Agenda Item 2.2.1	Implementation of the Harbour Porpoise Action Plans Conservation Plan for Harbour Porpoises in the North Sea Report and Action Points of the North Sea Group
Document 2.2.1.b	**Report of the North Sea Plan Coordinator**
Action Requested	• Take note • Give guidance
Submitted by	Secretariat

NOTE:
DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

INTERIM REPORT ON THE IMPLEMENTATION OF THE ASCOBANS NORTH SEA CONSERVATION PLAN FOR HARBOUR PORPOISES - 4
with focus on bycatch situation and population monitoring
December 2012

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Coordinator of the ASCOBANS North Sea Conservation Plan for Harbour Porpoises (but see point 5 for further details).

Introduction

The North Sea Steering Group (NSSG) had its second meeting prior to AC 19 in March in Galway. One of the points on the agenda was to review the progress in the implementation of the ASCOBANS Conservation Plan for Harbour Porpoises in the North Sea, based on the report provided by the coordinator (Desportes 2012).

The 12 action points of the plan are the following:

1. Implementation of the Conservation Plan: coordinator and Steering Committee;
2. Implementation of existing regulations on bycatch of cetaceans;
3. Establishment of bycatch observation programmes on small vessel (<15m) and recreational;
4. Regular evaluation of all fisheries with respect to extent of harbour porpoise bycatch;
5. Review of current pingers, development of alternative pingers and gear modifications;
6. Finalise a management procedure approach for determining maximum allowable bycatch limits in the region;
7. Monitoring trends in distribution and abundance of harbour porpoises in the region;
8. Review of the stock structure of harbour porpoises in the region;
9. Collection of incidental porpoise catch data through stranding networks;
10. Investigation of the health, nutritional status and diet of harbour porpoises in the region;
11. Investigation of the effects of anthropogenic sounds on harbour porpoises;
12. Collection and archiving of data on anthropogenic activities and development of a GIS.

While discussing the implementation of Actions 2-6, the NSSG noted that *much of the bycatch occurs in fisheries not covered by Regulation 812/2004 to which many Member States (MS) restrict their monitoring. It was also highlighted that many MS were not implementing Article 12 of the Habitats Directive. It was recognised that there was a gap in knowledge regarding much of the fleet <15m in the North Sea. Only patchy information was currently available on bycatch from smaller vessels (<15 m) and bigger vessels that are currently not monitored. Data from a Norwegian study (Bjørge et al 2011) show that bycatch from vessels (<15 m) may be substantial.* ***It was suggested that for the next meeting a summary of the outputs of [ICES] WGBYC would be provided and ASCOBANS support provided where appropriate.***

The action 7 of the conservation plan for harbour porpoises in the North Sea was given high priority at the adoption of the plan in 2009. The NSSG noted that a good and recent estimate of harbour porpoise abundance and distribution in the North Sea, both static and dynamic (seasonal), was missing. The NSSG agreed therefore on three recommendations:

1) To underline the necessity and promote a follow up of the SCANS II project in order to have a good and recent (static) estimate of harbour porpoise abundance and distribution in the NS, and a better idea on trends (based on 3 points 1995, 2005 and 2015?).
2) To promote the synergy between current national monitoring programmes on harbour porpoise distribution and abundance between North Sea countries.
3) To stress the need for EC funding for monitoring population size and necropsy of stranded animals.

As a result, the following action point was adopted:

- The coordinator will prepare a document to investigate whether further coordination and possibly standardising of national monitoring of abundance and trends is feasible. The coordinator will summarise progress and options. This document will be available for the next meeting of the North Sea Steering Group (**AP2012-06**)

This report focuses on providing 1) a summary of the outputs of ICES SGBYC/WGBYC regarding bycatch rates in North Sea fisheries and compliance with the mitigation required under EC 812/2004; 2) an overview on the monitoring of porpoise abundance occurring in the North Sea; and 3) an schematic overview of the progress realised by Member States (MS) in implementing the conservation plan.

1. Setting things in perspective or why monitoring is a must

Two large scale sightings surveys have been conducted in the North Sea, the SCANS surveys in 1995 and 2005 (Hammond et al 2002, in press, SCANS-II 2008). Total harbour porpoise abundance in the North Sea during July estimated from the 2005 SCANS-II survey was not significantly different from the estimate generated from the July 1994 SCANS survey. However, a large-scale southward shift in distribution was evident with the main concentration in the North Sea having shifted from the northwest in 1994 to the southwest in 2005 and the high densities around coastal Denmark seen in 1994 being not present in 2005. The apparent increased abundances in the southern North Sea, the English Channel and the Celtic Shelf were offset by decreases in the northern North Sea.

A systematic change in distribution over this period is corroborated by the increases in sightings of porpoises from the coasts of Germany, he Netherlands, Belgium, UK and France over the last decade, as well as a dramatic increase in the number of strandings (Camphuysen 2004, 2011, Jauniaux et al 2008, Gilles et al 2009, 2011, Haelters and Camphuysen 2009, Jung et al 2009, for a review of trends see Evans 2010).

Data from two Norwegian dedicated sightings surveys show a 10-fold decline in sighting rates of harbour porpoises in the northern North Sea (56°-62° N) between 2004 and 2009 (Øien 2005, 2010), suggesting that porpoise density in this area is still low and may have further decreased (Figure 1). The two surveys do not have harbor porpoise as target species. They use a methodology targeting minke whales and they cannot provide an absolute abundance for harbour porpoises. However, they are highly comparable to each other, using the same methodology and protocols (and same cruise leaders), and they provide comparative sightings rates. In 2005, 96 primary sightings of harbour porpoise were made over 2,495 km of primary search effort (blocks NSCII and NS, Figure 1), while in 2009, only 10 sightings were made over 2,854 km of primary search effort (blocks EN3 and EN2, Figure 1).

So does a distributional shift alone explain the observed reduced, and likely continuing decreasing density in this area or are other factors involved?

Bycatch has been recognized as one factor which may have severely impacted harbour porpoise populations in the North Sea, and the northern part in particular (e.g., Vinther 1999, Vinther and Larsen 2004, Berggren et al

2002). However the bycatch situation in the North Sea remains at present very unclear for several reasons (e.g. ICES WGBYC 2011, Northridge 2011, Northridge et al 2011).

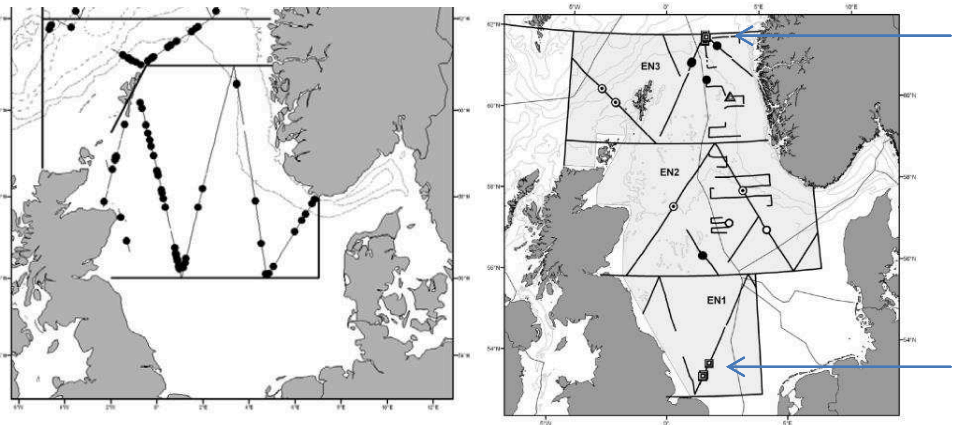


Fig. 1. Primary sightings of species other than minke whales in the 2004 and 2009 Norwegian surveys in the North sea (Øien, 2005, 2010): On the left, the 2004 survey with only harbor porpoise sightings, on the right, the 2009 survey with sightings of several species, and with harbour porpoise sightings indicated as square [and blue arrows]

Porpoise bycatch in Norwegian coastal waters has recently been estimated for the anglerfish and cod fisheries at 20,720 (CV=0.36) for the period 2006-2008 - i.e. an annual bycatch of 6,900 (Bjørge et al 2011, 2013), with about 1000 per annum being predicted taken south of 62°N. The authors noted that the true bycatch was likely to be greater than this when other small-scale gillnet fisheries in the North Sea are considered, including fisheries for lumpsucker, leisure fisheries, and fisheries for mackerel.

The bulk of the porpoise bycatch in Danish set net fisheries also occurred in the northern half of the North Sea (Vinther 1999). It decreased from a peak of over 7,000 animals in 1994 (peak effort) to about 4000 animals in 1999-2001 (Vinther and Larsen 2004). In 1997, Vinther and Larsen (2004) estimated the bycatch of porpoises to be over 5,300 porpoises. Since then, the Danish set net fishing effort in the North Sea and Skagerrak has overall declined and changed in character (i.e., the relative proportion of effort dedicated to the different target species has changed) The fishing effort has decreased from over 17,000 days at sea in 1998 to over 6,000 d.a.s in 2007, and then stabilized at that level until 2011; it is not known whether there has been any change in efficiency in the fishery (Finn Larsen, DTU Aqua, pers. comm., Figure 2). Pingers are mandatory in these fisheries, but only for vessels above 12 m length. Half of the fleet, however, comprises smaller vessels. Inspection vessels carry out spot checks in those areas where pinger use is mandatory and they have reported no violations from Danish vessels, but no information has been provided on how often pingers were inspected (ICES SGBYC 2010). A dedicated bycatch monitoring is not required under EU CR 812/2004 in this fishery and none has been carried in this fishery since 2001.

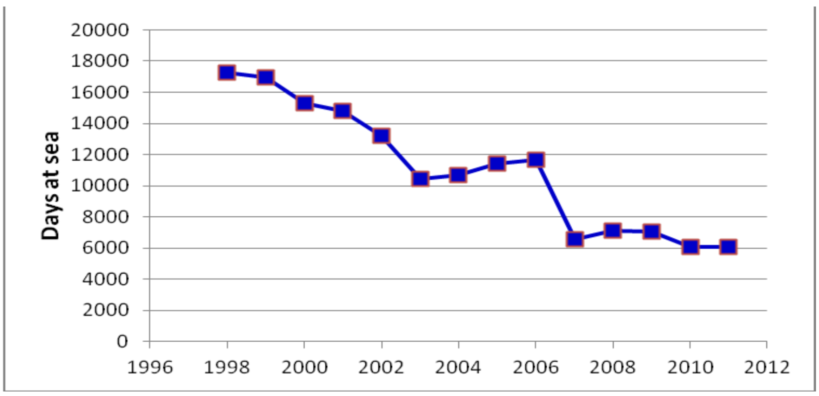


Fig. 2. Danish set net fishing effort in the North Sea and Skagerrak for trips where the target species was cod, hake, plaice, turbot, anglerfish or lumpfish (DTU Aqua data, unpublished).

The European fishing fleet mainly constitutes vessels under 12 m, with a proportion above 79% in the North Sea Range states (all gear types). The proportion of gillnetters under 12 m in the Atlantic (incl. North Sea) Uk and French fisheries is 97 and 84 % respectively (ICES 2010d). The Norwegian study (Bjørge et al., 2011), which targets vessels less than 15m using gillnets in the coastal zone, has indeed clearly shown that smaller vessels also take porpoises. Although "scientific studies" should have been implemented under CR (EC) 812/2004 for obtaining data on incidental catches for boats under 15 m, these have been very scarce. As a consequence, knowledge about the level of by-catch in the smaller segment of the fleet is very limited for the professional fishery and lacking for the recreational and semi-recreational fisheries.

Without amongst other things estimates of the bycatch in the Danish set net fishery in the last decade and by the smaller vessels, it is not possible to assess how much bycatch in the northern North Sea has contributed/is contributing to, the observed reduced density in this area. The monitoring of both bycatch and trends in abundance continues to be essential for informing trends in conservation status. Monitoring of fisheries known to produce potentially high bycatch rates must be a priority, especially when attention is placed upon the recovery of different fish stocks in the North Sea. Besides the monitoring of trends in absolute abundance at the population level through large scale decadal surveys (SCANS surveys), it is possible to assess trends in abundance by using indices of relative abundance, that can be based on more regional data and reinforced by more regular sampling, at a time scale much shorter than a decade. These data will then be less dependent upon inter-annual variability.

2. Review of the outputs of [ICES] WGBYC on the situation in the North Sea

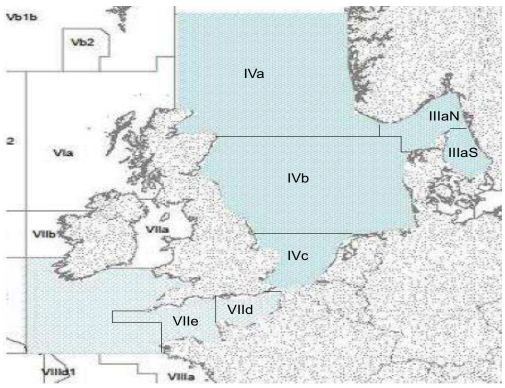
2.1 Requirement regarding mitigation and monitoring in the North Sea under CR (EC) 812/2004

The use of pingers or acoustic deterrent devices is only required under Regulation 812/2004 for certain fisheries and areas and solely for vessels with an overall length of 12 m or more (Figure 3 and Table 1), and in some cases where specific net types are used or in certain months (Table 1).

Table 1. Requirement for pinger use in the North Sea under CR (EC) 812/2004

Fig. 3. Pinger use - areas and gears regulated under CR (EC) 812/2004 in the North Sea, Skagerrak and Kattegat, and the Channel and Celtic Sea (ICES WGBYC 2011)

Area	Gear	Period
ICES sub area IV and division IIIa	Any bottom-set gillnet or entangling net, or combination of these nets, the total length of which does not exceed 400 meters	1 August – 31 October
ICES sub area IV and division IIIa	Any bottom-set gillnet or entangling net with mesh sizes ≥ 220 mm	All year
ICES divisions VIId and VIIe	Any bottom-set gillnet or entangling net	All year



In the North Sea, Skagerrak and Kattegat, only nets with meshes of 220 mm or more and any nets set in strings of less than 400 m (wreck-net fishery) during the months of August to October must be equipped with pingers. In the Channel, ICES VIId–e, all bottom-set nets are required to have pingers year round.

Mandatory monitoring schemes are only required for vessels with an overall length of 15 m or over, and only for some areas and under specific conditions, as given in Table 2 for the North Sea. There is also specification for the level of coverage that must be achieved, according to fleet size.

For vessels under 15 m CR (EC) 812/2004 stipulates that "*MS shall take the necessary steps to collect scientific data on incidental catches of cetaceans … by means of appropriate scientific studies or pilot projects*". The same fisheries as for the mandatory monitoring schemes, given in Table 2 for the North Sea, are concerned.

Table 2. List of North Sea fisheries requiring monitoring under CR (EC) 812/2004.Only vessels with an overall length of 15 m or over are concerned.

Area	Gear
ICES sub area IV and divisions IIIa, and VIIed	Pelagic trawls (single and pairs)
ICES divisions VIIed	High-opening trawls
ICES sub area IV and divisions VIIed	Driftnets

This means, in particular, that there is no mandatory monitoring for any gillnet fisheries, not even in the North Sea ICES area IV, where a high bycatch rate had been estimated in the nineties. Pingers are mandatory in that area, but this concerns only vessels over 12m, although the big bulk of the fleet is constituted by vessels under that size. Also the overall compliance to the use of pingers is poorly documented (see below), as is their reliability and their mitigating effect on a longer time frame.

Clearly, the defined monitoring scheme is problematic, when all the gillnet fisheries – the most problematic fisheries in relation to harbor porpoise bycatch - are exempted of any monitoring.

2.2 Implementation of existing regulations on bycatch of cetaceans (CP action 2)

A detailed review of the implementation of CR (EC) 812/2004 and of the adequacy of the regulation to address the bycatch problem, is conducted annually by ICES (ICES SGBYC 2008, 2009, 2010; ICES WGBYC 2011, 2012), and has been reviewed by ICES (2010a,b,c,e) and twice by the European Commission (COM (2009) 368 & COM (2011) 518). It is summarised comprehensively by Northridge (2011), and also discussed in ASCOBANS (2012).

