result that this Region has only been cited as an area where this species is threatened.

ICES Evaluation: *P.phocoena* occurs in all regions but is most abundant in Regions II and III. The population structure in the OSPAR Maritime Area is complex and not yet fully understood. The ICES Advisory Committee on Ecosystems concluded in 2003 that there is good evidence of a past decline in the Channel and southern North Sea[1] and more recently in the Baltic. There is good evidence that the main threat is by-catch, particularly bottom-set gillnets. The by-catch is likely to be unsustainable on the Celtic shelf, in the Baltic, and in some parts of the North Sea.

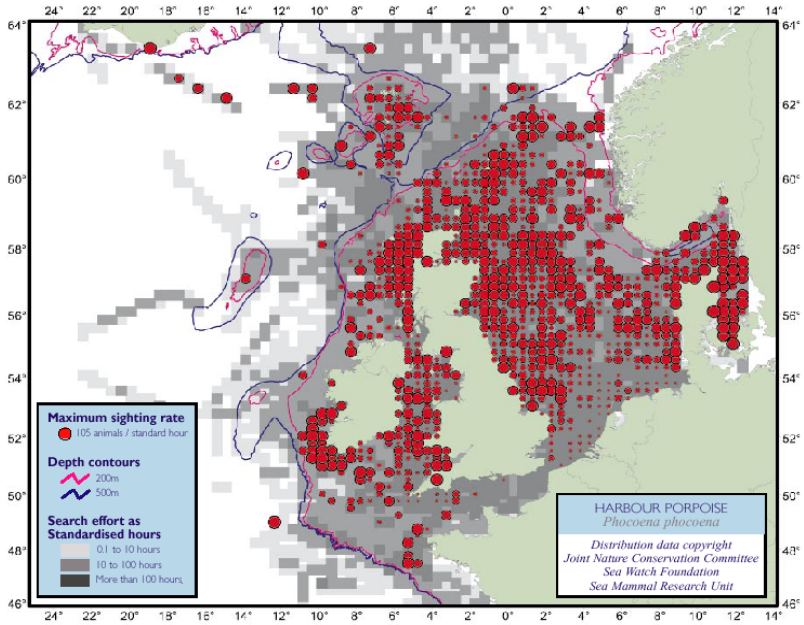
3. Current Status of the Species

Distribution in the OSPAR Maritime Area

P.phocoena occurs in all OSPAR Regions. The *Atlas of Cetacean distribution in north-west European waters* (Reid *et al*., 2003) shows the occurrence in part of the OSPAR Maritime Area.

Figure 1: Occurrence of *Phocoena phocoena* in part of the OSPAR Maritime Area (Source: Reid *et al*., 2003)

[1] The SCANS survey in 2005 rather indicated a southerly shift and not a decline of the population within the North Sea.



There is no comprehensive information available on the distribution of *P.phocoena* for the entire OSPAR Maritime Area.

However, in the eastern North Atlantic, *P.phocoena* is common and widely distributed on the continental shelf from the Barents Sea and Iceland south to the coasts of France and Spain. It is the most abundant cetacean species in north-western European shelf waters and extends southward along the African coast to Mauritania (Boisseau *et al*., 2007).

Population (current/trends/future prospects)

There has been much debate regarding the genetic structure of *P.phocoena* populations in the eastern North Atlantic. In general, there are thought to be a number of sub-populations in the Atlantic and possibly also in the North Sea and adjacent waters, with separate populations occurring in the Irish Sea, northern North Sea and southern North Sea (Kinze, 1990; IWC, 1996; Walton, 1997; Lockyer, 1999; Andersen et al., 1999; Rosel *et al*., 1999). However, it is highly likely that there is an exchange of individuals between these populations. More recently, *P.phocoena* populations within the eastern North Atlantic have been demonstrated to show geographic structuring as a consequence of limited gene flow along parts of the coast (Tolley & Rosel, 2006). Similarly, genetic analyses by Fontaine *et al*., (2007) indicated that *P.phocoena* populations of the eastern North Atlantic behave as a 'continuous' population that extends from the French coasts of the Bay of Biscay northwards to the arctic waters of Norway and Iceland. The ASCOBANS/HELCOM population structure workshop held in 2007, concluded that for the North Sea there is some population structure, but the evidence was currently insufficient to define boundaries between any (sub-) populations (ASCOBANS, 2008).

A number of surveys covering different parts of the OSPAR Maritime Area have been carried out to determine the size and trends in the population of *P.phocoena*.

The most wide-ranging surveys for estimating *P.phocoena* abundance in the region were conducted in 1994 covering the North Sea, the English Channel and the Celtic Sea (SCANS) and in 2005 (SCANS II) covering the North Sea and European Atlantic continental shelf waters. Based upon the 1994 SCANS survey, the North Sea population was estimated at about 280 000 animals with a further 36 000 in the Skagerrak and Belt Seas and another 36 000 over the Celtic shelf between Ireland and Brittany (Hammond et al., 2002).

Abundance estimates from the 2005 SCANS II surveys for a similar area (315 000 (95% CI: 201 500-395 100)) did not show any significant change in the overall population sizes (approximately 335 000 individuals) but there have been marked changes in their distribution (SCANS II, 2008). In the 1994 SCANS survey, high density distributions of *P.phocoena* were observed off the coastline of south-east Scotland and NE England

and off the north and west coasts of Denmark, but in the 2005 SCANS II survey these main concentrations had apparently shifted further south to the southern North Sea (SCANS-II, 2008).. Additionally, higher densities were seen in the Celtic Sea than had been reported in 1994. The densities of *P.phocoena* that had occurred in 1994 appeared to have shifted offshore in 2005. Although supporting evidence is lacking at present, a change in prey distribution is considered the most likely, though not necessarily the only, reason behind these changes in distribution. These estimates are a good basis for assessing the threat posed by the by-catch rates in the region and serve as a baseline for detecting future trends.