We compile/summarise below the elements relevant to the North Sea in terms of compliance of the regulation, regarding both mitigation and monitoring, and estimated bycatch levels. Most of the information has been extracted from the ICES reports, sometimes by simply copying/pasting some paragraphs, which are then clearly indicated with text in italics.

2.2.1 Mitigation measures implemented

As concluded by ICES (2010d) and ICES WGBYC (2012), implementation of the mitigation measures as prescribed in Regulation 812/2004 has been limited for a variety of reasons. Reliable/official records of the numbers of boats that should carry pingers and that are actually carrying them at present are lacking (Table 3). Also, ICES WGBYC (2012) notes that *given that several member states also report voluntary pinger use or the use of pingers in field trials, there is therefore a more general concern that member states do not know how many vessels are using pingers or when and where, and will therefore find it hard to assess the conservation benefits of the regulation.*

Some countries, like Denmark and Germany, undertake regular monitoring of the reliability of the pinger in use using electronic devices to test whether or not pingers are actually functioning, but how regular and recurrent are these spot checks is not communicated. Systematic enforcement or a regulation system, and information on compliance, are lacking. Carrying out these controls is difficult, however, because there is only a very small window in which an infringement can be proved. Inspections made in ports do not necessarily confirm the use of functioning pingers during fishing operations. ICES WGBYC (2011) noted that *very little thought appears to have been given throughout the EU as to how to ensure that pingers are actually functioning when they are being used. This area of enforcement needs further elaboration.*

Table 3 summarises the present information on pinger use from North Sea member states (NSMS) as presented by ICES WGBYC (2012). Clearly, not all MS have/have provided a clearly overview of the situation.

Table 3. Summary of information on pinger use from North Sea MS with possible obligations to use them. Extracted from Table 1 a & b of ICES WGBYC (2012), with Belgium updated with present information.

EU COASTAL MEMBER STATE	Boats requiring pingers, nbr of them	% using them	Enforcement reported?	Using current regulation specs?	Other mitigation being tested	Type of pinger used
Belgium	Yes, 1	0	-	-	-	None
Denmark	Yes, 28	100%	Yes, with no specification	No - 450 m spacing under derogation		Aquamark 100
France	Yes, 117?	0	no	No - concerns about safety, cost, durability		None
Germany	Yes, ?	?	Yes, with no specification	Yes		?
The Netherlands	No	-	-	-	Testing pingers with inshore gillnets	Fishtek Banana
Sweden	Yes, ?	?	No	?		
UK	Yes, ~22	67–100% (~85%)	No	No - using DDDs	Pair trawlers using pingers voluntarily	DDD-03

Extracts from the summary of each NSMS's 2011 report to the European Commission from EU member states regarding the implementation of Council Regulation 812/2004 during 2010 as reported by ICES WGBYC (2012) are provided below, with updated information for Belgian.

Belgium *There are 6–8 vessels using gillnets in VIId and IVc but none is over 12 m, so no pingers are required, and pingers are not being used by Belgian.*
The present situation has changed (Haelters pers. comm.). There are 2-4 vessels using gillnets in VIId and IVc. Three of them are under 12 m and are not required to use pingers. One of the vessel is larger than 12 m, but fishing in ICES IVc with nets with mesh size below 220mm, therefore not requiring pinger there. However, the ship occasionally fish in VIId - where pingers are mandatory all year for any bottom-set gillnet or entangling net regardless of mesh size.

Denmark *Has 69 gillnet vessels fishing in IIIdc, and 40 in IV. Of these, only 28 (five and 23) are more than 12 m and are therefore required to use pingers. The 28 vessels concerned are reported generally to use Aquamark 100 devices which can be spaced at 450 m under derogation. This is the second derogation with Commission approval. Inspection vessels monitor the use of pingers using hydrophones; no infringements have been detected.* No information was provided on how often pingers are inspected.

France *A total of 117 French vessels of more than 12 m are using nets in the area where pingers are required, and a few of these have been working with experimentally equipped nets. The French report states that the requirement to use pingers under 812/2004 remains a problem for the French fleet.*

Germany *German fishing companies have been informed through official notices about their obligations under Regulation 812/2004. The report states that German fishing vessels are using commercial pingers, and that inspections have not revealed any infringements. Eleven inspections were made in 2010. No operational or other problems were noted with respect to pinger use.* No information was provided on how often pingers are inspected.

The Netherlands: *Reported only that pingers are not required in any Dutch fleet segment.*

Sweden *Reported that, in 2007, fishermen operating in areas where pingers are mandatory, had been given pingers. But as these pingers had a lifetime of about two years, it cannot be assumed that they are still working. There is no enforcement of pinger use in this area and fishermen cannot report fishing with pingers in the EU-logbook. There is therefore no information on the current use of pingers by Swedish boats.*

United Kingdom: *UK reported that its over 12 m gillnet fleet in Division VII is using DDDs, which are not on Annex 1 of the regulation, but which have been shown to be effective during sea trials (see below Section 6.1 for further details). Up to 19 gillnet vessels have been using pingers in Division VII during 2010, which represents between 67% and 100% of the UK fleet operating in different subdivisions within VII. It is intended that 100% of the relevant UK vessels will be equipped with pingers by 2011. No enforcement measures have been implemented.*

The situation in the North Sea (Division IV) is unclear, as logbook data do not enable vessels that meet the pinger requirements of Annex 2 of the regulation to be fully identified, but there appear to be at least two vessels that should be required to use pingers. There is no information on compliance by these boats.

2.2.2 Monitoring schemes

The conclusion of ICES (ICES SGBYC 2010) is still valid: *Adherence to the monitoring regime specified in Article 4 of the Regulation has been inconsistent throughout MS. Under this Article, MS are obliged to set up dedicated observer programmes, although it is apparent from the National Reports received that a number of MS have not implemented such programmes. In most such cases these MS have made attempts to monitor cetacean bycatch through other means such as the DCR/DCF* (Data Collection Regulation/Data collection Framework: on board discards and catch sampling). *The lack of an observer programme in some member states appears to be mainly due to limited financial and manpower resources. In the current economic climate this is understandable but nonetheless has resulted in only limited coverage in the fisheries of these Member States. Whether this can be improved through better coordination and shared monitoring between Member States which participate in the same fishery, should be explored.*

When the mandatory monitoring has been conducted it as seldom reached the stipulated level for various reasons, including financial as well as logistical constraints. Total fleet effort cannot always be reliably predicted from year to year. Placing observers on foreign owned boats and national-flagged boats operated from abroad has proved difficult.

ICES WGBYC also notes: *Whereas Regulation 812/2004 requires monitoring schemes to be designed to achieve estimates of the bycatch rates of the most frequently caught cetacean species with a CV of no more than 0.3, this target is extremely hard to achieve in reality because of inherently low bycatch rates in many fisheries. SGBYC has already recommended that the EU adopts a more pragmatic approach based on the principle of sufficient sampling, under which monitoring schemes should be designed to provide confidence that bycatch rates are lower than some predefined bycatch reference limit. Such an approach would enable Member States to focus monitoring as and when most needed.*

Table 4 summarises the situation regarding the mandatory monitoring in the North Sea for the last years.

Table 4. Summary of information on observer schemes in NS in 2008 & 2010 from those fleets that require monitoring under 812/2004. (ICES SGBYC 2010; ICES WGBYC 2012, especially Table), with some added notes.

MS	Observer Coverage of taxa other than cetaceans	Dedicated cetacean observer scheme (DCOS) in 2010	Cetacean observer scheme as part of DCF	Additional Comments
Belgium	Unknown	**No**	**No**	Observations made during research cruises for discard/biological sampling
Denmark	Unknown	**No**	**Yes** for gillnet fisheries. In 2010, 40 d.a.s. for all NS setnet fisheries in NS **No** for pelagic otter trawls and pelagic pair trawls, as no bycatch observed*.	In 2010-11, CCTV on 6 vessels <12m, incl in NS, 100% coverage in 8 months. ***In 2008:** 3-11% coverage DCOS in pelagic trawl fishery > 15m in ICES IIIabcd: no bycatch observed
France	Unknown	**Yes**, both for >15 and <15 Below target	**Yes**	DCF monitoring was on fisheries not listed in Regulation 812. Same picture in 2008
Germany	Unknown	**No**	**Some trips in 2008**	Some DCF monitoring of pelagic trawlers in area VII
The Netherlands	Unknown	**No**	**Yes** **Below target**	Same picture in 2008. See also comment ** below table
Sweden	No	**No**	**No**	In 2008 pelagic trawling in Areas IIIa, IIId, IVa and IVb were DCOS covered at 1.4%. CCTV on 2 gillnet vessels <15m, 71 days of fishing operation.
United Kingdom	Yes	**Yes,** both for >15 and <15 Below target	**Yes**	Protected species monitoring. The dedicated programme is in place since 2005 See also comment *** below table

***** The Netherlands***

A pilot observer study was conducted in the Dutch set-net fishery in 2008 on 3 (out of #90) vessels, focused primarily on trammel nets targeting cod/mixed species as they were believed to have a relatively high bycatch rate. 48 day trips were observed and the fishing effort during these trips amounted to 210 km-days of trammel nets for cod/mixed species, 64 km-days of gillnets for cod and 12 km-days of tangle nets for sole. Bycatches of one harbour porpoise and one grey seal were observed; both occurred in trammel nets (ICES SGBYC 2010).

***** *UK***

*Further sampling of gillnet boats had been conducted in Subareas VII*efghj *and IV, and outwith the requirements of 812/2004 (see under point 2.2.3 – Onboard Observers). Bycatch rates and estimated UK-based bycatch mortalities for harbour porpoises (ca 840) had been achieved for 2009, with a CV of less than 0.3, although not all gillnet fleets in these subareas had been sampled .*

2.2.3 Establishment of bycatch observation programmes on vessels smaller than 15 m and recreational vessels, both segments outside the scope of Regulation 812 (CP action 3)

As noted by Northridge (2011), the European fishing fleet constitutes mainly vessels under 12 m, with more than 79% in the North Sea range states (all gear types). For example, the German gillnet fleet in the North Sea in 2008 was composed of 30 vessels < 7.5m, 20 between 7.5-15m, and a single one > 15 m (Kock, 2010). Of the 622 UK registered fishing vessels using gillnets in 2010 in Areas VIIefghj, only 22 of these were over 12m (S. Northridge in litt.[1]). The 96%, which are under 12m do not therefore need to use pingers. Many studies in

[1] Simon Northridge, Acoustic deterrents in UK gillnet fisheries: acoustic deterrents_UK_Northridge.pdf

different maritime domaines have indeed clearly showed that this segment also take porpoises (e.g., Hardy and Tregenza 2010, Bjørge et al 2011, Morizur et al 2011, 2012, Kindt-Larsen and Dalskov 2010, Kindt-Larsen et al 2012).

The establishment of bycatch observation programmes on small vessels (<15m) is not an obligation under EC 812/2004, but "MS **shall** take the necessary steps to collect scientific data on incidental catches… by means of appropriate scientific studies or pilot projects". Also in its report from 2011, *WGBYC maintains that bycatch monitoring of under-15 m vessels is a requirement under the HD. WGBYC emphasizes that bycatch is responsive to gear in use and not to vessel length*. WGBYC therefore recommends that if a full picture of bycatch (and therefore of impact) is required, MS need to ensure that bycatch by boats of less than 15 m is also monitored, and, if necessary, mitigated against, as mandated by the HD" (ICES WGBYC 2011). A full picture of by-catch in this segment of the fleet includes both professional and recreational or semi-recreational fisheries.

The establishment of bycatch observation programmes on small vessels is annually reviewed by ICES (ICES SGBYC 2009, 2010; ICES WGBYC 2011, 2012). Alternative monitoring measures to onboard observers, their advantages and limitations, have also been reviewed by the Joint NAMMCO/ICES Workshop on observation schemes for bycatch of mammals and birds (ICES WKOSBOMB 2010).

Monitoring of bycatch of smaller vessels, including experimentation, has developed in the last few years, going from an experimental stage to longer term studies, and the results so far are very promising and deserve an immediate wider implementation.

Remote Electronic monitoring (REM) – using CCTV (*Closed Circuit TV system)*
Experiments have been conducted for assessing bycatch rates using CCTV in Sweden (2008, 2 vessels, 70 d.a.s.), Denmark (DK, 2008-2012, 1 + 6 vessels), the Netherlands (NL, 2011, 1 vessel) and Germany (2011-2012, 3 vessels 10-15m, 200 fishing trips in 2011). They were very successful and experiments conducted in DK and NL clearly show that bycatch of harbour porpoises does occur in smaller vessels (Tilander and Lunneryd 2010, ICES SGBYC 2010, Kindt-Larsen and Dalskov 2010, Kindt-Larsen et al 2011, 2012, ICES WGBYC 2012, Oesterwind and Zimmermann 2013, Marije Siemensma pers. comm.). Sweden attempted to conduct a further experiment in 2010, and nine camera systems to place on board fishing boats were bought for investigating discard as well as marine mammal and bird bycatch, but only one fisherman was willing to cooperate (Anonym 2011, p.2).

The largest experiment was conducted in Denmark, where six Danish commercial gillnetters (10-15 m) targeting cod *Gadus morhua* and plaice *Pleuronectes platessa* participated, using trammel nets and bottom set gillnets, and operating under the Danish catch quota management system fished with Remote Electronic Monitoring (REM) systems from May 2010 to April 2011 in the North Sea, Skagerrak and Øresund. The REM systems provided video footage, time and position of all net hauls and bycatches of marine mammals. Comparisons between REM results and fishers' logbooks showed that the REM system gave more reliable results, since fishers, in many cases, did not observe the bycatch while working on the deck, because the bycatch had already dropped out of the net before coming on board. Furthermore, very high coverage percentages at low cost, compared to on-board observers, could be obtained with REM (Kindt-Larsen et al 2012). The other aim of the experiment was to test whether a shift from a landing quota system to a catch quota system (where all catches are counted against the vessels' catch quotas) will work on small vessels. The conclusion of the study was that "*there were no particular problems related to using the EM system on such small vessels, that marine mammal bycatch could be reliably recorded and that* ***the EM system provided a better approximation to the total bycatch than fishermen's records and better than normal DCF observers***" (ICES WGBYC 2012). During the eight months of monitoring, 15 bycatches of porpoises were observed, of which eleven specimens were taken by one vessel operating in IVb and IIIaN (ICES WGBYC 2012).

In 2012-13, Denmark is implementing 12 months of monitoring of smaller vessels having their main fishery in Kattegat and Belt Seas, aimed at equipping 14 to 16 gillnetters less than 15 m long (forming the majority of gillnetters in Kattegat and Inner Danish Waters). To date (December 2012), there are only 10 - 11 vessels signed up, but effort is pursued to getting more to participate (Finn Larsen, DTU aqua, pers. comm.).

In December 2012 IMARES and Marine Science & Communication (MS&C) will be starting a 3-year project funded by the Dutch Government for investigating the bycatch of harbour porpoises in Dutch set net fisheries, where monitoring is not required under EC812/2004. Twelve fishermen with vessel under 15m will voluntarily participate into the project which involves the implementation of CCTV on their vessels for three years. Additionally, two of these vessels will also be equipped with pingers. The vessels concerned will likely be fishing in the eastern part of IVc, within 30-40 km to the Dutch coast (Meike Scheidat, pers. comm.)

It is worth noting than in all these CCTV programmes, the participation of vessels is voluntary and the coverage might not be representative of the targeted fleet.

Onboard observers

France The project FilManCet (Fileyeurs Manche Cetacés, Morizur et al 2011), initiated by the fishing industry, ran over a two-year period from late 2008 for estimating the bycatch rate in set-net fisheries located at the two opposite ends of the English Channel, where pingers are mandatory but not used (Morizur et al 2011). Observers were placed on gillnetters regardless of size (7 - 22 m), in the Channel and Southern North Sea, with 82% and 100% of observation effort on vessels < 15m in the western Channel (ICES VIIe), and the eastern Channel (ICES VIId) and southern North Sea (ICES IVc) respectively, with an overall coverage of 3%. Some bycatch was recorded (two porpoises in ICES VIIe on two vessels less than 12m, and one in IVc).

Regular observations have continued for set nets in the southern North Sea / English Channel, as this area is considered as an area of issues for interaction with fisheries, under the project Obsmer (Morizur et al 2011, 2012). In 2011, the coverage for trawlers <15 m, was 5%, and for set net vessels, 1%.

UK Pilot schemes had been implemented in 2008 to cover under-15 m vessels mentioned in Annex III of Regulation 812/2004, although at low coverage. In 2010 (Northridge et al 2011), 66 of the 11,236 d.a.s. for under-15 m vessels were observed (0.59 %) for towed gear in ICES areas VII and IV, with the only observed cetacean bycatch made by one pair trawl fishing for bass in area VII, out of the seven vessels observed. For the same year (Northridge et al 2011), 130 out of the 33,399 d.a.s. were observed for static gear (0.4%), no bycatch were observed.

Other monitoring

Norway The Norwegian coastal gillnet fisheries are carried out by small vessels less than 15 m total length, which are usually not suitable for carrying an extra person as an observer when at sea for multiple days. A segment of the fleet of coastal gillnetters targeting anglerfish and cod was monitored by contracted two fishing vessels in each of nine coastal statistical areas to provide detailed information on effort, catch of target and all non-target species, including marine mammals and birds. The 18 vessels were contracted to target anglerfish and cod using the same gillnet type as the rest of the coastal fleet (bottom-set gillnets with half mesh of 180 mm for anglerfish and bottom-set gillnets with half mesh of 75–105 mm for cod). Bycatch rate were modeled based on catch and bycatch data from 2006-2008. The annual bycatch was estimated to 6,900 harbour porpoises in the period 2006-2008 in the anglerfish and cod fisheries (Bjørge et al. 2011, 2013). The monitoring of the coastal gillnetter fleet is continuing and will be intensified from next year (Arne Bjørge pers. comm.). Mitigation measures suggested include prohibition of large mesh nets (36 cm mesh) in water shallower than 50 m, and the use of pingers in water deeper than 50m (Bjørge et al. 2013).

Recreational fisheries

The monitoring of recreational netfisheries is not a point at all considered by the European legislation, although it is known that bycatch occurs, also in coastal and beach fisheries (e.g. Jan Haelters, Yvon Morizur and present author, pers. comm). In France an interview has been attempted for assessing the extent of the fisheries and the possible bycacth pressure associated with the different type (Sami Hassani and Yvon Morizur, pers. comm.).

General recommendation regarding monitoring of smaller vessels

It is quite clear from the picture already obtained in MS and Norway, that a smaller vessel size is not an efficient mitigation measure, and that smaller vessels can have substantial bycatch rates. As pointed out by ICES WGBYC (2011), bycatch is responsive to the type and amount of gear in use and not to vessel length. Some compulsory monitoring of this segment of the fleet must be incorporated into the revised CFP. The VMS regulations have already been altered to include vessels between 12 and 15 m, but more needs to be done.

As concluded by ICES WGBYC (2011, 2012), electronic monitoring has proved to be a very cost-effective and reliable method for documenting marine mammal bycatch (provided that fishers can be persuaded to adopt the system), and their utilisation should be promoted, especially as they can be placed on small vessels.

The advantages quoted by Kindt-Larsen et al (2012) are:

- Close to 100% coverage of all net hauls
- Video footage can be analysed at 12 times normal speed
- Possibility of going through the data more than once and by multiple persons
- Marine mammals are easily recognized and can be detected
- Pinger use is easily identified
- Control and security of the system is high
- Technological improvements with regards to GPS, cameras, software, etc., are very fast, and quality can therefore easily be improved
- Low costs compared to on-board observers
- No observer effect

Supplementary advantages quoted by ICES WGBUC are:

- Fishermen cannot put pressure on observers to have them not reporting bycatches
- The system can be installed onboard small vessels
- Fishery observer data collection saturation problems can be resolved

It could be added that, not least, CCTV have no other task than to monitor bycatch, unlike the observers working under the EU Data Collection Framework.

Also, there is to date no information/control in any MS in terms of effort or bycatch rate of semi-recreational and recreational fisheries using set nets, whereas these are spread all along the NS coasts. The results obtained so far by the monitoring of vessel down to 7 m length (Morizur et al 2011, 2012), point to the necessity for all the MS to implement studies aimed at evaluating the effort deployed in these fisheries, and the by-catch rate observed.

2.3 Observed and estimated bycatch level in the North Sea (CP action 4)

Table 5 summarises the bycatch presently estimated for the North Sea in the period 2008-2010, as extracted from ICES SGBYC (2010) and ICES WGBYC (2011, 2012) as well as some additional data for 2011 (Morizur et al 2012). The present situation where most cells are filled with zeroes, annual bycatch can be interpreted in two contradictory ways:

1) the table reports a true overall picture of the bycatch in the North Sea, and the pressure is much reduced compared with the situation in the earlier period (up to the mid 00ies, see e.g. Table 4 in ASCOBANS 2009).

2) the table does not provide a true picture of the overall bycatch situation. The monitoring schemes are mostly reporting zero bycatch, except in some UK segments, but this does not indicate that bycatch is not occurring, simply because the wrong section of the fleet is being monitored or it is monitored at low level too low for allowing a reliable extrapolation to the fleet.

Table 5. harbour porpoise bycatch estimated (BC) for different North Sea fisheries. Data extracted from ICES SGBYC (2010) and ICES WGBYC (2011, table 6 & 7; 2012, Table 4). Very high % coverage corresponds to results based on a few effort days. PT, pelagic trawl; na, not available; her, herring; mac, mackerel; bw, blue whiting; hor, horse mackerel.

Metier level 3	Target	Country	Fishing area	2007	2008	2009		2010		2011
				BC	BC	BC	**Season / % coverage (cv)**	BC	**% coverage**	BC
PT		SE	IIIa	0	0					
Nets	na	DK	IIIaN			0	na/0.63			
Nets	na	DK	IIIaS			0	na/0.42			
Nets		DK	IIIa		(1)					
PT		DK	IIIa	0	0					
PT		GE	IIIabcd					0	14	
PT		SE	IVa	0	0					
PT		NL	IVa	0	0			0	19.5	
PT		UK	IVa	0						
PT	her, jax, mac	IR	IVa		0	0	10-12/2.02	0	3.4	
PT		DK	IVb	0						
PT		NL	IVb	0				0	14.3	
na		UK	IVb					0	10.5	
Nets		NL	IVc		0					
PT		NL	IVc		0					
PT		FR	IVc					0	50	
PT		FR	IVc					0	75	
na		UK	IVc					0	0.8, 0.1	
PT	Hor, mac,bw,her	NL	VIId	0	0	0	12-03/12.93			
PT		UK	VIId	0				0	0,2	
PT		FR	VIId					0	7.5, 5.9, 6.0	
PT		FR	VIId					0	3.5, 17.6	
Nets		FR	VIId		-(1%)	-	na/1.00			
PT		NL	VIIe	0	0					
PT		UK	VIIe	0				0	25	
PT		FR	VIIe					0	17.2, 2.4	
Nets, all		FR	VIIe		80 (5%)	80	na/5.00(na)			
Nets < 15	demersal	FR	VIIe							0
Nets > 15	monkfish	FR	VIIe							94
Nets	na	UK	VIIefghj			791	1-12/1.85(0.31)			
All	na	UK	VII					540	(cv=0.13)	
PT		FR	VI, **VII**, VIII	0						

Clearly, these totals provide only a very patchy overview of total bycatch within the North Sea due to lacking / too low / uneven sampling coverage, the lacking/deficient monitoring leading by definition to a lack of bycatch reporting. The main table in the WGBYC database reveals major gaps in total effort data collated to date, specifically in gillnets and pelagic trawl fleet segments that have not been monitored (ICES WGBYC 2012).

This inadequacy between the reported bycacth and the true picture is supported by other qualitative sources of data. Haelters and Camphuysen (2009) and Jauniaux et al (2008) report substantial bycatch observed along the coasts of Belgium and the Netherlands. There has been an increasing rate of strandings in the Netherlands in recent years, and among then a high rate has been diagnosed as bycaught (see Camphuysen & Siemensma 2011 for a review). Low bycatch rates are observed in the eastern Channel (Morizur et al 2011, 2012), although strandings occur in this region and have increased in the last decade (Van Canneyt et al 2009). See also Evans (2010) for a review of these trends along the NS coast.

Northridge (2011) also concludes that "*It is clear that these totals provide only a very patchy overview of total cetacean bycatches in Europe for several reasons: firstly, for several fisheries even where bycatches have been observed, data have been deemed too patchy or unrepresentative to provide a reliable bycatch estimate; secondly, because only a minority of fisheries has been sampled, and thirdly, because most of the attention is being devoted to over 15m vessels that form a minority of the fleet, for gillnets at least. It is also worth noting that several member states either do not currently have bycatch monitoring schemes at all (i.e. are ignoring the regulation), or include protected species bycatch monitoring under other monitoring activities (fish discard or biology schemes) which may compromise their efficiency."*

ICES WGBYC (2011) noted that "*at present, EU Member States largely restrict any sampling to that specified in Regulation 812, although other fleet segments may be more appropriate to monitoring. Some fleets are therefore probably being monitored too much and others too little. Specifically, for example, insufficient monitoring of set-net fisheries in IVc is currently being undertaken as this is not mandated under Regulation 812".*

ICES WGBYC (2012) encountered problems when trying to populate the database with data provided by ICES division for the previous three years. *Despite a clear definition of data required under the EC standard format, some data fields continue to be provided in a variety of different formats. Métier data are particularly heterogeneous and, consequently, data can only be analysed at métier level 3, e.g. pelagic trawls or nets, and this prevents detailed analyses of bycatch in relation to gear types*. One of the problems has been that in the past, data have been reported by multiple divisions (e.g. VI, VII, VIII, or VII abcdegj), which precludes detailed analysis.

Pelagic trawling in the NS

WKREV812 (ICES 2010d) notes that: *Pelagic trawling in the North Sea accounts for relatively few days at sea compared with those in the Atlantic or compared with gillnet fishing. While some bycatches of cetaceans in pelagic trawls in the North Sea have been reported in the past (Couperus 1997), there are none from recent years. Porpoise bycatches in pelagic trawls are only very rarely recorded, and delphinids seem more vulnerable. In recent years, 174 days at sea on UK pelagic trawlers and 410 days on Dutch pelagic trawlers have been monitored in the North Sea, with no cetacean bycatch reported. No bycatches have been reported in other monitoring schemes either. This suggests that monitoring these fisheries could easily be scaled back as bycatch rates appear to be too low to be of concern.*

2.4 Challenging the basis for only considering the North Sea as a single MU, when calculating Take Limits

For assessing conservation level threats, WKREV812 (ICES 2010d) calculated 1.7% Take Limits for the different MUs and considered whether bycatches were likely to exceed the calculated Take Limit, on the basis of the reported catch, the estimated bycatch rate and fishery effort, as well as an assessment of the uncertainty existing around these numbers.

The workshop used the SCANS II survey results as the basis for providing estimates of harbour porpoise abundance in the North Sea (Table 1). The SCANS II blocks were compared with the ICES subdivisions and abundance estimates for each survey block, allocated on a pro-rata basis to each ICES subdivision. *This rather crude analysis assumed that the density of animals is constant within each survey block. ICES Subdivision III was split into southern and northern regions (Kattegat and Skagerrak respectively); the pro-rated abundance estimate for porpoises in Subdivision III was arbitrarily split in two for expedience, allocating half to the North Sea-Skagerrak region and half to the Kattegat-Belt seas region* (ICES 2010d). Take limits were then calculated (Table 6) for a single larger area North Sea + Skagerrak (IIIaN).

Table 6. Pooled abundance estimates for each of the Management Regions proposed by the wkrev812 (ICES 2010d, Table 1) for harbor porpoises, together with the associated 1.7% take limits. Extracted from Table 1 of ICES WGBYC 2012. The SCANS II abundance estimates have been revisited several times, and the numbers used do not seem to match the latest version (Hammond et al in press).

Region	Abundance	1,7% take limits
Atlantic N (V, VI, VII, VIIIa,b)	153 977	2617
Atlantic S (VIIIc,e,e, IX)	2831	48
North Sea – Skagerrak (IIIaN)	**205 751**	**3498**
Kattegat (IIIaS), Belt Seas	14 030	238
Baltic (including all of subdivision 24	4856	83

Splitting subdivision III in two assumes that the density of animals is constant within each survey block. However, just by looking at the distribution of the sightings it becomes clear that the density in block S is far from constant and that the absolute bulk of the sightings is made in the Little Belt and just north of Fyn, with a second, smaller, aggregation at the south-east of Skagen, with very few sightings in area IIIaN. A Danish study (Teilmann et al 2008, Sveegaard et al 2011a,b) has also shown by combining several techniques, including sightings surveys, acoustic surveys and telemetry, that harbor porpoises are not distributed evenly but aggregate in certain areas.

The decision of splitting the S block in two does not seem to take into account the existing information about population structure or to follow the most recent information, both genetic (Wiemann et al 2010) and behavioural (Teilmann et al 2004, 2008). Wiemann et al (2010) provide strong evidence for a split between the Skagerrak and the Belt Sea, with a transition zone in the Kattegat. Teilmann et al (2004, 2008) proposed a population boundary across the sea of Kattegat between the Islands of Læsø and Anholt, i.e., just south of the aggregation east of Skagen. And this was the conclusion also of the ASCOBANS-HELCOM Small Cetacean Population Structure workshop (Evans et al 2009). Both in terms of area and in animal number, this boundary does not correspond to a split in two of block S.

The North Sea + Skagerrak is taken by some as a single population, thus de facto implicitly assuming that bycatches taken in Norway coastal NS areas can be of animals from the BPNS. The Danish telemetry study (Teilmann et al 2004, 2008, Sveegaard et al 2011b) also showed, however, that porpoises tagged in Skagen moved seasonally from the northern Kattegat and Skagerrak northwards as far as the Shetland Islands, but did not range into the southern portion of the North Sea (Figure 4).

Based on the above study and other, non behavioural evidences and adopting a precautionary approach, the ASCOBANS-HELCOM Small Cetacean Population Structure Workshop held in 2007 by 24 specialists in marine mammal genetics and ecology (Evans et al 2009) recommended a subdivision of the North Sea in North-eastern North Sea & Skagerrak on one side and South-western North Sea & Eastern Channel on the other side, the western Channel being grouped with the Celtic Sea + South-west Ireland and Irish Sea with the following specifications:

1) Division of the North Sea into two MUs along a median (at this stage arbitrary) line, running NNW-SSE;
2) Inclusion of the Shetland Islands, Skagerrak and northern Kattegat within the Northeastern North Sea MU;
3) Northern boundary shift of the Northeastern North Sea MU along the Norwegian coast;
4) Inner Danish Waters MU to include part of the Kattegat, all of the Danish Belt seas, and the Western Baltic.

ICES WGMME (2010) also endorsed the MUs for harbour porpoise proposed by the ASCOBANS-HELCOM small cetacean population structure workshop for the North Sea. ICES WGMME (2012), however, reconsidered its recommendation concerning the splitting of the North Sea into two Management Units, on the following arguments: (a) the very strong difference in distribution of harbour porpoises in the North Sea observed in SCANS-II 2005 compared to SCANS in 1994; (b) the near continuous distribution of SCANS-II sightings across the southern and central North Sea and up the east coast of the UK; and (c) the widespread movements of animals radio-tagged off northern Jutland across the central and northern North Sea. ICES WGMME (2012) concluded that splitting the North Sea into two Management Units was therefore not supported by the data and recommended a single North Sea Management Unit comprising ICES Area IV, and most of Division IIIa (Skagerrak and northern Kattegat) south to the most appropriate boundary with the Belt Seas MU, as well as Division VIId; very few harbour porpoise being seen in the eastern Channel.