Within the scope of the MINOS and MINOSplus projects, the Research and Technology Centre Westcoast (FTZ) conducted aerial line transect sighting surveys that covered waters in the German EEZ and the 12 nautical mile zone of the North Sea from May 2002 to June 2006. The estimated abundance in the German North Sea was highest in April/May 2005 with an estimate of 38 089 individuals (95% CI = 19 628-81 126; CV=0.38) and in May/June 2006 with an estimate of 51 551 individuals (95%CI = 27 879-98 910; CV=0.32). *P.phocoena* density was found to be highest in late spring to early summer. Lower numbers were estimated in autumn, *e.g.* 10 849 individuals. (95%CI = 5 544-22 202; CV=0.34) in Oct./Nov. 2005. The distribution of *P.phocoena* was heterogeneous, with the animals showing clear preferences for several discrete areas, suggesting that these may be important foraging grounds. The preference was most clear in spring and summer, where hot spots were detected in two parts of the German EEZ. The Sylt Outer Reef in the north-east was favoured in spring and summer, while the Borkum Reef Ground in the south-west was favoured in spring. Preferences were less evident in autumn (Gilles *et al.*, 2008).

For the Kattegat, Belt Seas 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 modelling (DSM, Teilmann unpublished data). When Skagerrak is added to this area (area I in Hammond *et al*., 2002) the DSM abundance estimates for 1994 is 31 715 (CV=0.25) porpoises and for 2005 15 557 (CV=0.30) porpoises (Hammond *et al*., in prep). Due to wide confidence intervals in line transect surveys, this 38 - 51% decline was however, not statistically significant, but should give reason for concern (Teilmann *et al*., 2008).

Previous surveys carried out in 1988/89 estimated 11 000 *P.phocoena* in the Lofoten-Barents Sea area and 82 000 in the northern North Sea and southern Norwegian waters, although these may be under-estimates (Bjørge & Øien, 1995; IWC, 1990).

P.phocoena is believed to have been common in waters off the coast of the Netherlands and Belgium in the 19th and first half of the 20th century with data suggesting a decline in the southern North Sea between the 1970s and 1990s. Since the mid-1970s there has been an increase in the number of sightings and strandings in Belgian waters and the Netherlands (Camphuysen, 1994 and 2004; Witte *et al.*, 1998; Haelters *et al*., 2000). With the more recent findings from the SCANS surveys, however, it is generally agreed that this increase could well be explained by a population shift to the southern North Sea.

Future population trends are difficult to predict. A comparison of the two SCANS surveys (1994 and 2005) only allows a geographically limited trend analysis for the summer distribution and abundance subject to several assumptions. The observed southward population shift could equally be explained by a change in habitat use and/or movement patterns (*e.g*. following migratory prey).

Condition (current/trends/future prospects)

Although the health aspects have been noted by some OSPAR Contracting Parties, this information has not yet been compiled into a single database. ASCOBANS has been asking its Contracting Parties to provide annual information on population status including health aspects.

Limitations in Knowledge

Supporting evidence to explain the changes in distribution and density detected in SCANS II is lacking at present. A change in prey distribution is considered the most likely, though not necessarily the only reason behind these changes in distribution. Trend data on the population sizes are only available from Germany, Iceland, Netherlands, and Spain. Incidentally collected baseline data on health aspects are available from

Belgium, Germany, UK, Iceland, Netherlands (only coastal waters), and Spain, but not from Ireland, Portugal, and Sweden. Human threats have generally been poorly monitored, although a greater understanding of by-catch is developing. An increasing source of information is expected through national reports on incidental capture and killing of cetaceans in fisheries under EU Regulation 812/2004. In a recent assessment of these reports, however, ICES SGBYC (2008) found that the wide variety of report structures combined with a lack of European integration meant that it was not possible to estimate the proportion of the *P.phocoena* population that was subject to by-catch. It has to be noted that not all of these data have been made available to OSPAR during the preparation of this Background Document.

4. Evaluation of Threats and Impacts

Threat and link to Human Activities

Relevant human activity: fishing (by-catch); shipping, military activity; research.

Category of effect of human activity: physical – noise; biological – removal as non-target species.

The causes of lowered *P.phocoena* abundance are primarily related to human activities. The most significant threat to the species at the present time is fishing due to the large numbers of animals taken as by-catch by a variety of fisheries. Porpoises are taken incidentally in several different gear types (driftnets, pelagic trawls, etc.), but mostly in bottom-set gillnets (Read, 1999). Annual by-catch in the Skagerrak probably exceeds 4% of the total population (www.ascobans.org). In the UK, by-catch was the cause of death in 24.8% of stranded porpoises (Pinn, 2008), in the Netherlands it was over 50% (Leopold & Camphuysen 2006), and in Germany 46% (Siebert *et al.,* 2001).

The influence of the possible depletion of prey is less clear. Considering that many fish species consumed by *P.phocoena* have commercial value (Santos, 1998) and are overfished in OSPAR waters, this could have a negative influence, *e.g.* if animals have to switch to fish of lower nutrient value where the preferred type is not available.

Another threat to this species is marine pollution, for example from toxic substances that bio-accumulate and are known to reduce reproductive fitness (Jepson *et al*., 1999, 2005; Siebert *et al*. 1999; Das *et al*., 2004). Persistent organic pollutants (POPs), bio-accumulating in the blubber of *P.phocoena* include polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and brominated flame retardants. A recent, as yet unpublished, EU study found the highest PCB levels in *P.phocoena* from the southern North Sea (Netherlands and Belgium). These also had the lowest reproductive rate of the stocks studied (M. Addink, *pers. comm*.).

Acoustic disturbance (from shipping traffic, oil exploration, military activities, etc.) may increase physiological stress and induce behavioural changes. It can also reduce available habitat and lead to displacement of *P.phocoena* from breeding or feeding grounds (Tougaard, 2003; Thomsen, 2006). Single or multiple exposures to intense sound, especially from seismic surveys, pile driving and underwater explosions, may also lead directly to impairmed hearing. Experimental data show *P.phocoena* is less tolerant of noise than other odontocete species (Lucke *et al*., 2008).

All these threats may impact *P.phocoena* singularly or may lead to cumulative effects and thus need to be studied accordingly. Because the main threats to *P.phocoena* are clearly linked to human activities, they can be addressed through respective management actions.

5. Existing Management Measures

Conservation Measures

P.phocoena is one of the protected species listed in the Annexes of the European Habitats Directive (Natura 2000). Apart from OSPAR, there are several other treaties which have been signed by several OSPAR

Contracting Parties (ASCOBANS, NAMMCO, Bern Convention, Bonn Convention, 5th Conference on the Protection of the North Sea – Bergen, etc.), each with its own emphasis though generally giving strict protection to cetaceans including *P.phocoena*. Many of the useful potential measures fall within the remit of fisheries organisations or ASCOBANS.