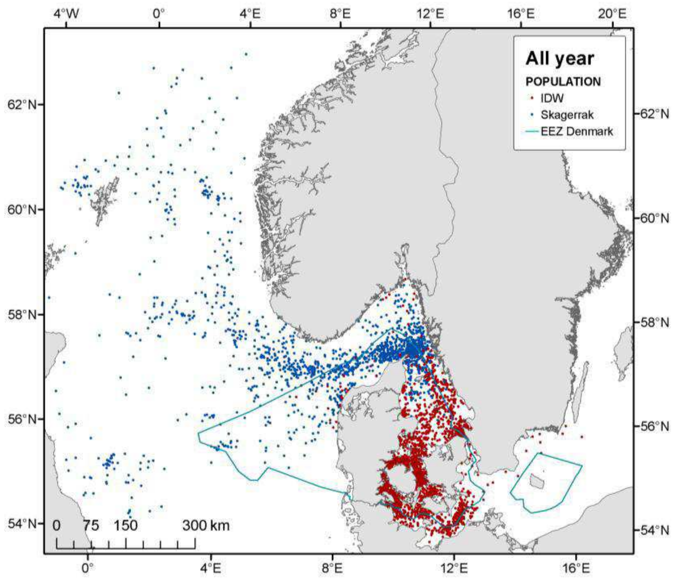


Figure 4. Locations (one per day) of 63 radio-tagged porpoises. Porpoises tagged in the IDW are red, and porpoises tagged in the northern tip of Jutland (Skagen) are blue (N=63 porpoises, n=4287 locations). From Teilmann et al (2008).

However, as it was noted by the ASCOBANS-HELCOM workshop, if in the past, the tendency has been to assume one large MU and then to subdivide this once differences have been detected by various methods, a more precautionary approach would be to start with a number of smaller MUs based upon preliminary evidence of differences, and then to pool these once one has data to show the differences are unlikely to be significant. Considering the degree of uncertainty on the level of bycatch reported for the North Sea, combined with a paucity of data for some areas and a total lack of knowledge for others, we would like to recommend the precautionary approach of splitting the NS into two MUs to also be considered, as a way of defining a confidence limit for the risk associated to bycatch.

2.5 Reiterating concerns: a situation remaining very unclear in the North Sea

The common conclusion is that there are problems and patchiness in the implementation of the bycatch regulation, and problems in meeting the reporting requirement to ICES. The absence of compliance to the reporting obligation combined with the reporting of fishing effort in a format which does not allow extrapolation to the fleet - and the fact that the regulation does not encompass some of the fisheries known to, or susceptible to have bycatch – all lead still to a very patchy overview of bycatch levels in most fisheries. A reliable assessment of bycatch in the North Sea has not been possible yet, and the conservation status of the harbor porpoise, particularly on a regional basis, remains very uncertain.

Information on level of bycatch in smaller vessel fisheries, and coastal fisheries is still missing in many states, although the European fishing fleet is mainly constituted by vessels under 12 m, and the Norwegian study (Bjørge et al 2011, 2013) has clearly shown that this smaller vessel segment takes porpoises. There is no information whatsoever on bycatch rates in recreational fisheries, although bycatch is known to occur.

Although projects aimed at monitoring bycatch in small vessel fisheries have intensified, the gap of knowledge in this area is a crucial problem for assessing the conservation status of the harbour porpoise anywhere, and in particular in the North Sea.

There is no mandatory monitoring of the gillnet fisheries in ICES area IV. There was a high level of bycatch in the Danish segment of the fishery – the only one monitored - in the nineties. Pingers are mandatory for vessels above 12 m, but half of the fleet is under 12 m, i.e., not required to use pingers. The same is actually true for all fleets, some with a much higher proportion of smaller vessels. The situation for the UK fishery in the North Sea is also unclear due to the limited sampling with only one porpoise reported caught among 582 observed hauls in the past four years with major areas of concern for cetacean bycatch remaining England southwestern waters of the Western Channel and Celtic Sea (Northridge et al. 2011).

The pressure of the documented Norwegian bycatch, coupled with an unknown, but possibly not insignificant, level of bycatch in the gillnet fisheries in ICES Area IV and an equally unknown bycatch in the smaller vessel segment of the fleet and in recreational fisheries, could be significant when considered in the light of a likely declining northern North Sea harbour porpoise population.

ICES WGBYC (2011) continues proposing to tackle the bycatch issue in a different way, repeating its recommendation that "*bycatch monitoring schemes should have more flexible targets, not necessarily with the aim of providing total bycatch estimates with predetermined CVs, but should rather aim to ascertain whether or not bycatch rates in specific fisheries are likely to represent a conservation problem".*

The need for a flexible approach has been emphasised both for monitoring and mitigation measures (European Parliament 2010, ICES 2010abe), particularly in view of the observed changes in porpoise distribution patterns in recent years (Hammond et al 2002, in press, SCANS-II 2008, Øien 2010).

Some of the key issues remain reliably determining the bycatch pressure

- in all static net fisheries, regardless of vessel size and including the segment where pingers are mandatory,
- in recreational and semiprofessional fisheries, both coastal and more offshore.

This means also including gillnet fisheries in the mandatory monitoring schemes and extending the mandatory monitoring schemes to smaller vessels and to recreational fisheries. To these effects, the use of CCTV monitoring should be recommended. To avoid any bias, it could simply become mandatory in (at least) any professional fisheries. The actual analysis of the data could still follow a monitoring scheme providing the desired coverage level for each specific fishery.

3. Monitoring harbour porpoise abundance in the North Sea between large scale decadal surveys (CP action 7): 2005- 2015.

Review of the approaches used to monitor cetaceans in European waters are provide by Evans & Hammond (2004) and SCANS (2008, appendix D2.1 & D2.4) and new development have been made since. The approaches which are applicable to the small and elusive harbour porpoise are of four types, i) Acoustic monitoring, static or not, ii) Satellite telemetry tracking individual animals and iii) Visual surveys, from land, ship or aircraft, and very recently iv) High Definition Digital imagery. Visual surveys from ship or aircraft are the approaches the most commonly used in the North Sea.

Two large-scale decadal surveys covering the North Sea were carried out in 1994 and 2005 (Hammond et al 2002, in press, SCANS-II 2008). The next large-scale survey, including the North Sea, is expected to be taken place in 2015. A kick-off meeting was held in Edinburgh in December 2012. These surveys initiate a series of large decadal surveys providing robust estimates of abundance of harbour porpoises in July in the North Sea and allowing looking at trends in abundance over the larger area. They do not provide, however, means of looking at trends in smaller areas, such as national waters or smaller.

Finer scale information on abundance and distribution is essential to assess the impact of several anthropogenic threats in addition to bycatch, such as wind farm construction and operation, and as a basis for regional management plans to ensure favourable conservation status of species in the NATURA 2000 framework. For either of these two reasons, a relatively large amount of regular regional/local monitoring efforts, some dedicated to harbor porpoises and others encompassing them, have been carried out since 2005 in the North Sea, notably in the south east. Until now, the resulting distribution and abundance data have been used mainly in a national context, with no attempt to analyse them in a wider perspective.

The UK Joint Cetacean Protocol (JCP) project (Paxton et al in prep) and the earlier Joint Cetacean Database (JCD) project (Reid et al. 2003) attempts to analyse effort related data, both large scale surveys and more localized monitoring, in an international scale and includes the data from SCANS, SCANS II (and CODA) and a lot of the effort conducted in the UK. But the monitoring which has been carried out in the eastern North Sea and Channel since 2005 is not included in these analyses.

Questions arose whether these monitoring data could be used, retroactively and in the future, for getting trends in relative abundance over a large area of the North Sea in between large scale decadal surveys, if necessary supported by more coordination and standardisation. In order to get a better overview of these monitoring efforts, a catalogue of the effort carried out since 2004 in the North Sea and planed/foreseen until 2015, was prepared, completing the catalogue prepared by Evans (2010) for the ASCOBANS area.

A non-exhaustive review of the recent literature pertaining to surveys for harbor porpoise was conducted, and further information was gained from the Annual National Progress Reports to ASCOBANS. Grey literature, survey reports and supplementary information were obtained from/through the members of the NSSG, as well as other scientists responsible for monitoring effort (Norwegian Marine Research Institute, University of Aberdeen – Lighthouse Field Station, Observatoire Pelagis). UK NGOs and consulting companies conducting surveys in the North Sea were contacted (Cetacean Research & Rescue Unit - CRRU, Sea Watch Foundation, ORCA, MarineLife, WWT Consulting, WDC, IFAW-MCRI). Answers and information were, however, only received from the Sea Watch Foundation, CRRU and IFAW-MCRI.

A catalogue of dedicated line transect sightings surveys conducted in the North Sea since 2004 was compiled, including dates, location, institute and factors relating to survey type, target species, survey design, field methods, as well as effort conducted, number of sightings, density and abundance (Appendix 1a and 2). More localised monitoring projects were also included. This list may, however, not be exhaustive as much of the information only exists as grey literature and most of the NGOs contacted have not provided information to date. It adds to the Evans et al (2007) review of the UK NGOs efforts (dedicated or not to cetaceans) in the period 1998-2007, derived from a comprehensive questionnaire survey that detailed metadata by organization/research group. We choose not to include land-based monitoring projects, although this may be added in the future, if thought relevant by the NSSG. Land based monitoring has its obvious limitations but nonetheless it has provided useful information on coastal hotspots, seasonal variation in relative abundance and longer-term trends, many of which have then been mirrored in offshore surveys. These are conducted in a number of countries around the North Sea, including France, UK, Belgium, and the Netherlands. Future monitoring plans for the period 2012 – 2015 were obtained from focal persons, relevant institutes and some websites[2] from ministries and agencies (Appendix 3).

3.1 Monitoring schemes for harbour porpoise in the North Sea – aims and plans

Monitoring is understood as repeated, at least yearly, dedicated surveys for monitoring harbour porpoise populations, or marine mammals, within a larger area of the national waters. More localised monitoring projects are given in Appendix 1a, but are not summarised here.

Dedicated regular regional/local monitoring efforts targeting harbor porpoises in the North Sea started in 2002 with a German programme (Scheidat et al 2004), aiming at obtaining better knowledge on the distribution of porpoises for informing management decisions related to the implementation of windmill parks and that of identification of Natura 2000 sites. Monitoring efforts have continued and expanded in the last decade, mainly in the south eastern areas of the North Sea, increasing significantly in 2008 onwards and spreading over different times/seasons of the year, but with an absence of regular effort in the western and central North Sea.

Appendix 1a compiles all the dedicated survey efforts – including more localized ones; Appendix 2 presents a synoptic table of these per year and season. Figure 5 shows the different national monitoring areas, while Figure 6 shows the coverage realized within a selected season since 2008. The maps present the outline of the strata, and the intensity of effort within a stratum may change.

3.1.1 France

In the past, France has conducted localised surveys on occasions in the French part of the Channel (2005, Jung et al 2009) and a monthly monitoring over a year in Mer d'Iroise (2008, Stephan & Hassani 2009b).

Dedicated ferry line-transects surveys have been conducted between UK and Spain, thus encompassing the western Channel, in cooperation with the NGOs ORCA in the period 1998-2002 (Kiszka et al 2007). Since November 2011 ferry-surveys are conducted between Dunkirk and Dover (DFDS Seaways, Bouveroux et al 2013).

In March 2009 a series of seasonal line transect shipboard surveys were initiated in the southern bight of the North Sea and the Eastern English Channel in French territorial waters (Bouveroux et al 2012, DREAL NORD 2012).

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[2] DK: http://bios.au.dk/fileadmin/bioscience/Fagdatacentre/MarintFagdatacenter/TekniskeAnvisninger2011_2015/TA_M15_Artsovervaagning_af_marsvin.pdf
GE: http://www.bfn.de/habitatmare/en/monitoring.php
FR: http://www.aires-marines.fr/Connaitre/Habitats-et-especes-pelagiques/Oiseaux-et-mammiferes-marins-en-metropole

In 2011, the programme SAMM of systematic collection of baseline data on the distribution and abundance of the marine megafauna and anthropogenic activities in French mainland EEZ started in the framework of the Natura 2000 marine network (Pettex et al 2012). The programme is coordinated by the Agency of the Marine Protected Areas (AAMP), and financed by the Ministry in charge of the Environment (MEDDTL). The programme includes a combination of methods, among others, dedicated aerial line transect sampling in the Channel (including UK waters) and the Atlantic and Mediterranean French waters. Megafauna is the target, so all marine mammals, birds, sea turtles and sharks are targeted. The programme does not aim at estimating absolute abundance for the species, but at assessing relative abundance to look at distributional changes in time and space and getting an index of relative abundance between large scale decadal surveys.

The programme includes both a survey of the territorial waters (TW) as a specific coastal stratum, as well as included in a wider shelf stratum. The original programme included surveys in two consecutive winters and summers in the period October 2011 – August 2013. The first two set of surveys, in winter 2011-2012 and summer 2012, have been conducted, but the second series of survey have been called off for financial reasons.

Besides this dedicated programme, dedicated marine mammal observers are systematically present on fishery surveys conducted by IFREMER in European waters, including in January-February in the eastern Channel and southern North Sea during the programme IBTS (International Bottom Trawl Survey) (Olivier Van Canneyt pers. comm., Sterckman and Pibot 2012).

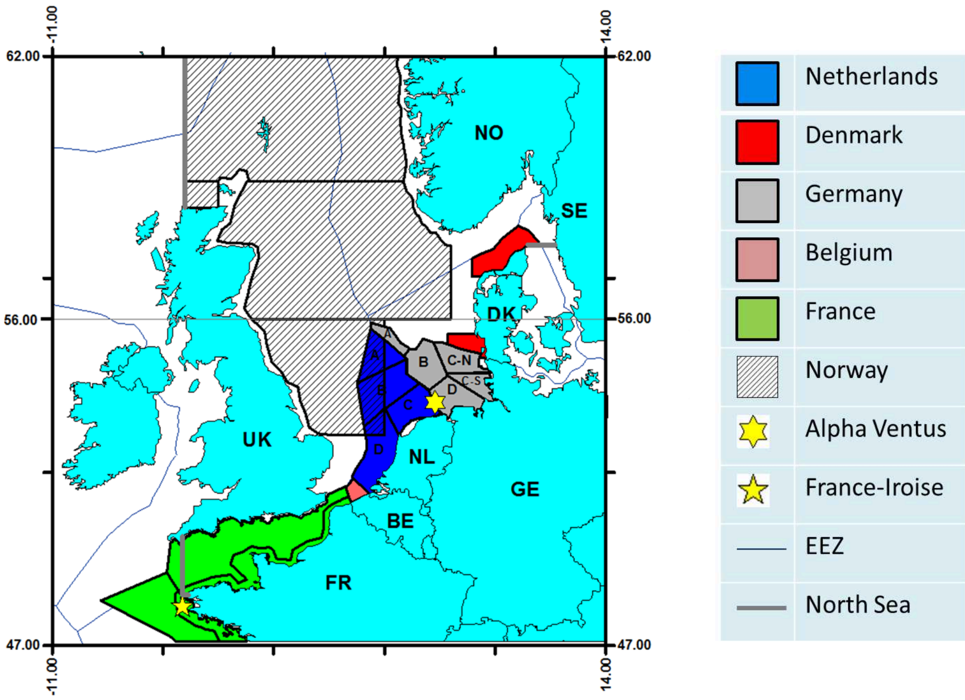

Fig. 5. Map showing the different survey blocks used in dedicated surveys since 2005 in the North Sea

3.1.2 Belgium

The temporal and spatial distribution of marine mammals in Belgian waters, and in particular harbor porpoises - the only common marine mammal in Belgian waters, is monitored using different data sources for assessing the conservation status of the species in the framework of the Habitats Directive and for assessing the impact of human activities, particularly the construction of offshore windfarms (Haelters 2009).

A series of dedicated aerial line transect surveys started in April 2008. Belgian waters (**BPNS** – Belgium Part of the North Sea) are covered on average 4 times per year, taking advantage of good weather windows. Until now, monitoring has been conducted mostly in the period February to November, but with one survey day in Jan 2010. Surveys are conducted by the Management Unit of the North Sea Mathematical Models (MUMM, Haelters 2009, Haelters et al 2011ab, 2012).

3.1.3 The Netherlands

Surveys aiming at estimating harbour porpoise abundance in the Dutch EEZ started in 2008, for assessing the impact of increasing human activities, such as the construction of offshore windparks and gillnet fisheries (Scheidat and Verdaat 2009, Scheidat et al 2012). The present Dutch monitoring is conducted on a year to year project basis, performed within Beleidsondersteunend onderzoek (BO) of EL&I-programs and performed by IMARES. The first complete surveys of the Dutch Continental Shelf (**DCS**) were, however, conducted under the framework of the Shortlist Masterplan Wind programme (SMW) in 2010. The objective of this SMW programme is to estimate the abundance of harbour porpoises on the Dutch Continental Shelf. Spatial and temporal patterns in distribution are assessed for the whole DCS in general, with an emphasis on the wind farm survey areas (Geelhoed et al 2011). In 2012 the entire DCS was surveyed in March (Geelhoed et al 2013). A monitoring scheme in relation to MFSD/ HD has not been established yet, but is under discussion.

3.1.4 Germany

Germany has, presently, two large-scale monitoring schemes in the North Sea. Dedicated aerial surveys for assessing the distribution and density of harbour porpoise in the German part of the North Sea (**GPNS**) started in 2002 in the framework of the construction of windmill parks, and to investigate potential areas for implementing Natura 2000 (Scheidat et al 2004); these have continued since then (Scheidat et al 2007, Gilles and Siebert 2009, 2010, Gilles et al 2009, 2011, 2012), as part of the German monitoring programme of Natura 2000 sites, funded by the Federal Agency for Nature Conservation (BfN). From May 2011 onwards these surveys have been conducted by the Institute of Terrestrial and Aquatic Wildlife Research (ITAW). The surveys normally focusing on a single of the four GPNS survey areas at a time. Complete surveys of the GPNS are conducted every three years in the summer (2009, 2012 and next 2015), although they were conducted in spring, summer and autumn in 2012.

In the period 2008-2012, dedicated sightings surveys have also been conducted in the south-western part of the German North Sea and parts of neighbouring Dutch waters (10,934 km²) in the framework of the "StUKplus-Project” dealing with the monitoring of the offshore wind test field “Alpha Ventus”. These include both aerial surveys (3-5 times per year) in the wider testfield areas in 2008-12; shipboard surveys in a smaller area (2,110 km²) around the windfarm site (DP BT SCANSII method and acoustic) in 2008 -11; and C-POD stations from 2008 until Feb. 2012. The overall project will continue until the end of 2013. This research is funded by the Federal Environment Ministry (BMU), and coordinated by the Federal Agency for Shipping and Hydrography (BSH) (Siebert et al 2011; Dähne et al 2012; Gilles pers. comm.)

3.1.5 Denmark

Monitoring of the five Danish SACs in the North Sea started in 2011, with an aerial survey conducted every year in July (Naturstyrelsen, 2011; Sveegaard, pers. comm.) over two areas, one including the three Skagerrak SACs in the north (# 10,121 km²) and one including the two SACs in the south (5,342 km²). The project is coordinated and financed by the Danish Nature Agency, under the Ministry of Environment.

3.1.6 Sweden

No monitoring effort has been conducted in Swedish North Sea waters since SCANS II in 2005.

3.1.7 United Kingdom

There is no larger scale monitoring effort encompassing harbor porpoises in the North Sea. However, some smaller scale recurrent surveys are conducted in the Moray Firth by the University of Aberdeen Lighthouse field station (inner Moray Firth) and the Cetacean Research and Rescue Unit (Outer Moray Firth) (Appendix 1). Surveys are also conducted off the Grampian coast by the Sea Watch Foundation, and in North-east England

(Northumbria by MarineLife, and Yorkshire by Sea Watch Foundation). In addition a number of ferry surveys across various areas of the Channel, North Sea and Northern Isles of Scotland are undertaken on a regular basis by ORCA, NIORCET and the Sea Watch Foundation. There are regular surveys in the western part of the English Channel, conducted by the Cornwall Wildlife Trust and by MarineLife. For a review of these in the period 1998-2007, see Evans et al (2007). In relation to offshore renewable energy development, there are regular aerial surveys targeting mainly the coastal sector for marine megafauna, mainly birds but also cetaceans.

In addition, the Joint Cetacean Protocol (JCP) collaborative project aiming at the long term surveillance and monitoring of cetaceans in UK waters and the wider northeast Atlantic is collating as much of the effort related data as possible for various cetacean species including harbour porpoises. This includes data from research institutes, developers and NGOs, including SCANS, CODA, European Seabirds at Sea data and Sea Watch data. The work aims to produce robust estimates of cetacean density, distribution and population trends, and the output includes density surface plots, an analysis of trends over time, and the power to detect those trends. The final report is due to be published online in early 2013 (see also http://jncc.defra.gov.uk/page-5657).

3.2 Comparison between the different monitoring efforts

3.2.1 Target species

The target species, i.e., the species for which the methodology is optimized, is for most of the surveys the harbour porpoise, with as the main exception the French survey programme SAMM. All surveys in the North Sea collect data on all cetacean species encountered, although, particularly in the southern sector, this is dominated by the harbour porpoise.

In the case of the French survey programme, SAMM, the megafauna is the target, so all marine mammals, birds, sea turtles and sharks are equally targeted. In most of the Channel, porpoises are the predominant species of all non-bird species, but marine birds represent 95% of all the observations for the three French sectors and are more numerous in the Channel than in the French Atlantic and Mediterranean sectors (Pettex et al 2012).

Surveys incorporating the recording of both seabirds and cetaceans, particularly when seabirds are the primary target or are the predominant taxa, may compromise detection rates of harbour porpoises.

3.2.2 Methodology

Interestingly, even if some different platforms and methodologies are used across the North Sea, the bulk of monitoring effort in the central and southern North Sea performed by Germany, Holland, Belgium and, more recently, France, is based on the same methodology, especially developed for harbour porpoises: dedicated aerial line transect distance sampling, following standard protocols developed during SCANS II (SCANSII 2008), and described in Scheidat et al (2008) and Gilles et al (2009).

Germany, the Netherlands, and Belgium are conducting single platform surveys, while the SAMM programme conducts a mixture of single and double platform surveys. The surveys are flown from high-wing two-engine planes equipped with bubble windows flying at an altitude of 183 m (600 ft) with a speed of 90 to 100 knots. The planes used are a Partenavia P68 (P68) in Germany and the Netherlands (a German and an English plane respectively), a Norman Britten Islander (BNI) in Belgium, and a Britten Norman 2 (BN2) in France.

All groups have their own pool of observers, although many of them have been flying together, have been taught by the same core observers, and were involved in the development of the SCANS II aerial methodology.

One clear difference is the combination in the SAMM programme of a LTS for marine mammals and other megafauna with a strip transect for birds and trash, floating devices and buoys. When bird species dominate as they do in many parts of the Channel, there is the danger that the survey of birds impairs the recording of porpoises. SAMM is not aiming for an absolute abundance of porpoises but for an index of relative abundance for the different species. So as long as protocols are kept identical between surveys, i.e., the proportion of units of a target item missed remains the same between surveys, the different surveys will provide comparable results, which can be used in trend analysis. To investigate the bias introduced by the combined bird/marine mammal surveys compared to a marine mammal survey, the programme carries out flights with double platforms (two independent observer teams on the same plane), where one conducts a survey dedicated to marine mammal only while the other one conducts a marine mammal + bird survey.

Sighting data, allowing for correction both for availability and perception bias for porpoises, are collected in Germany and Holland by using the racetrack data collection method (Hiby & Lovell 1998, Hiby 1999). However, because of time constraints, single surveys seldom generate enough data for getting reliable correction factors. Such factors were calculated from the pooled German 2002-2006 aerial surveys (Scheidat et al 2008, Gilles et al 2009). As they use similar methodology, planes and often observers, the subsequent German and Dutch surveys also use these correction factors, while they continue collecting new data for improving the calculation.

This homogeneity in methodology between the aerial surveys is clearly a good starting point for a coordinated or combined analysis to look at trends over the general area.

Most of the surveys have also started recording systematically the presence of anthropogenic activities (as sighted on the transects), such as trash, remains of fishing nets (ropes, ghost nets), fishing activity, oil spills, etc. The protocols are, however, not standardized. e.g., during the Dogger Bank summer survey in 2011, the Germans recorded anything larger than a *Tetrapack*, but the Dutch partners had a different protocol and did not record garbage, although they did monitor ghost nets.

3.2.3 Spatial extent, spatial contiguity and concurrence of monitoring efforts

Figure 1 shows the different "national" monitoring blocks in the North Sea. The contiguous monitoring area - from the North Sea Danish SIC to the west of the Channel - covers an area of c. 202,152 km². To that can be added the Danish Skagerrak block of c#. 10,121 km² and the larger "Alpha Ventus" monitoring area of 10,934 km². The 2009 Norwegian block covers c. 453,577 km². The combined Belgian, Dutch and German areas, which were all covered in spring 2012, spans 103,936 km².

Appendix 2 and Figure 6 clearly show that at times a large chunk of the southern North Sea, and even the North Sea overall, as in summer 2009, have been covered during the same season and sometimes over shorter periods of less than a month (Belgian, Dutch and German surveys in March 2001). In other years or seasons, only small areas, sometimes disconnected, have been covered simultaneously (e.g. summer 2008: Iroise, "Alpha Ventus" and GPNS-C_nord, Figure 6).

Springtime is the period when most different national efforts are conducted, with, for example, in spring 2012, the GPNS, the DCS and BPNS being covered, and probably also part of the Channel. However, surveys in the same season do not necessarily mean simultaneously in time. The winter French Channel survey was ended by mid-February, the BPNS and DCS surveys were in March, the GPNS survey was in May and the summer French Channel survey started mid-May. The greatest concurrence of contiguous surveys was achieved in:
- July 2010: between July 3 and 23, when BPNS, DCS, "Alpha Ventus", which are contiguous, were covered, as well as GPNS-C_nord;
- March 2011: between March 6 and 29 when BPNS, DCS and GPNS-D were all covered (Appendix 1, surveys indicated in yellow).

3.2.4 Coordination of surveys

Most monitoring efforts in the North Sea are carried out at national levels with limited cooperation between countries and no attempt in analysing the results in a wider perspective.

Germany, the Netherlands, Belgium, and lately France, use to keep each other informed on planned surveys. According to Jan Haelters from Belgium (pers. comm.), Germany, the Netherlands and Belgium have tried in the last years to coordinates their surveys in the spring, but in autumn and winter any opportunity to fly is utilised, as they are scarce.

In March 2011, however, a tripartite coordination between Belgium, the Netherlands and Germany resulted in coverage over the period 6-29 March of the contiguous Belgian (BPNS), Dutch waters (DCS), part of the German waters (GPNS-D), and a small area of French waters, i.e. an area of 21,320 km² (ASCOBANS 2011, p. 14, 5.1-78). In August 2011, a survey covering the Dogger Bank was conducted by ITAW in cooperation with IMARES and with financial support from Denmark and the UK (Gilles et all 2012). It is not known as this point, if such a program may become recurrent.

Belgium is quite flexible in its surveys, given that the aircraft it uses is the property of MUMM - RBINS (Royal Belgian Institute of Natural Sciences), the institute responsible for the monitoring. Belgium, Germany and the Netherlands use different planes, and have enough observers to work simultaneously.

3.3 <u>Seasonal variation in densities</u>

Densities vary seasonally within all strata, with movements of porpoises in and out of the areas. Contiguous areas can be covered in the same season, but at an interval large enough that animals may have moved from one area to the next. Figure 42 from Gilles et al (2011), illustrates well how the density of porpoises can rapidly change in a relatively small monitoring area, like the German area C_Nord of 8,024 km² - and consequently in an even smaller area, like the Belgian one (3600 km²), and figure 43 from the same report shows how variable densities can be from year to year in the same monitoring area.

Peak densities do not occur at the same time along the eastern coast of the North Sea, spreading from late winter in Belgium (with high densities in February to March also in TW, and low abundance from May to January with a more offshore distribution than earlier in the season, Haelters et al 2011a), early spring in Dutch waters (Scheidat et al 2012), late spring to early summer in German waters, April in area D, and June in area C_North, with a north-south density gradient in summer (Gilles et al 2009) and generally higher densities in June than in July (Gilles et al 2012). In all three areas, the density of porpoises is low in late summer and autumn. Seasonal variation in densities are also observed along the east coast of UK, numbers peaking in late summer except in the south-east (East Anglia & Kent) where it peaks in March-April, i.e. at a similar time to Belgium and the Netherland Evans (2010) gives a complete review of these seasonal trends.

Clearly, if abundance estimates have to be added, it is important that the same animals do not get counted twice in two different areas at different times. The shorter the time intervals between surveys in adjacent areas, the better, particularly in spring, and possible migration of animals from one area to another has to be taken into account when coordinating the timing of the different surveys.

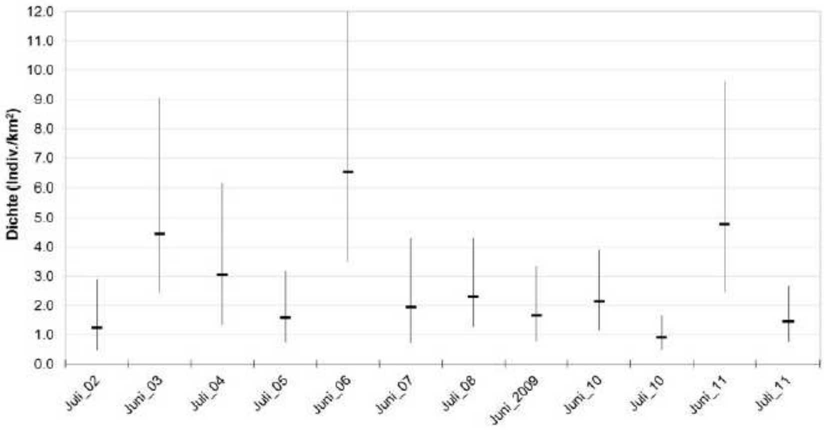

Abb. 42: Sommererfassung in Stratum C_Nord 2002 bis 2011. Dargestellt sind Schweinswaldichte und assoziierte 95% Konfidenzintervalle. Das MINOS-Gebiet C wurde von 2002 bis 2007 post-stratifiziert, da C_Nord nur den nördlichen Teil abdeckt (Daten aus Scheidat et al. 2007, Gilles et al. 2008 und Gilles & Siebert 2009, 2010).

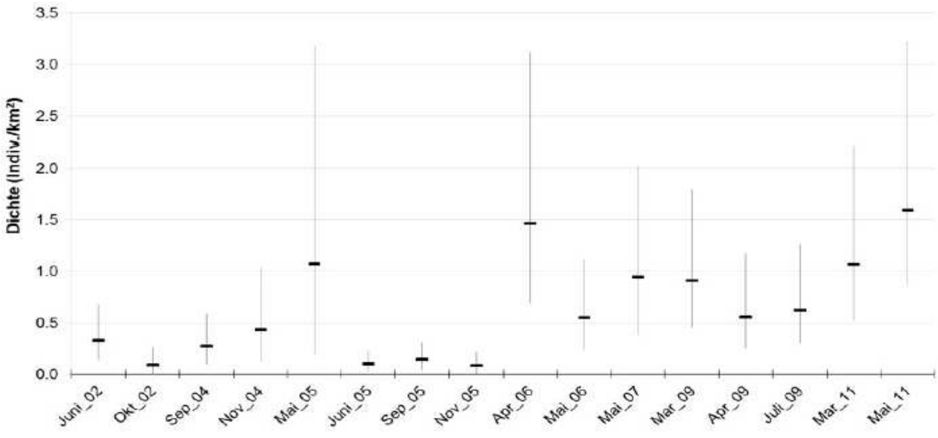

Abb. 43: Stratum D. Schweinswaldichte und assoziierte 95% Konfidenzintervalle (Daten aus Scheidat et al. 2007, Gilles et al. 2008 und Gilles & Siebert 2009, 2010).