Table 1: Competent Authorities for Management/Protection of Harbour Porpoises[2]

Authority/treaty	*Role in management/protection*
ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas)	Obliges signatories to apply the conservation, research and management measures prescribed in the ASCOBANS annex. Those involve by-catch reduction, pollution control, research, monitoring, and PR.
Bern Convention	Is concerned with the protection of endangered natural habitats in Europe; appendix II of this treaty accords strict protection to *P.phocoena*.
Bonn Convention	The convention on the conservation of migratory species; appendix II lists species thought to have an unfavourable conservation status including all cetaceans (e.g. *P.phocoena*); not listed on appendix I.
EU Habitats and Species Directive	Council Directive 92/43/EEC, lists *P.phocoena* in annex II and IV; this means that favourable conservation status of this species has to be achieved and Special Areas of Conservation (SACs) are to be designated for this species where needed; the Directive also obliges members to monitor and prevent by-catch.
European Commission and Common Fisheries Policy	Three articles of European fisheries legislation concern by-catch (EC regulations 345/92, 1239/98, 973/2001) whilst cetacean by-catch is specifically covered by EU Regulation 812/2004. This came into force in January 2005 which lays down measures to: reduce incidental catches (by-catch) of cetaceans in fisheries through the mandatory introduction of acoustic devices (pingers) on vessels over 12 m; monitoring of vessels (over 15 m) in fisheries where by-catch of cetaceans has been implicated; phase out and eventually ban fishing with drift nets in the Baltic Sea. The first phase of the pinger requirements is to be implemented in certain North Sea fisheries by June 2005.
5th North Sea Conference	Reduction of by-catch of *P.phocoena* below 1.7 % of the population
NAMMCO (North Atlantic Marine Mammal Commission)	Provides scientific advice and conservation/management recommendations for all species of cetaceans and pinnipeds relevant to member countries (Norway, Iceland, Faroe Islands and Greenland). Includes stock assessment, sustainable harvest levels, by-catch and marine mammal – fisheries interactions.

Directed fishing/hunting of *P.phocoena* is prohibited in the OSPAR Maritime Area. However, by-catch remains an issue. Currently there are no conservation plans in place for *P.phocoena* in the OSPAR Maritime Area though ASCOBANS is in the process of finalising a conservation plan for *P.phocoena* in the North Sea.

It should be emphasized that regional differences in *e.g.* population density, ecology and types of fishery in the various OSPAR regions means that conservation measures need to be conceptualized in such a way that they can be "tailored" for a specific area.

[2] For further information on authorities and treaties please refer to Annex 4.

In several countries, the uses of pingers (devices that warn porpoises of the presence of nets) have contributed to a decline in by-catch (UK study, www.ascobans.org). Vinther and Larsen (2003) clearly show this for the Danish gillnet fishery. It should be realised though that these devices could also drive porpoises away from favourable areas that they need for foraging and breeding. The EU by-catch legislation (812/2004) requires all fishing vessels over 12 m long using certain gear types to use pingers. ICES BGBYC (2008) found that many of the fisheries covered by this legislation do not have a significant porpoise by-catch and concluded that the legislation needs reviewing. Forcing fishermen to use pingers without clear knowledge of which fishery causes significant by-catch may be counter-productive and may damage future cooperation with the fishing industry.

Tests of alternative fishing gear (*e.g.* long-lines instead of bottom-set gillnets) are being conducted by Swedish fishermen (ASCOBANS, 2008). In Germany, a research project is being undertaken by the Federal Agency for Nature Conservation (BfN) to study the applicability of ecologically sound fish traps as an alternative to gillnets.

Sweden introduced the Swedish Harbour Porpoise Action Plan, including a number of measures such as reduction of by-catch, distribution of information on harbour porpoise, or setting up of a reporting system.

Monitoring Measures

There are several projects in the OSPAR area that monitor various aspects of the harbour porpoise and there will be regular monitoring in EU states under the EU Habitats Directive. Field studies monitor for example:

- presence and occurrence of porpoises in certain areas;
- migratory routes (Danish Environmental Research institute);
- impact of pelagic trawling (NECESSITY, EU programme);
- by-catches in some types of fisheries (Greenpeace and UK studies), and
- stranded animals and the occurrence of carcasses on certain coasts.

Post-mortem examinations are carried out on strandings and by-catches to assess the health status, reproduction and other aspects of life history and to preserve samples for chemical and genetic analyses as part of the UK and German Cetaceans Stranding Investigation programme, that started in 1990 (Benke *et al*., 1998; Siebert *et al*., 2001; Deaville & Jepson, 2008). BIOCET, 2001-2003 collected similar data from Scotland, Ireland, the Netherlands (and Belgium), France and Galicia (Spain). SCANS II focused on aerial and boat population counts for most western European waters. Tagging studies have also been a source of information on the range and behaviour of *P.phocoena* in Danish Waters (Teilmann *et al*., 2008). In Denmark, at the Fjord & Belt Centre, a unique project has studied four captive porpoises since 1997; likewise at the Dolphinarium in Harderwijk in the Netherlands individuals are kept and studied in captivity.

A new project, Cetacean Offshore Distribution and Abundance (CODA) began in January 2007. This project undertook surveys of offshore waters (beyond the continental shelf edge) west of the UK, Ireland, France and Spain. The key objectives were: (a) to map summer distribution of common dolphins, bottlenose dolphins, deep diving whales and other cetaceans in offshore waters of the European Atlantic; (b) to estimate abundance of common dolphins, bottlenose dolphins, sperm whales and other species, as data allow, in offshore waters of the European Atlantic; (c) to develop further the management framework developed under project SCANS-II to assess the impact of by-catch on small cetaceans and to calculate safe by-catch limits for common dolphins; and (d) to investigate habitat preferences of common dolphin and other species, as data allow, in offshore waters of the European Atlantic. The preliminary results were recently presented at the 2008 IWC meeting. Although *P.phocoena*were observed during CODA, there were insufficient numbers to enable an abundance estimate to be made.