3.4 Maximising the output of the North Sea monitoring surveys

3.4.1 Past surveys

The monitoring of harbour porpoise populations carried out in the North Sea has taken place on a country by country basis, and results have been analysed as such. This monitoring has, however, become quite intensive and covered large areas of the south-eastern North Sea. Surveys are conducted at different times of the year, allowing an analysis of seasonal changes on a local basis. All in all, this monitoring represents a considerable investment in terms of scientist time and money.

To date, however, this monitoring only provides information of seasonal and yearly trends in a patchwork of relatively small areas, and no synoptic overview has been obtained by combining the results. Such an overview would represent a considerable advance in our understanding of the southern North Sea porpoise populations, their dynamics and distributional shifts, and would help mitigate the effect of anthropogenic activities.

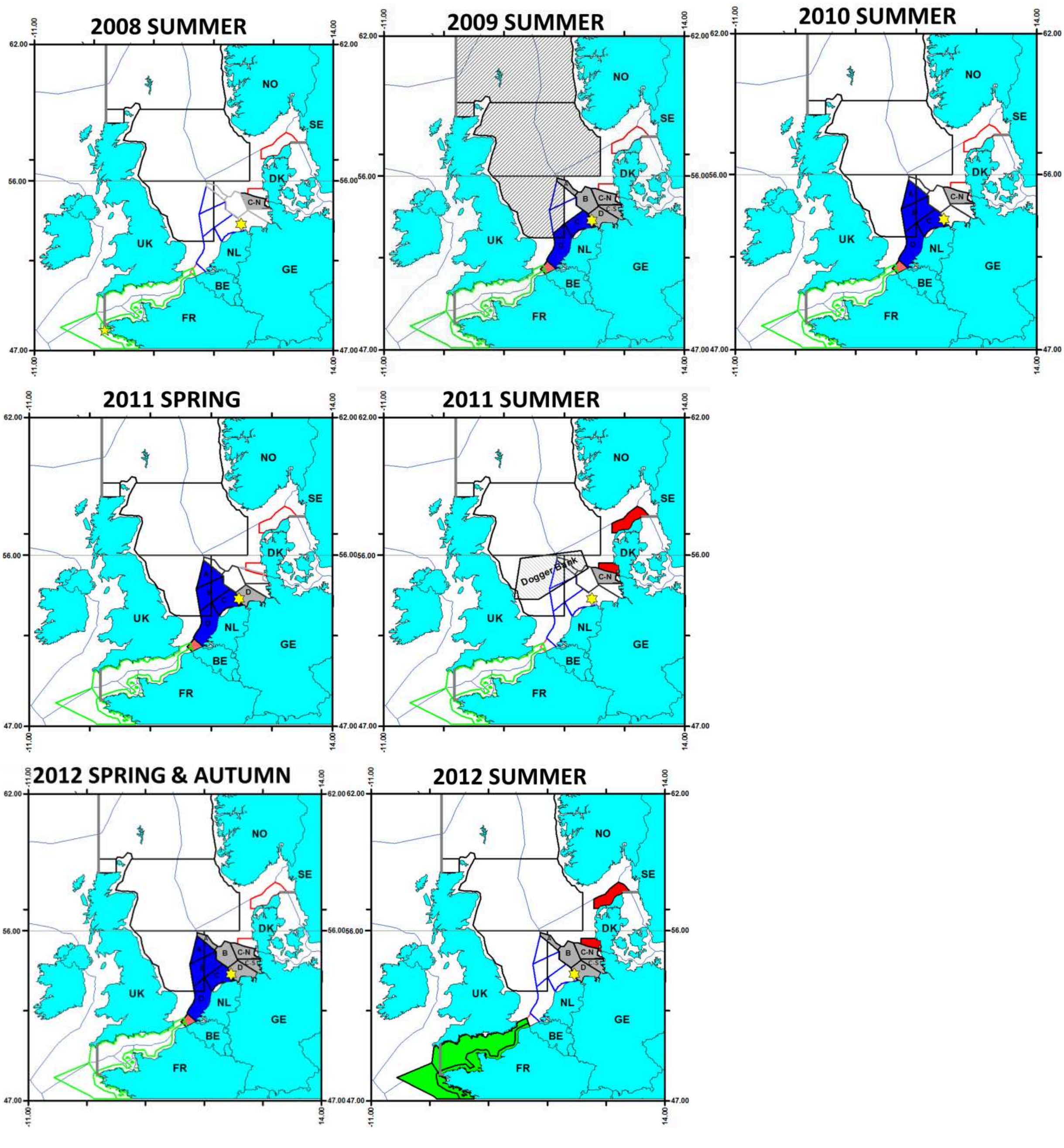

Fig. 6. Yearly and seasonal variation in the overall coverage and spatial contiguity obtained. The areas covered in a particular season are coloured-filled like in Fig. 5. (In autumn 2012, the area A and D of the DCS were only partially covered).

A framework such as the international collaborative project, the Joint Cetacean Protocol (JCP), aiming at the long-term surveillance and monitoring of cetaceans in UK and adjacent waters, would seem very relevant. Besides data from dedicated surveys, it also allows the inclusion of other effort related data (following defined criteria), as thus collected from platforms of opportunity, for example ferries. Up to now, the analyses have, however, only been performed on vessel and aerial survey data (Peter Evans, pers. comm.).

Also, as pointed out in SCANS II (2008), if areas that are too small are covered, it is possible that changes in movement patterns caused by variations in the environment could have a large impact on abundance estimates and, consequently, on estimates of trends. A collaborative approach could compensate for the weakness of small monitoring areas, as is currently taking place in the eastern North Sea.

The homogeneity in methodology among the aerial surveys carried out in the North Sea is clearly a good starting point for a coordinated or combined analysis for looking at trends over the general area.

3.4.2 Future surveys

Appendix 3 gives an overview of the national surveys planned for the coming three years.

Clearly each national/regional monitoring activity is designed, in terms of methodology, spatial extent, seasonality and recurrence, to suit best the objective of the monitoring, which differs between projects, ranging from general monitoring of the megafauna in the French SAMM programme to investigating the effect of windmill construction and operation in Belgian and German waters, or monitoring the abundance of porpoises in smaller SCI areas in Denmark. It is therefore doubtful that a full coordination of the surveys (including continuity in time and space) can be achieved.

A stronger coordination and cooperation, even at the cost of some changes in the established monitoring schemes, would, however, maximize the output of the individual national monitoring programmes. Enhanced surveys are necessary for an improved understanding and evaluation of e. g. the seasonal variations in abundance, or the shifts in distribution of harbour porpoises as shown from the two large-scale SCANS surveys.

It is probably worth recalling some of the conclusions of SCANS II (2008) regarding the monitoring of small cetacean populations:

“A proper design of the survey is critical to address monitoring issues of cetacean populations, and in particular that a large enough area is covered so that shifts in distributions can be accounted for when analysing the data.”

“EU Member States must implement surveillance of cetacean populations to satisfy the requirements of the Habitats Directive; surveillance is equivalent to monitoring as considered in this project [SCANS II]. A fundamental problem with this is that, with some exceptions, cetacean populations are not limited to the waters of any particular country. Independent information on the status of a species on a country by country basis will not be informative about population trends or status if that species ranges widely across national boundaries. In these cases, the only way to obtain information that is useful for conservation at the biological population level is through coordinated monitoring efforts among Member States.

“It should be clear from the above that to move forward, Member States need to agree on a coordinated approach to monitor small cetacean populations.”

In that perspective, it seems a shame that it had not been possible in 2011-2012 for the French Channel, BPNS, DCS, GPNS and North Sea Danish SCI surveys to be at least in one period “simultaneous”, thus providing the contiguous coverage of a 202,152 km² area.

Also, although the Norwegian northern North Sea survey is very different in essence, it would seem desirable to take advantage of it when it takes place, maybe helping to complete overall coverage of the North Sea.

In 2013, with the amount of surveys already planned, it would be possible by coordinating the dates of the surveys to obtain in the summer period an almost contiguous area: Danish NS SCI / GPNS-C_nord /Alpha Ventus / DCS / BPNS (Figure 7).

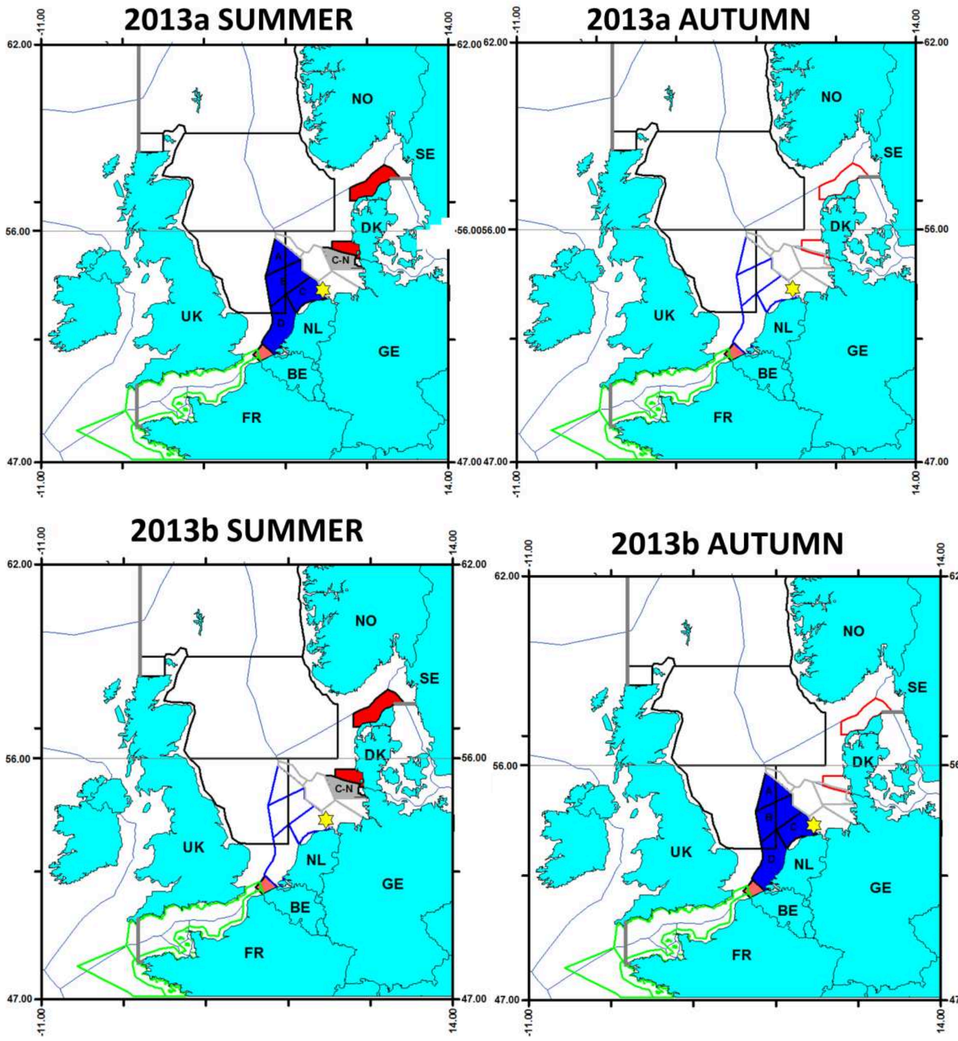

Fig. 7. Resulting grouping possibilities (a versus b) for the summer and autumn 2013 surveys, by choosing to carry out an eventual second DCS survey (depending on finances) either in summer or in autumn.

3.5 Conclusion: SCANS III – an opportunity to go forward?

SCANS III could be a means for pushing things forward in terms of analysis of trends in abundance in the North Sea, for the period 2005–15, with support for the generation of a monitoring scheme and an international database of sightings data, which will then allow the examination of trends in between the large decadal surveys, both backwards and into the future. This could be done by continuing and extending the JCP project, so the focus changes from being UK-based to be truly international. One could say that such an activity within SCANS III would mean that SCANS III goes beyond itself and continues when it is completed.

Although SCANS survey blocks are generally much larger than the national monitoring units (especially when considering Belgium), it might be worth investigating whether it would be possible also to get results at the level of the national monitoring schemes, at least the larger ones. Block design could also take into account MUs.

As strandings rates have proved to be useful qualitative indicators of increasing anthropogenic activity, as in the UK, Holland and Belgium, it would also be beneficial to support a wider northern European strandings database. A review of strandings schemes is provided by Evans (2010). Those North Sea countries with well-developed schemes are UK, France, Belgium, and the Netherlands,, with Germany to a lesser extent although only in Schleswig-Holstein. These countries have started collaborating to build an international strandings database (see for example Deauville and Jepson, 2012).

It may also be worth thinking whether the NSSG should play a role, and which one, in the planning of SCANS III.

4. Overview of the progress realised by Member States (MS) in implementing the conservation plan.

Table 6 presents a qualitative assessment of the progress realised by the member state in implementing the 12 actions defined in the Conservation Plan. The table is based on the version adopted by the NSSG at its second meeting (March 2012), but moving from a binary scale (progress / no progress) to a -1-to-3 scale.

5. Adoption of the report

The original version of this report was circulated to the ASCOBANS North Sea Steering Group (NSSG) on December 10, 2012. The report was then modified to take into account 1) the discussion of the NSSG during its conference call on December 13, as well as 2) the comments on the report subsequently sent to the coordinator by the members of the NSSG. The report was finally adopted on January 21, 2013.

Before being sent as document to the ASCOBANS AC20, the report was updated with the now published 2012 survey data (Appendix 1), as well as with the references of newly published articles.

6. References (both text and appendices)

Anonym. 2011. Swedish Annual National Report to ASCOBANS for 2010. Document ASCOBANS AC18_2-09 rev.1. 6pp. http://www.ascobans.org/pdf/ac18/AC18_2-09_rev1_NationalReportSweden.pdf

Anonym. 2012. Plan for forskningsprojekter – til beskyttelse af marsvin i danske farvande. [Plan over the research projects dealing with the protection of harbour porpoises in Danish waters]. Ministeriet for Fødevarer, Landbrug og Fiskeri, NaturErhvervstyrelsen. 26pp. Unpublished (In Danish, no English summary). Available at: http://naturerhverv.fvm.dk/natura_2000.aspx?ID=44244

ASCOBANS. 2009.ASCOBANS Conservation Plan for Harbour Porpoises (*Phocoena phocoena* L.) in the North Sea.. http://www.ascobans.org/pdf/ASCOBANS_NorthSeaPlan_MOP6.pdf

ASCOBANS. 2011. Report of the 18th meeting of the ASCOBANS Advisory Committee. 72pp. http://www.ascobans.org/pdf/ac18/ASCOBANS_AC18_Report_inclAnnexes.pdf

ASCOBANS. 2012. Report to ASCOBANS AC19 from intersessional bycatch working group. ASCOBANS AC19/Doc. 4-06 (WG). 8pp.

Berggren, P., Wade, P., Carlström, C. and Read, A.J., 2002. Potential limits to anthropogenic mortality for porpoises in the Baltic region. *Biological Conservation* 103, 313-322.

Bjørge, A., Godøy, H. and Skern-Mauritzen, M. 2011. Estimated by caych of harbour porpoise Phocoena phocoena in two coastal fisheries in Norway. IWC SC63/SM18.

Bjørge, A., Skern-Mauritzen, M. and Rossman, M.C. 2013. Estimated bycatch of harbour porpoise (Phocoena phocoena) in two coastal gillnet fisheries in Norway, 2006–2008. Mitigtion and implications for conservation. Biological Conservation 161: 164–173.

Bouveroux, Th., Melis, B., Simar, V. and Pezeril, S. 2012. Distribution of harbor porpoises (Phocoena phocoena) in the southern bay of the North Sea and the eastern English Channel, France. Poster presented to the 26th Annual Conference of the European Cetacean Society.