The North Atlantic Sightings Surveys (TNASS) are joint international cetacean surveys in the north-east and central Atlantic with participation from Norway, Iceland and the Faroes that have been carried out on four occasions since 1987 (most recently in 2001). Although *P.phocoena* is not the target species, the surveys give general information on distribution and relative abundance (NAMMCO 2003). TNASS was undertaken concurrently with CODA in 2007, matching its borders to SCANS and CODA areas and extended across the North Atlantic to the USA and Canada. Results are not expected until 2009.

6. Conclusion on overall status

There is no comprehensive and detailed analysis of the genetic structure of *P.phocoena* populations and their respective sizes across the whole OSPAR Maritime Area, and no corresponding database on European populations exists. Abundance estimates, however, have been derived by research and monitoring programmes for selected portions of their distribution range. As yet, no reliable assessment of the overall status of harbour porpoise populations and future trends can be made.

Enhanced surveys are necessary for an improved understanding and evaluation of *e.g.* the seasonal variations in abundance or the shifts in distribution of *P.phocoena* as shown in the SCANS result.

The effectiveness of all the treaties for practical protection of *P.phocoena*, including the funding of studies to generate additional data often seems limited.

A more cooperative approach among Contracting Parties may help to harmonize monitoring and research as well as conservation measures.

7. Action to be taken by OSPAR

Action/measures that OSPAR could take, subject to OSPAR agreement

As set out in Article 4 of Annex V of the Convention, OSPAR has agreed that no programme or measure concerning a question relating to the management of fisheries shall be adopted under this Annex. Where the Commission considers that action is desirable in relation to such a question, it shall draw that question to the attention of the authority or international body competent for that question. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them. For the avoidance of doubt, in the context of the OSPAR Convention, the management of fisheries includes the management of marine mammals.

Communication: In the North Sea *P.phocoena* is covered by the terms of the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), a regional agreement under the Bonn Convention. Many of the useful potential measures fall within the remit of fisheries organisations or ASCOBANS. OSPAR should communicate its concern about this species to the relevant bodies and introduce any relevant supporting measures that fall within its own remit if such measures exist or are introduced in the future. OSPAR should work with these organisations to identify any complementary measures

The top priority for management to improve the status of this species must be aimed at reducing the incidental capture of *P.phocoena*. This may include technical measures, such as acoustic deterrents, closed areas or closed seasons. More general measures concerned with fisheries management such as effort control may also be required. However, it has to be noted that the CFP has competence for fisheries measures outside 12 nautical miles in EU countries so it is not possible for individual EU Contracting Parties to implement fisheries measures.

Existing work under the OSPAR Hazardous Substances and Eutrophication Strategies and interface with EC measures in these areas continues to be important for improving coastal water quality (*e.g.* by reducing the discharge of substances that are toxic, persistent and liable to bio-accumulate) The implementation of the EC Marine Strategy Framework Directive will also be important in this regard.

Monitoring. In this context, a comprehensive and coordinated monitoring approach should be established addressing the following issues:

a. regional differences in abundance and overall trends of the population in the OSPAR Maritime Area;

b. fisheries by-catch rates;

c. effects of other human-induced pressures, in particular pollutants (*e.g.* POPs, brominated flame retardants)[3] and noise disturbances[4].

Ideally, all monitoring should be linked to human activities so that management recommendations can be made, as necessary. For example, the study of changes in (regional) diets can indicate prey depletion which may indicate human-induced factors such as fisheries and/or climate change.

It is therefore suggested that OSPAR should work collaboratively with ASCOBANS and relevant fisheries organisations in developing recommendations on possible protective management measures and that at the same time a monitoring approach for *P.phocoena* should be developed as part of the ICG-COBAM work and implemented as part of a revised JAMP.

[4] OSPAR has published an Overview of the Impacts of Anthropogenic Underwater Sound in the Marine Environment which will provide a baseline from which to consider the impact of noise on harbour porpoises (OSPAR Publication 2009/441).

Annex 1: Overview of Data and Information provided by Contracting Parties

Table 2: Data provided by Contracting Parties (CPs)

Contracting Party	Feature occurs in CPs Maritime Area	Contribution made to the assessment (e.g. data /information provided)	National reports References or web links
Belgium	Yes		
Denmark	Yes		High density areas for harbour porpoises in Danish waters. Teilmann, J., Sveegaard, S., Dietz, R., Petersen, I.K., Berggren, P. & Desportes, G. 2008: National Environmental Research Institute, University of Aarhus. 84 pp. – NERI Technical Report No. 657. http://www2.dmu.dk/pub/FR657.pdf
France	Yes		
Germany	Yes		Research report EMSON (in German) http://www.habitatmare.de/de/downloads/berichte/EMSON_Meeressaeugetiere_Nordsee-Ostsee_2006.pdf Info on MINOS projects including download of reports: http://www.minos-info.org/ Gilles, A., Herr, H., Lehnert, K., Scheidat, M., Siebert, U. (2008). Harbour porpoises - abundance estimates and distribution. Chapter 2 in: Wollny-Goerke, K., Eskildsen, K. (eds). Marine mammals and seabirds in front of offshore wind energy. Teubner Verlag, Wiesbaden: 19-36 Current monitoring programme soon to be seen on: http://www.habitatmare.de/de/monitoring-programm.php
Iceland	Yes		
Ireland	Yes		Berrow, S., O'Brien, J.,O'Connor' I., McGrath, D. 2007. Abundance estimate and acoustic monitoring of harbour porpoise Phocoena phocoena in the Blasket Islands candidate Special Area of Conservation. Report to the National Parks and Wildlife Service. Leeney, R., (2007) Distribution and abundance of Harbour Porpoises and other cetaceans in Roaringwater Bay, Co Cork. Unpublished report

			to National Parks & Wildlife Service, Ireland. Berrow *et al*., (2008) Harbour Porpoise Survey 2008. Unpublished report to National Parks & Wildlife Service, Ireland. Berrow *et al*., (2008) Small Cetacean Survey 2008. Unpublished report to National Parks & Wildlife Service, Ireland.
Netherlands	Yes		
Norway	Yes		
Portugal	Yes		
Spain	Yes		
Sweden	Yes		
UK	Regions II and III	Summary of current understanding provided in audit trail document for recent FCS report required under the Habitats Directive. Conservation status considered favourable.	<www.jncc.gov.uk/article17>.

P. phocoena was included in the OSPAR List in 2003 following nomination by in 2001 by Belgium, Netherlands, Portugal, UK and WWF. Contact Persons:

- Eva Degré, Directorate for Nature Management, Tungasletta 2, N-7485 Trondheim, Norway;
- Meike Scheidat, Institute for Marine Resources and Ecosystem Studies, P.O. Box 167, 1790 AD Den Burg, The Netherlands;
- Fatima Brito, Direcção Geral do Ambiente, Rua Murgueira-Zambujal, 2720-865 Amadora, Portugal;
- Sabine Christiansen, WWF North East Atlantic Marine Ecoregion, Hongkong Str. 7, 20457 Hamburg, Germany
- Jan Haelters & Francis Kerckhof, Management Unit of the North Sea Mathematical Models, 3^{e} en 23^{e} Linieregimentsplein, 8400 Oostende, Belgium;
- Mark Tasker, Joint Nature Conservation Committee, Monkstone House, Peterborough, PE1 1UA, UK.

Annex 2: Description of the Proposed Monitoring and Assessment Strategy

Rationale for the proposed monitoring

So far, monitoring has been undertaken only in some of the OSPAR Contracting Parties, on a country by country basis (*e.g.* Belgium, France, Germany, Norway, the Netherlands, and UK) or during EU-funded or supported projects such as BIOCET, BYCARE or the SCANS surveys.

In order to obtain a more comprehensive assessment of the genetic structure of harbour porpoise populations and their respective sizes encompassing the entire OSPAR Maritime Area, and to understand better the observed general shifts and seasonal variations in their distribution in the North-East Atlantic, a coordinated and continuous monitoring programme and corresponding database has to be established jointly by OSPAR Contracting Parties.

Use of existing monitoring programmes

Considering the results and findings of the SCANS surveys, cooperation with ASCOBANS to develop agreed monitoring protocols is recommended. Several OSPAR Contracting Parties already have in place veterinary or toxicological monitoring schemes for by-caught or beach-cast porpoises.

Synergies with monitoring of other species

Most monitoring of *P.phocoena* can also detect other marine mammals such as whales, dolphins, as well as seals and sea lions. For example, the 2005 SCANS II survey focused on harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*) and common dolphin (*Delphinus delphis*) inhabiting shelf waters of the Atlantic margin, the North Sea and adjacent waters but also provided abundance estimates for minke whale and white sided dolphins.

The two SCANS surveys in 1994 and 2005 have been the only broad-scale monitoring programmes. At a two-day workshop in October 2006, best survey practices were discussed, including a comparison of visual and acoustic survey methods and a cost-benefit analysis.

Proposed Assessment Criteria

Criteria have been developed against which the status of *P.phocoena* populations can be assessed as favourable, unfavourable-inadequate or unfavourable-bad, thus requiring different degrees of conservation effort. These criteria and the threshold levels that would signal a change in management and monitoring requirements are summarised in Table 3.

Many of these criteria are not part of the proposed monitoring programme (below). However, they are listed so that assessments can still be carried out using these criteria, should they be monitored.

Table 3: Proposed criteria to assess the Status of *P.phocoena* Populations

	Favourable	Unfavourable-Inadequate	Unfavourable- Bad
Occurrence / Distribution	in > 90% of known historic area (or similar baseline)	in 70-90% of known historic area (or similar baseline)	in < 70% of known historic area (or similar baseline)
Population Estimate and Trend [national average]	stable or increasing with respect to historic or other baseline reference value	decreasing with respect to historic or other baseline reference value	large decline with respect to historic or other baseline reference value
Porpoise Density [national average]	high (> 1.0 animal per km^2) *	medium (0.3-1.0 animal per km^2) *	low or decreasing (< 0.3 animal per km^2) *
Population Structure [national average]	Reproduction, mortality and age structure not deviating from normal (if data available)	Reproduction, mortality and age structure deviating from normal (if data available)	Reproduction, mortality and age structure strongly deviating from normal (if data available)
Habitat Quality [including prey availability]	Sufficiently large area of good quality habitat suitable for the long term survival of the species.	Habitat quality deteriorating and/or being reduced in area	Habitat quality is poor and/or insufficiently large enough, and clearly not allowing the long term survival of the species
Health Status - Toxin loading [POPs and metals]	< 17 mg/kg lipid total PCBs ** [targets for metal concentration to be determined]	> 17 mg/kg lipid total PCBs ** [targets for metal concentration to be determined]	(not yet determined) [targets for metal concentration to be determined]
Anthropogenic mortality [including by-catch]	< 1.0% of estimated population size	1.0-1.7% of estimated population size	> 1.7 % of estimated population size
Fisheries Monitoring and Reporting of By-Catch [to support mortality values as above]	Appropriate monitoring and reporting of harbour porpoise by-catch for all affected fisheries	Monitoring and reporting conforming to the minimum requirements of EU Reg 812/2004 *** (or equivalent for Non-EU Member States)	Incomplete monitoring and reporting of harbour porpoise by-catch
Anthropogenic Disturbances / Displacement [relative ranking ****]	little or no: ship traffic, motorised tourism, military sonar, seismic testing, other noise, or extraction activities	some: ship traffic, motorised tourism, military sonar, seismic testing, other noise, or extraction activities	extensive: ship traffic, motorised tourism, military sonar, seismic testing, other noise, or extraction activities

* Tentative working values in OSPAR Region II, subject to change when more data are available; a thorough understanding of long-term and seasonal variability is prerequisite.

** Tentative working values, subject to change when more data are available

*** Or superseding legislation

**** Relative ranking approach needs to be elaborated

It is suggested that the approach similar to that being taken by the EC Habitats Committee be considered. However, it should be pointed out that there are some differences between the EC Habitats Committee general species evaluation matrix (EC DocHab 04-03/03-rev.3, Annex C) and Table 2.

In the EC table, the following decision-criteria are applied:

a. favourable: all in this column, or one unknown;

b. inadequate: one or more in this column, but none in the *bad* column;

c. bad: one or more noted in this column.

Each population status triggers a management response:

- Favourable: requires only continued baseline monitoring;
- Inadequate: requires intensified enhanced monitoring also of the threats, and an investigation of management measures, leading to recommendations on how to improve the status;
- Unfavourable-bad: requires immediate interim management measures while further investigation (as for inadequate status, above) is undertaken.