Bouveroux, Th., Simar, V. and Pezeril, S. 2013. Density, seasonal distribution and habitat preferences of harbor porpoises from the southern bight of the North Sea and Dover Strait. Poster presented to the VLIZ mini-symposium 'Marine Observation in the Southern Bight of the North Sea', 14-15 February 2013, Bruges.

Camphuysen, C.J. 2004. The return of the harbour porpoise (*Phocoena phocoena*) in Dutch coastal waters. *Lutra*, 47: 113-122.

Table 6. Qualitative assessment of progress in the implementation of the ASCOBANS North Sea Conservation Plan for Harbour Porpoise (update December 2012). Except for Action 2 (regulation), the scale is as follows: na = not applicable; -1, situation is less good than at the adoption of the plan in 2009, 0 = no progress, 1 = small progress or at experimental level; 2, steady progress; 3, fully implemented. Com., comments.

	Actions - North Sea Conservation Plan (CP) for HP	Priority CP		SE	DK	D	NL	BE	FR	UK	NO	Com.
1	Implementation of the CP: co-ordinator and Steering Committee	High		yes (part time)								
2	Implementation of existing regulations on bycatch of cetaceans e.g. EC 812/2004 & Habitat Directive (HD) (* Table 1ab, ICES WGBYC 2012)	High	*No. vessels requiring pingers	yes?	28	yes?	0	1	117	22	na	
			* % vessels using pingers	0	100	yes?	na	0	0	67-100		
			Dedicated observer prog	no	no	some	no	no	yes	yes		
			Monitoring under HD	no	no	no	no	no	no	yes		
3	Establishment of BYC observation programmes on vessel smaller than 15m long, professional and recreational fisheries	High	Professional	1	1	1	1	0	2	2	2	1
			Recreational	0	0	0	0	0	1	na		
4	Regular evaluation of all fisheries with respect to extent of HP BYC No MS monitors all fisheries, some deemed not relevant	High		0	0	0	0	0	0	0	0	
	Progress for several fisheries, a.o. >15 m vessels			1	1	1	1	1	2	2	0	
	Not required dedicated observer schemes			no	no	no	no	no	yes	yes	na	
	Through DCF/DCR observer schemes			no	yes	no	yes	yes	yes	yes		
5	Review of current pingers, dev. of altern.pingers and gear modif.	High		2	2	2	2	na	1	2 to 3	na	2
6	Finalise a management procedure approach for determining maximum allowable bycatch limits in the region	High		General progress made through SCANS II and taken up at the ICES WGBYC							0	3
7	Monitoring trends in distribution and abundance of HP in NS	High	Large scale	0							0	4
			EEZ	0	0	3	2	3	2	1	0	
8	Review of the stock structure of HP in NS	High		0	1	0	0	0	1	2	?	5
9	Collection of incidental HP data through stranding networks	Medium		1	-1	-1	1	1	1	2	0	6
10	Investigation of the health, nutritional status and diet of HP in NS	Medium		0	-1	-1	1	2	1	2	?	7
11	Investigation of the effects of anthropogenic sounds on HP	Medium		0	1	2	1	1	0	2	?	8
12	Collection and archiving of data on anthropogenic activities and development of a GIS	Medium		0	0	1	1	1	0	1 to 2		9

Comments

1. **UK:** more than steady progress overall, with good coverage in some areas but not in others.
2. **UK:** current pingers reviewed and alternative pingers developed. Detection units are being developed for enforcement. Full implementation expected in 2013.
3. **UK:** has just let a contract to further develop the CLA approach for determining bycatch limits
4. **UK:** JCP bring together effort related data from SCANS, CODA, academics, NGOs, and industry to assess trends in distribution and abundance over the UK EEZ (constrained by 300m depth contour). Trends for harbour porpoise have been assessed from 1994 to 2010. Publication expected in 2013 after international peer-review.
5. **UK:** MUs for UK waters have been developed and will be implemented in early 2013.
6. **DK: 10-15** (fresh) porpoises from the area Wadden Sea-North Sea-Skagerrak are collected per year and necropsied to determine the cause of death, this from March 2012 onwards.
   UK: UK has a very well established scheme. Between 2005 and 2010, the UK undertook 478 post mortem examinations. 71 of these die as a result of bycatch.
   D: there has never been a proper stranding network In Lower Saxony.
7. **D:** In Schleswig Holstein in 2010-2012, there has only been funding for biological basic measurements. In Lower Saxony, there has never been any systematic sampling or investigation of strandings.
   UK: health, nutritional status and diet are assessed in for all PMEs in UK.
8. **UK:** Considerable amount of work ongoing in Scotland in relation to the development of the renewable industry.
9. **UK:** data from MMO observations on seismic survey vessels has been collected for many years. A summary report collecting the results and demonstrating the effectiveness of the soft start approach will be published early 2013. A sound register as part of the MSFD work is under development.

Camphuysen, C.J. 2011. Recent trends and spatial patterns in nearshore sightings of Harbour Porpoises (*Phocoena phocoena*) in the Netherlands (Southern Bight, North Sea), 1990-2010. Lutra 54(1): 37-44.

Camphuysen, C.J. and Siemensma, M.L. 2011. Conservation Plan for the Harbour Porpoise in the Netherlands: towards a favourable conservation status. NIOZ Report 2011-07, Royal Netherlands Institute for Sea Research, texel. Available at http://www.zeeinzicht.nl/docsN2000/NIOZ%20Report%202011-07%20LQ.pdf

Couperus, A. S. 1997. Bycatch of marine mammals and discards in pelagic fisheries. Journal of Northwest Atlantic Fishery Science 22: 209–218.

Cucknell, A-C, Boisseau, O., McLanaghan, R. and Moscrop, A. 2012. A Final report on the presence and distribution of harbour porpoises (*Phocoena phocoena*) from visual and acoustic survey in French and British waters of the English Channel in May and June 2011. ASCOBANS AC19, Document 5.02. Available at: http://www.ascobans.org/ac19.html.

Dähne, M., Gilles, A., Peschko, V., Adler, S., Lucke, K., Krügel, K., Müller, S., Ruse, A., Benke, H. and Siebert, U. 2012. Effects of the construction and operation of Alpha Ventus on harbour porpoises.RAVE conference, Bremerhaven, May 2012.

Deauville, R. and Jepson, P.D. 2012. Interest and feasibility of a web-accessed database for marine mammals strandings and necropsy data in the ASCOBANS region. ASCOBANS AC19/Doc. 6-05 (S). 13pp.

Desportes, G. 2012. Interim report on the implementation of the ASCOBANS North Sea Conservation Plan for Harbor Porpoises. ASCOBANS AC19/Doc. 4-05 (S). 46pp.

DREAL NORD. 2012. Inventaire et etude écologique des mammifères marins de la façade maritime Nord-Pas-de-Calais / Picardie / territoire d'étude du projet de Parc Naturel Marin des 3 estuaires en vue de produire l'ètat initial Natura 2000 en mer et du PNM et de délimiter las ZNIEFF mer. Contrat no. 2011280. Rapport final (tome 2). 81pp.

Eisfeld, S.,Keith, S., Pope, A., Still, D., Dolman, S. and Simmonds, M. 2009. Outer Moray Firth Cetacean Research 2008. Project Report for the BBC Wildlife Fund. 23pp. Unpublished.

European Commission. 2009. Cetacean incidental catches in Fisheries: Report on the implementation of certain provisions of Council Regulation (EC) No 812/2004 and on a scientific assessment of the effects of using in particular gillnets, trammel nets and entangling nets on cetaceans in the Baltic Sea as requested through Council Regulation (EC) No 2187/2005. COM (2009) 368 final.

European Parliament. 2010. Directorate General For Internal Policies Policy Department B: Structural and Cohesion Policies. Fisheries. Mitigation of Incidental Catches of Cetaceans in EU Waters. IP/B/PECH/IC/2009_39. http://www.europarl.europa.eu/studies

European Commission. 2011. Proposal for a Regulation of the European Parliament and of the Council on the Common Fisheries Policy COM (2011) 425.

Evans, P.G.H. 2010. Review of Trend Analyses in the ASCOBANS Area. ASCOBANS AC17/Doc. 6-08 (S). 68pp.

Evans P.G.H., Andersen, L., Bjorge, A., Fontaine, M., Galatius, A., Kinze, C.C., Lockyer, C., De Luna, C., Pierce, G., Sveegaard, S., Teilmann, J., Tiedemann, R. and Walton, M. 2009. Harbour Porpoise *Phocoena phocoena*. In: Evans P.G.H. & J. Teilmann (eds) Report of the ASCOBANS / HELCOM small cetacean population structure workshop. ASCOBANS Bonn, Germany.

Evans P.G.H. and Hammond, P.S. 2004. Monitoring cetaceans in European waters. Mammal Rev 34(1):131-156.

Evans, P.G.H., Pesante, G., Anderwald, P., Ansmann, I., Baines, M., Baulch, S. and Nuuttila, H. 2007. Cetacean monitoring effort carried out by voluntary NGO's in UK waters. Report to the JNCC. Sea Watch Foundation. 66pp.

Geelhoed, S., Scheidat, M., Aarts, G., van Bemmelen, R., Janinhoff, N., Verdaat, H. and Witte, R. 2011. Shortlist Masterplan Wind – Aerial surveys of harbour porpoises on the Dutch Continental Shelf. Research Report IMARES Wageningen UR - Institute for Marine Resources & Eco-system Studies, Report No. C103/11, 48pp.

Geelhoed, S, Scheidat, M & Bemmelen R van, 2013. Marine mammal surveys in Dutch waters in 2012. Research Report IMARES Wageningen UR - Institute for Marine Resources & Ecosystem Studies. Report No. C038/13, 22pp.

Gilles, A., Herr, H., Lehnert, K., Scheidat, M. and Siebert, U. 2007. Erfassung der Dichte und Verteilungsmuster von Schweinswalen (Phocoena phocoena) in der deutschen Nord- und Ostsee. MINOS 2 - Weiterführende Arbeiten an Seevögeln und Meeressäugern zur Bewertung von Offshore - Windkraftanlagen (MINOS plus). Endbericht für das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit FKZ 0329946 B. Teilprojekt 2.

Gilles, A., Herr, H., Lehnert, K., Scheidat, M. and Siebert. U. 2008a. Harbour porpoises - abundance estimates and seasonal distribution patterns. In: Wollny-Goerke, K. and Eskildsen, K. (eds). *Marine mammals and seabirds in front of offshore wind energy*. Teuber Verlag Wiesbaden, pp 19 – 36.

Gilles. A., Herr, H., Lehnert, K., Scheidat, M., Kaschner, K., Sundermeyer, J., Westerberg, U. and Siebert, U. 2008b. Erfassung der Dichte und Verteilungsmuster von Schweinswalen (Phocoena phocoena) in der deutschen Nord- und Ostsee. MINOS 2 - Weiterführende Arbeiten an Seevögeln und Meeressäugern zur Bewertung von Offshore - Windkraftanlagen (MINOS plus). Endbericht für das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit FKZ 0329946 B. Teilprojekt 2, 66pp. http://www.tihohannover.de/fileadmin/user_upload/tiho_hannover/kliniken_institute/79_terr_aqua_wildtierforschung/Berichte/MINOSplus_TP2_final.pdf

Gilles, A., Peschko, V. and Siebert, U. 2010. Schweinswalerfassung im Bereich des niedersächsischen Wattenmeeres im Rahmen eines Monitorings. http://www.nationalpark-wattenmeer.de/sites/default/files/media/pdf/Schweinswal_NDS_2010.pdf

Gilles, A., Peschko, V., Scheidat, M. and Siebert, U. 2012. Survey for small cetaceans over the Dogger Bank and adjacent areas in summer 2011. ASCOBANS AC19/Doc.5-08 (P).

Gilles, A., Peschko, V. and Siebert, U. 2011. Monitoringbericht 2010–2011. Marine Säugetiere und Seevögel in der deutschen AWZ von Nord- und Ostsee. Teilbericht marine Säugetiere - Visuelle Erfassung von Schweinswalen und akustische Erfassung im Seegebiet Doggerbank. Final report for the Federal Agency of Nature Conservation, p 5–73 (+ appendix). (in German, English summary) http://www.bfn.de/habitatmare/en/downloads/monitoring/BfN Meeresmonitoring marine Saeugetiere AWZ_2010-2011.pdf

Gilles, A., Risch, D., Scheidat, M., and Siebert, U. 2006. Erfassung von Meeressäugetieren und Seevögeln in der deutschen AWZ von Nordund Ostsee (EMSON). Teilvorhaben: Erfassung von Meeressäugetieren. Endbericht für das Bundesamt für Naturschutz. F+E Vorhaben FKZ: 802 85 250. http://www.habitatmarenatura2000.de/de/downloads/berichte/EMSON_Meeressaeugetiere_Nordsee-Ostsee_2006.pdf

Gilles, A., Scheidat, M., and Siebert, U. 2009. Seasonal distribution of harbour porpoises and possible interference of offshore wind farms in the German North Sea. *Marine Ecology Progress Series* 383: 295–307.

Gilles, A. and Siebert, U. 2008. Schweinswalerfassung im Bereich des niedersächsischen Wattenmeeres im Rahmen eines Monitorings http://www.nationalpark-wattenmeer.de/sites/default/files/media/pdf/Schweinswal_NDS_2008.pdf

Gilles, A. and Siebert, U. 2009. Erprobung eines Bund/Länder-Fachvorschlags für das Deutsche Meeresmonitoring von Seevögeln und Schweinswalen als Grundlage für die Erfüllung der Natura 2000 - Berichtspflichten mit einem Schwerpunkt in der deutschen AWZ von Nord- und Ostsee (FFH-Berichtsperiode 2007-2012) – Teilbericht Schweinswale. Visuelle Erfassung von Schweinswalen. Final report to the Federal Agency for Nature Conservation, p 5-30. (in German, English summary) http://www.bfn.de/habitatmare/de/downloads/monitoring/BfN-Monitoring_MarineSaeugetiere_2008-2009.pdf

Gilles, A. and Siebert, U. 2010. Monitoringbericht 2009-2010. Marine Säugetiere und Seevögel in der deutschen AWZ von Nord- und Ostsee. Teilbericht marine Säugetiere - Visuelle Erfassung von Schweinswalen, pp 4-34, research report. (in German, English summary) http://www.bfn.de/habitatmare/de/downloads/monitoring/BfN-Monitoring_MarineSaeugetiere_2009-2010.pdf

Haelters, J. 2009. Monitoring of marine mammals in the framework of the construction and exploitation of offshore wind farms in Belgian marine waters. *In:* Degraer, S. & Brabant, R. (Eds.). Offshore wind farms in the Belgian part of the North Sea: State of the art after two years of environmental monitoring. Royal Belgian Institute of Natural Sciences, Management Unit of the North Sea Mathematical Models, Marine ecosystem management unit. Chapter 10: 237-266.

Haelters, J. and Camphuysen, C.J. 2009. *The harbour porpoise in the southern North Sea. Abundance, threats and research & management proposals.* IFAW, Brussels, Belgium and den Haag, The Netherlands. 56pp.

Haelters, J., Kerckhof, F., Jacques, T. G. and Degraer, S. 2011a. The harbour porpoise *Phocoena phocoena* in the Belgian part of the North Sea: trends in abundance and distribution. *Belgian Journal of Zoology*, 141 (2): 75-84.

Haelters, J., Kerckhof, F., Vigin, L. and Degraer, S. 2011b. Offshore windfarm impact assessment: monitoring of marine mammals during 2010. Pp. 131-146. *In*: Degraer, S., Brabant, R. and Rumes, B. (Eds.). Offshore wind farms in the Belgian part of the North Sea: selected findings from the baseline and targeted monitoring. Royal Belgian Institute of Natural Sciences, Brussels..

Haelters, J., Van Roy, W., Vigin, L. and Degraer, S. 2012. The effect of pile driving on harbor porpoises in Belgian waters. Pp. 127-143. *In*: Degraer, S., Brabant, R. & Rumes, B. (Eds.). Offshore wind farms in the Belgian part of the North Sea: selected findings from the baseline and targeted monitoring. Royal Belgian Institute of Natural Sciences, Brussels.