Techniques/Approaches

Considering the results and findings of the SCANS surveys, cooperation with ASCOBANS to develop agreed monitoring protocols is recommended. A centralized database for the collection and calibration of all the survey results and corresponding data should be established.

However, in the meantime, the following recommendations are designed to outline what is thought to constitute basic and enhanced monitoring programmes.

As a basis, relevant current and historical data should be collected into a national database from each CP and be made available to OSPAR.

Baseline Monitoring

- By-catch reporting according to 812/2004;
- Reporting of strandings and by-catches;
- Baseline aerial surveys (or SCANS type survey using distance sampling from suitable platforms) of national waters at least every six years, preferably every three years; these should follow standard line transect protocols such as in use by SCANS or MINOS;
- Annual acoustic surveys of areas known or suspected to host dense *P.phocoena* populations or to be breeding, birthing, or rearing grounds; e.g. in SCIs/SACs/MPAs developed for *P.phocoena*.

Baseline Monitoring

During all surveys, data should be collected on used and unused porpoise habitat (*i.e.* presence/absence data) as well as on the proportion of calves observed (as a proxy for birth rate). Such data can tie into enhanced monitoring (below).

A variety of survey methods are likely to be employed. This is acceptable as long as results are adjusted (standardized) to account for different methods and so that numbers are comparable.

Dedicated survey platforms with trained observers are always preferable, but for more distant areas offshore observations from a platform of opportunity may provide useful results, as long as they are corrected for effort. For coastal and shelf waters, as generally frequented by *P.phocoena*, aerial surveys can produce better data (more homogeneous over a large area and less likely to influence the behaviour of the porpoises during the survey) and may be cheaper, especially over large areas when compared to larger survey vessels. Furthermore, it may be only possible to visit offshore areas every few years by ship, whereas

inshore areas can be surveyed quarterly (or as required) by airplane thus providing a better level of surveying intensity.

Visual ship-borne surveys could be augmented by towed hydrophone arrays. Their effectiveness, however, appears to be still unclear due to ship noise and the shyness of *P.phocoena* near vessels.

Aerial and/or ship-borne surveys, and towed hydrophone acoustic surveys, should provide data on:

- Distribution and density;
- Group structure;
- Proportion of calves;
- Habitat quality (ship only);
- (Inter- or intra-annual) Population shifts.

Moored acoustic monitoring devices (such as the T-POD) should provide data on:

- Seasonality (changes in relative density);
- Occurrence of migrations through geographical bottlenecks;
- Fine-scale habitat use (e.g. different vocal activities with different behaviours);
- Delineation of MPAs for *P.phocoena*.

Moored acoustic monitoring devices can be used up to two months at a time while left recording under water, but usually cover only a radius of 100-200 m around the instrument. Therefore, they appear to be ideal for monitoring restricted areas such as marine protected areas or special areas of conservation. Moored acoustic monitoring devices should be used in nearshore waters to record temporal and spatial porpoise distribution and fine-scale habitat use.

Enhanced Monitoring

In addition to the recommended baseline monitoring above, enhanced methods should be used when a population is considered to be endangered, or when a population has shown statistically significant declines over the course of five years, or in the absence of good population data, when there is a reasonable cause to suspect that the population is in decline:

- By-catch reporting on all vessels (including small vessels);
- Aerial surveys of national areas at least every three years, preferably every year[5]; these should follow standard line transect such as in use by SCANS or MINOS;
- Collection of tissue samples of by-caught specimen;
- Collection of tissue samples of dead animals washed ashore;
- Necropsies (post-mortem examinations) of a sample of animals involved in beach strandings and by-catches, particularly if they are of an unusual nature, such as mass stranding events; this should include the examination of all organs including brain, the inner ear, analysis of pollutants in tissues, and immune function tests. *Necropsies of by-caught individuals should provide data on*
    - pathological findings in all organs including brain, ear;
    - Stock structure;
    - Food preferences;
    - Toxin loadings (e.g. contamination with heavy metals, organochlorines and other persistent organic pollutants, algae);

[5] It is recommended to carry out a power analysis to determine the minimum required frequency

    - Age composition.

- Increased sighting surveys in areas of known or suspected problems, semi-annually or quarterly as well as the use of passive acoustic monitoring.

While dead animals are an excellent source for information on population health, reproductive status and age structure as well as for tissue samples to investigate toxic loading, the use of beach-cast animals (of unknown origin) may not always provide a picture representative of the living population. Ideally, of course, by-catch of *P.phocoena* would be eliminated completely; however in the meantime, by-caught individuals will likely remain the preferable sample group, though it may still be biased towards certain behaviours and age structure. Such sampling also provides an opportunity to collect information on the genetic population composition in OSPAR waters.

By-caught porpoises (usually out of bottom-set gillnets) are likely to present the least biased sample of the living population. In beach-cast animals, the cause of death is frequently related to their health status thus presenting a highly biased sample with regard to animal health. (There may be however, a reverse bias when determining the age structure of a given population using by-caught individuals, as independent (recently weaned) healthy young individuals appear to be more susceptible to being by-caught in fishing nets.) Agreements such as ASCOBANS, the EU Habitats Directive, and European Council Regulation (EC) 812/2004 already require most Contracting Parties to collect information on by-caught individuals.

However it should be stressed that countries should seek to avoid all by-catch or reduce it to as close to zero as possible.

Without photo-identification, which is impractical for *P.phocoena* on a larger scale due to their general vessel shyness and lack of obvious individual characteristics, the proportion of observed calves will have to serve as proxy for the recruitment. Habitat selection and any movements in between preferred habitats can lead to a better understanding of seasonality and site fidelity. Recent research suggests that this may be relevant in the southern North Sea (e.g. Van der Meij and Camphuysen, 2006). These biological parameters are likely to be of importance when delineating any protected areas for porpoises.

Enhanced monitoring activities could also benefit from research programmes providing data on:

- Genetic composition of porpoise populations;
- Habitat preferences;
- Food preferences and prey availability;
- Movements;
- Anthropogenic mortality.

These research activities would certainly increase our understanding of the species and its populations, and thereby improve future monitoring concepts as well as conservation measures.

Selection of monitoring locations

P.phocoena is known to frequent waters less than 200 m deep and to favour comparatively shallow waters. Furthermore, at least in some locations there appears to be a seasonality indicating seasonal inshore-offshore movements, *e.g.* into the southern German Bight as well as Dutch and Belgian coastal waters especially in late winter and early spring. Therefore, spatial and temporal factors need to be considered when selecting monitoring locations. It is recommended that harmonised protocols are developed in consultation with ASCOBANS.

Timing and frequency of monitoring

Considering the results and findings of the SCANS surveys, cooperation with ASCOBANS to develop uniform monitoring protocols is recommended. However, in the meantime, the following recommendations are designed to outline what is thought to constitute a basic and enhanced monitoring programme.

Baseline Monitoring

- National waters should be broadly surveyed at least once every six years, preferably every three years;
- Surveys should preferably occur during times calves are still dependant (a critical link in the life history, and also providing information on calf proportions indicating production);
- For all areas, ongoing by-catch and stranding (or dead animals found on beaches) monitoring and reporting is required.

Enhanced Monitoring

- National waters should be broadly surveyed at least once every three years, preferably every year.
- Annual surveys that cover broader areas than the baseline surveys will be required to (a) better provide overall population data, and (b) indicate spatial shifts in distributions. This should include – to the extent possible - offshore waters.
- Surveys to be performed in all affected coastal and near-shore shelf waters on at least a semi-annual, preferably on a quarterly, basis to obtain seasonal data.

Data Collection and Reporting

It is recommended that harmonised protocols are developed in consultation with ASCOBANS.

A centralized database for the collection and calibration of all the survey results and corresponding data should be established.

In the meantime, the following discussion outlines some considerations in baseline and enhanced monitoring.

Quality Assurance

Parameters measured by numerical values will express some natural variability. Coefficients of variation thus could be used as indicators for sufficient sample sizes. However, realistic and achievable threshold values for acceptable coefficient of variation need to be developed.

Table 4: Options for Monitoring *P.phocoena* Populations and their Evaluation

Monitoring objective	Method	Data quality	Benefits - Disadvantages
Group I: Quantitative Monitoring			
1. Presence	1. acoustic: stationary detectors (e.g. T-PODs, sonar buoys, bottom-mounted hydrophone arrays) or towed hydrophones	reliable for positive records, but not for absence (vocal activity, geographical coverage etc.)	long-term, weather independent
	2. opportunistic sightings	reliability of species identification depends on observer training, poor spatial coverage	low cost, weather dependent
2. Distribution	effort related opportunistic and dedicated ship-borne and aerial sightings; [possibly moored acoustic detectors?]	If sightings are effort related, then absence is detected. Appropriate statistical techniques can be used to take avoidance etc into account.	high cost, coastal (airplane) or slow (ship, unless several vessels simultaneously at very high costs) coverage, weather-dependent
Buckland et al. 2004; Garner et al. 1999			
3. Density	distance sampling: dedicated ship-borne and aerial surveys	potential over- or under-estimation	high cost, coastal (airplane) or slow (ship) coverage, weather-dependent
Buckland et al. 2004; Garner et al. 1999			
4. Trend (changes in absolute abundance)	1. repeated distance sampling under comparable conditions (e.g., month, weather, sea state, observers etc.); [possibly relative abundance measurements locally, e.g. by moored acoustic detectors?]	potential over- or under-estimation	very high costs especially for narrow confidence limits, weather dependent
Buckland et al. 2004; Garner et al. 1999	2. locally dedicated surveys from platforms of opportunity or from land	reliability of species identification depends on observer training, poor spatial coverage	low cost, weather dependent

Monitoring objective	Method	Data quality	Benefits - Disadvantages
Group II: Biological Aspects			
5. Seasonality	1. stationary acoustic detectors (e.g. T-PODs, bottom-mounted hydrophone arrays)	reliable for positive records, but not for absence (vocal activity, geographical coverage, oceanographic features etc.)	low cost, long-term, weather-independent
	2. locally dedicated surveys from platforms of opportunity or from land	reliability of species identification depends on observer training, poor spatial coverage	low cost, weather dependent
6. Movements (inc. site faithfulness)	radio-tracking via satellite transmitter (PTT)	possibly difficult to generalize due to small sample size and altered behaviour of individuals fitted with a tracking collar	high cost, small sample sizes, but high conservation value (e.g. for MPA boundaries verification)
7. Habitat use	ship-borne surveys (for abiotic *in situ*-measurements) together with GIS; [possibly also with radio-tracking or moored acoustic detectors, if behaviour can be recognised]	reliable for positive records in direct comparison with 'unused' sites	high cost, but high conservation value (e.g. to model distribution)
8. Proportion of calves	dedicated ship-borne and aerial surveys	inter-annual comparison possible for same area and month	high cost, weather-dependent
9. Recruitment			
10. Stock structure	Tissue samples of by-caught and beach-cast individuals; (or of live animals if already collecting biopsy [see 12.2])	Functioning and comprehensive stranding network is required	Sample size might be limited and origin of stranded animals may be unclear
Group III: Aspects of Population Health			
11. Age structure *Dierauf & Gulland 2001*	composition of by-caught and beach-cast individuals (GLG counts from tooth cuttings)	potentially biased by cause of death (e.g. more immatures are by-caught shortly after weaning)	slow coverage due to small sample size, significant changes difficult to detect; only for odontocetes (toothed whales inc. porpoises and dolphins)

Monitoring objective	Method	Data quality	Benefits - Disadvantages
12. Health status *Dierauf & Gulland 2001*	1. Disease prevalence in necropsies; 2. Antibody prevalence & immuno-competence in live tissue samples (remote biopsying); 3. possibly indirectly: through change in distribution (anthropogenic impact)	possibly difficult to generalize due to small sample size; potentially biased by cause of death; cause-effect relationship possibly difficult to prove	high cost, slow coverage due to small sample size, significant changes difficult to detect, but high conservation value
13. Reproductive status *Dierauf & Gulland 2001*	reproductive tissue samples of by-caught and beach-cast individuals; [possibly hormone measurements of live cetaceans]	potentially biased by cause of death	slow coverage due to small sample size, significant changes difficult to detect
14. Toxin loads *Vos et al. 2003*	tissue samples of by-caught and beach-cast individuals and strandings or remote biopsy	potentially biased by cause of death; cause-effect relationship possibly difficult to prove and sources may be difficult to determine	high cost, slow coverage due to small sample size, significant changes difficult to detect, but high conservation value
15. Genetical population structure	tissue samples of by-caught and beach-cast individuals or remote biopsying	potentially biased by location of corpse recovery	biopsy sampling: high cost, slow coverage due to small sample size

Annex 3: Existing Management Measures

ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas) is an autonomous agreement of the Convention on Migratory Species under the immediate auspices of UNEP/CMS. There is no harbour porpoise conservation plan yet in place. However, resolutions regarding by-catch have been passed, indicating 1.7% as an "interim" limit (in 2000) and 1.0% as a "precautionary" limit (ASCOBANS 2000).

Habitats Directive: In the waters of EU Member States, Article 12.4 of Council Directive 92/43/EEC (the Habitats Directive) requires States to establish a system to monitor the incidental capture and killing of all cetaceans, and that in the light of the information gathered they shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.[6] However, the Commission considered that this requirement of the Habitats Directive was not adequately implemented, and in December 2005 it sent eight Member States a first written warning - first step in the legal procedure - that they are breaching the Habitats Directive and need to take corrective action to ensure full protection of these marine mammals[7] (EC 2005a). However, this warning has in the meantime been dropped against the UK.

The EC advice is that any decline in abundance greater than 1% per year constitutes a "large decline" and thus unfavourable-bad conservation status for a given Annex species[8] (EC 2005b).

European Council Regulation (EC) 812/2004: Observer monitoring of specified fisheries (Annex III) is now required under European Council Regulation (EC) 812/2004, which lays down measures concerning incidental catches of cetaceans in fisheries (by-catch). It came into force on 1 July 2004, with various areas phased in through to January 2008. The Regulation sets out measures in specific fisheries to deter cetaceans away from fishing nets and requires monitoring of by-catch in certain fisheries. However, no numerical target for by-catch reduction is specified. The requirements of the Regulation include:

- the mandatory use of acoustic devices ("pingers") for vessels over 12 m involved in specified fixed gear fisheries (bottom-set gillnet or entangling net (Annex I);
- the monitoring of by-catch, by on board observers, of vessels 15 m or over in specified fisheries (Annex III);
- the annual reporting by Member States on the use of pingers and the implementation of the on-board observer programmes, including all information collected on the incidental capture and killing of cetaceans in fisheries.

Exemption for small boats: note that the above requirements exempt smaller vessels. However, smaller vessels are more likely to frequent the shallower nearshore harbour porpoise habitat, particularly when using bottom-set gillnets. BDC 2004 noted that although several types of fisheries may occasionally catch harbour porpoises, those that pose the greatest risk to harbour porpoise

[6] In addition, the directive requires member states to designate special conservation areas for the bottlenose dolphin (*Tursiops truncatus*) and harbour porpoise (*Phocoena phocoena*).

[7] The Commission considered that Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain and the UK had not established sufficiently effective surveillance systems.

[8] The full text reads: "Large decline: equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS AND below 'favourable reference population' OR More than 25% below favourable reference population OR Reproduction, mortality and age structure strongly deviating from normal (if data available)"

populations are bottom-set gill-nets. Such fisheries are relatively common throughout the shallower parts of the North Sea (BDC04/02/07, §10).

Scientific studies: While vessels of less than 15 m are exempt from the general requirement to carry on-board observers, Member States are still supposed to collect, by means of scientific studies or pilot projects, data on cetacean catches by these small vessels in the fisheries defined in Annex III. However, the regulation provides no specification for the detail, timeframe or extent of these studies.

The requirement for data collection on small vessels does not apply to fisheries that are not included in Annex III, notably those listed in Annex I, which are instead subject to pinger requirements, but only for vessels larger than 12 m. Thus, currently, Annex I small vessels are not studied nor are they required to use pingers, and as such represent a regulatory as well as a data gap. The UK, however, has regularly been covering small vessels under 812/2004.

North Sea Ministerial Declarations: In the 2002 Ministerial Declaration of the Fifth International Conference on the Protection of the North Sea of 20-21 March 2002 (The Bergen Declaration), Ministers agreed to numbers that reflected the 2000 ASCOBANS resolution, above:

> *As an interim objective, the Ministers agree to aim at reducing the by-catch of harbour porpoises below 1.7% of the best population estimate. On the same basis the Ministers agree on a precautionary objective to reduce by-catches of marine mammals to less than 1% of the best available population estimate, and urge the competent authorities to develop specific limits for the relevant species. (§29)*

The Bergen Declaration also called for "*the development and adoption, as soon as possible and in cooperation with the competent authorities, of a recovery plan for harbour porpoises in the North Sea*."[9] (§30)

In 2006, this 1% by-catch threshold (but not the 1.7% interim objective) was again stated. The Declaration of the North Sea Ministerial Meeting on the Environmental Impact of Shipping and Fisheries, also known as the Gothenburg Declaration, stated that:

> *Special attention should also be given to the development of fishing gear and fishing methods that will help minimise physical disturbance of the seabed and incidental by-catches of non-target fish, seabirds and other marine organisms and reduce by-catches of marine mammals to less than 1% of the best population estimate.* (§3, Gothenburg, Sweden, 4 & 5 May 2006)

OSPAR's North Sea EcoQO for Harbour Porpoises currently sets its by-catch limit to 1.7%.

In 2007, Germany brought to the attention of OSPAR the 1% precautionary limit as stated in the 2006 Gothenburg declaration (BDC 2007 SR, §2.6; OSPAR 2007 SR, §6.4). It was therefore agreed at OSPAR 2007 that the EcoQO should be reviewed.

Initial findings of an assessment of this EcoQO by ICES SGBYC and WGMME (ICES WGMME 2008 Report) state however, that with the way in which data is currently collected, it is not possible to assess accurately the proportion of the population being affected.

[9] While ASCOBANS has adopted a *basis* for a North Sea Conservation Plan (ASCOBANS resolution 1, MOP-5, 2006), it does not actually yet have a conservation plan written or in place (§6.2, Report of the 14th meeting of the Advisory Committee of ASCOBANS, San Sebastián, Spain, 19 - 21 April 2007).

Annex 4: References

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