Hammond P.S., Berggren P., Benke H., Borchers D.L., Collet A., Heide-Jorgensen M.P., Heimlich S. Hiby A.R., Leopold M.F. and Oien N. 2002. Abundance of Harbour Porpoises and other cetaceans in the North Sea and adjacent waters. *J. Appl. Ecol.* 39: 361-376.

Hammond, P.S., Macleod. K., Berggren, P., Borchers, D., Burt, L., Cañadas, A., Desportes, G., Donovan, G.P., Gilles, A., Gillespie, D., Gordon, J., Hiby, L., Kuklik, I., Leaper, R., Lehnert, K., Leopold, L., Lovell, P., Øien, N., Paxton, C.G., Ridoux, V., Rogan, E., Samarra, F., Scheidat, M., Sequeira, M., Siebert, U., Skov, H., Swift, R., Tasker, M-L, Teilmann, J., Van Canneyt, O. & Vázquez, J.A. In press. Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. Biological Conservation 164: 107-122.

Hardy, T. and Tregenza, N. 2010. Can acoustic deterrent devices reduce by-catch in the Cornish inshore gillnet fishery? Final Report to the Marine and Fisheries Agency. 26pp. unpublished. http://www.marinemanagement.org.uk/fisheries/funding/documents/fcf-pinger-trial.pdf

Hiby, AR.1999. The objective identification of duplicate sightings in aerial survey for porpoise. Pp 179-189. *In*: Garner GW, Amstrup SC, Laake JL, Manly BFJ, McDonald LL, Robertson DG (eds) Marine mammal survey and assessment methods. Balkema, Rotterdam. Hiby, AR. and Lovell, P. 1998. Using aircraft in tandem formation to estimate abundance of harbor porpoises. *Biometrics* 54: 1280-1289.

ICES. 2010a. EU request on cetacean bycatch Regulation 812/2004. Item 1, Special request Advice May 2010.

ICES. 2010b. EU request on cetacean bycatch Regulation 812/2004. Item 3, Special request Advice October 2010.

ICES. 2010c. Report of the Joint NAMMCO/ICES Workshop on observation schemes for bycatch of mammals and birds (WKOSBOMB), 28 June ‐ 1 July 2010, ICES, Denmark. ICES CM 2010/ACOM: 33. 40pp.

ICES. 2010d. Report of the Workshop to Evaluate Aspects of EC Regulation 812/2004 (WKREV812), 28–30 September 2010, Copenhagen, Denmark. ICES CM 2010/ACOM:57. 67pp.

ICES SGBYC. 2008. Report of the Study Group for Bycatch of Protected Species (SGBYC), 29–31 January 2008, ICES, Copenhagen, Denmark. ICES CM 2008/ACOM:48. 88 pp.

ICES SGBYC. 2009. Report of the Study Group for Bycatch of Protected Species (SGBYC), 19–22 January 2009, Copenhagen, Denmark. ICES CM 2009/ACOM:22. 117 pp.

ICES SGBYC. 2010. Report of the Study Group on Bycatch of Protected Species, 1–4 February 2010, Copenhagen, Denmark. ICES CM 2010/ACOM:25. 123pp.

ICES WGBYC. 2011. Report of the Working Group on the Bycatch of Protected Species. 1–4 February 2011, Copenhagen, Denmark. ICES CM 2010/ACOM:26. 73pp.

ICES WGBYC. 2012. Report of the Working Group on the Bycatch of Protected Species. 7–10 February 2012, Copenhagen, Denmark. ICES CM 2010/ACOM:28. 65pp.

ICES WGMME. 2010. Report of the Working Group on Marine Mammal Ecology. April 12–15 2010, Horta, The Azores.

ICES WGMME. 2011. Report of the Working Group on Marine Mammal Ecology. ICES CM 2010/ACOM: 25.

ICES WKOSBOMB. 2010. Report of the Joint NAMMCO/ICES Workshop on observation schemes for bycatch of mammals and birds. ICES CM 2010/ACOM: 33.

IFAW. 2011. Final Report of a Survey for Harbour Porpoises conducted from R/V Song of the Whale in French and British waters of the English Channel, May to June 2011. Unpublished Report. 23pp.

IFAW. 2012. Final Report for a survey for harbour porpoises (*Phocoena phocoena*) of the Dogger Bank and Southern North Sea conducted from R/V Song of the Whale 7th-24th November 2011. Unpublished Report. 19pp.

Jauniaux T., Berguerie H. Camphuysen C.J., Daoust P-Y. Drouguet O., Ghisbain T., Garcia-Hartmann M., Grondin A., Haelters J., Jacques T., Kiszka J., Leopold M., Pezeril S., Schnitzler J., and Coignoul F. 2008. Causes of death of harbor porpoises (*Phocoena phocoena*) stranded on the continental coastline of the southern North Sea (Belgium, France, and Dutch coasts) between 1990 and 2007. ICES Annual Meeting, Halifax, Nova Scotia.

Jung, J-L., Stephan, E., Louis, M., Alfonsi, E., Liret, C., Carpentier, F-G. and Hassani, S. 2009. Harbour porpoise (*Phocoena phocoena*) in north-western France: aerial survey, opportunistic sightings and strandings monitoring. *Journal of the Marine Biological Association of the United Kingdom*, 89: 1045- 1050.

Kindt-Larsen, L. and Dalskov, J. 2010. Pilot study of marine mammal bycatch by use of an Electronic Monitoring System. Report for DTU Aqua, January 2010.

Kindt-Larsen, L., Kirkegaard, E., and Dalskov, J. 2011. Fully documented fishery: a tool to support a catch quota management system. *ICES J Mar Sci* 68: 1606−1610.

Kindt-Larsen, L., Dalskov, J., Stage, B. and Larsen, F. 2012. Observing incidental harbour porpoise *Phocoena phocoena* bycatch by remote electronic monitoring*. Endangered Species Research*. 19: 75–83. http://www.int-res.com/articles/esr_oa/n019p075.pdf

Kiszka, J., MacLeod, K., Van canneyt, O., Walker, D. and Ridoux, V. 2007. Distribution, encounter rates and habitat characteristics of toothed cetaceans in the bay of Biscay and adjacent waters from platform-of-opportunity data. ICES Journal of Marine Science 64: 1033-43.

Kock, H.O. 2010. Natura 2000 and the Common Fishery Policy – Note. EP – IP/B/PECH/IC/2009-88. PE 438.602. 106pp. http://www.europarl.europa.eu/committees/de/pech/studiesdownload.html?languageDocument=EN&file=32391

Morizur, Y., Demaneche, S., Dube, B., Gaudou, O. and Dimeet, J. 2012. Les captures accidentelles de cétacés dans les pêches professionnelles françaises en 2011: Contribution au rapport national sur la mise en oeuvre du règlement européen (CE) No 812/2004 – (année 2011). R.INT.STH/LBH/2012.

Morizur, Y., Gaudou, O., Miossec, D., Toulhoat, L., and Gamblin, C. 2011. Captures accidentelles françaises de mammifères marins sur les filets calés en Manche-mer du Nord et en zones Ciem VII. Observations réalisées durant les deux années du projet FilManCet ainsi que dans le cadre d' Obsmer. http://archimer.ifremer.fr/doc/00035/14666/

Naturstyrelsen. 2011. Det Nationale Overvågningsprogram for Vand og Natur. NOVANA 2011-2015. Programbeskrivelse.
- Programbeskrivelse 1. del: http://www.naturstyrelsen.dk/NR/rdonlyres/865F26DE-5C14-4439-9943-339A647FAEC4/121204/NOVANA_del1endelig1.pdf
- Programbeskrivelse 2. del i samarbejde med DMU og GEUS: http://www.naturstyrelsen.dk/NR/rdonlyres/865F26DE-5C14-4439-9943-339A647FAEC4/121155/NOVANA_2del.pdf (harbour porpoise. Pp. 142-143)
- Programbeskrivelse del 3 - Tekniske anvisninger for marin overvågning 2011-2015 - Artsovervågning af marsvin http://bios.au.dk/fileadmin/bioscience/Fagdatacentre/MarintFagdatacenter/TekniskeAnvisninger2011_2015/TA_M15_Artsovervaagning_af_marsvin.pdf

Northridge, S. 2011. An overview of the state of bycatch monitoring and mitigation measures being implemented in European fisheries. IWC SC/63/SM21.

Northridge, S., Kingston, Al and Thomas, L. 2011. Annual report on the implementation of Council Regulation (EC) No 812/2004 – 2010. 21pp. Unpublished.

Oesterwind, D., and Zimmermann, C. 2013. Pilot study on the documentation of bycatch of seabirds and marine mammals in the gill net fishery of the PO Freest. Intermediate Report 2011. Presented to the Third meeting of the ICES WGBYC, Copenhagen, February 2013. Available from the authors.

Pettex, E., Stéphan, E., David, L., Falchetto, H., Levesque, E., Dorémus, G., Van Canneyt, O., Sterckeman, A., Bretagnolle, V. and Ridoux, V. 2012. Suivi Aérien de la Mégafaune Marine dans la ZEE et ZPE de France métropolitaine. SAMM – Hiver 2011/12. Rapport de campagne. Unpublished Report. 61pp.

Reid, J.B., Evans, P.G.H. and Northridge, S.P. 2003. *Atlas of Cetacean Distribution in North-west European Waters*. Joint Nature Conservation Committee, Peterborough. 76pp.

Robinson, K.P., Baumgartner, N., Eisfeld, S.M., Clark, N.M., Culloch, R.M., Haskins, G.N., Zapponi, L., Whaley, A.R., Weare, J.S. and Tetley, M.J. 2007. The summer distribution and occurrence of cetaceans in the coastal waters of the outer southern Moray Firth in northeast Scotland (UK). Lutra 50 (1): 19-30.

SCANS II. 2008. Small Cetaceans in the European Atlantic and North Sea. Final Report submitted to the European Commission under project LIFE04NAT/GB/000245, Available from SMRU, University of St Andrews, St Andrews, UK.

Scheidat, M., Gilles, A., Herr, H., Risch, D. and Siebert, U. 2007. Monitoring der Abundanz von Schweinswalen und anderen Kleinwalen in deutschen Gewässern (03HS059). Endbericht für das Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMELV), 36pp.

Scheidat, M., Gilles A, Kock K-H. and Siebert U. 2008. Harbour porpoise (Phocoena phocoena) abundance in the south-western Baltic Sea. *Endangered Species Research* 5: 215-223.

Scheidat, M., Kock, K.H. and Siebert, U. 2004. Summer distribution of harbour porpoise (*Phocoena phocoena*) in the German North Sea and Baltic Sea. *J Cetacean Res Manag* 6: 251–257.

Scheidat, M. and Verdaat, H. 2009. Distribution and density of harbour porpoises in Dutch North Sea waters. Report number C125/09. IMARES Wageningen.

Scheidat, M., Verdaat, H., and Aarts, G. 2012. Using aerial surveys to estimate density and distribution of harbour porpoises in Dutch waters. *J. Sea Res*. 69: 1-7.

Siebert, U., Gilles, A., Dähne, M., Peschko, V., Krügel, K., Benke, H., Lucke, K., Müller, S., Adler, S., and Sundermeyer, J. 2011. Ergänzende Untersuchungen zum Effekt der Bau- und Betriebsphase im Offshore-Testfeld „alpha ventus“ auf marine Säugetiere.[StUKplus - investigations on the effects of offshore wind farms on marine mammals in the test field „alpha ventus“]. In: Bla-sche, K., Dahlke, C., Boethling, M., Binder, A. (eds). Ökologische Begleitforschung am Offshore-Testfeldvorhaben „alpha ventus“ zur Evaluierung des Standarduntersuchungskonzeptes des BSH-StUKplus. Fortschrittsbericht 2010, p 83-136. In German, no English summary. www.bsh.de/de/Meeresnutzung/Wirtschaft/Windparks/StUKplus/StUKplus-Fortschrittsbericht_2010.pdf

Stephan, E. and Hassani, S. 2009a. Distribution et abondance des petits cétacés en mer d’Iroise. Rapport final. Unpublished. Actes colloque SFEP, Morlaix 2009. 9pp.

Stephan, E. and Hassani, S. 2009b. Etude pilote « PINGIROISE » Axe n° 3. Distribution et abondance des petits cétacés en mer d’Iroise. *In.* Anonym. Etude pilote ≪ Pingiroise ≫ Rapport final - Juin 2009.

Sterckman, A. and Pibot, A. 2012. PACOMM – Programme d’Acquisition de Connaissances sur les Oiseaux et les Mammifères Marins en France Métropolitaine 2011-2014. Point d’avancement, avril 2012. 16pp. Unpublished. http://www.maia-network.org/upload/iedit/10/779_2679_PointInfo_PACOMM_Avril2012.pdf

Sveegaard, S., Teilmann, J., Berggren, P., Mouritsen, K.N., Gillespie, D. and Tougaard, J. 2011a. Acoustic surveys confirm areas of high harbour porpoise density found by satellite tracking. *ICES Journal of Marine Science* 68: 929-936.

Sveegaard, S., Teilmann, J., Tougaard, J., Dietz, R., Mouritsen, K.N., Desportes, G. and Siebert, U. 2011b. High-density areas for harbor porpoises (*Phocoena phocoena*) identified by satellite tracking. *Marine Mammal Science* 27: 230–246.

Teilmann, J., Dietz, R., Larsen, F., Desportes, G., Geertsen, B.M., Andersen,L.W., Aastrup, P., Hansen, J.R. & Buholzer, L. 2004. Satellitsporing af marsvin i danske og tilstødende farvande. Danmarks Miljøundersøgelser. Faglig rapport fra DMU nr. 484

Teilmann, J., Sveegard, S., Dietz, R., Petersen, I.K., Berggren, P., Desportes, G. .2008. High density areas for harbour porpoises in Danish waters. NERI Technical Report 657. National Environmental Research Institute, University of Aarhus. www.dmu.dk/Pub/FR657.pdf

Thompson, P., Brookes, K., Cheney, B., Bates, H., Richardson, N. and Barton, T. 2011. Assessing the potential impact of oil and gas exploration operations on cetaceans in the MorayFfirth. Second year Report for DECC, Scottish Government, COWRIE, and Oil & Gas UK. 16pp. Unpublished Report

Thompson, P., Brookes, K., Cheney, B., Cândido, A., Bates, H., Richardson, N. and Barton, T. 2011. Assessing the potential impact of oil and gas exploration operations on cetaceans in the Moray Firth. First year Report for DECC, Scottish Government, COWRIE, and Oil & Gas UK. 65pp. Unpublished Report.

Thompson, P., Brookes, K., Cheney, B., Graham, I. and Barton, T. 2012. Assessing the potential impact of oil and gas exploration operations on cetaceans in the Moray Firth. Third year Report for DECC, Scottish Government, COWRIE, and Oil & Gas UK. 18pp. Unpublished Report.

Tilander, D. and S.G. Lunneryd, 2010. Pilot Studies of Electronic Monitoring (EM) system for fisheries control of smaller vessels. Paper presented to the Third meeting of ICES SG BYC, Copenhagen, February 2010. Available from the authors.

Van Canneyt, O., Dars, C., Gonzalez, L., and Dorémus, G. 2009. Les échouages de mammifères marins sur le littoral français en 2008. Rapport CRMM pour le Ministère de l’Ecologie, de l'Energie, du Développement Durable et de la Mer, Direction de l'eau et de la biodiversité, Programme Observatoire du Patrimoine Naturel: 31pp.

Vinther, M. 1999. Bycatches of harbour porpoises (*Phocoena phocoena* L.) in Danish set net fisheries. *Journal of Cetacean Research and Management* 1: 123-136.

Vinther, M. and Larsen, F. 2004. Updated estimates of harbour porpoise by-catch in the Danish bottom set gillnet fishery. *Journal of Cetacean Research and Management*, 6(1): 19-24.

WDCS. 2005. Report of a cetacean survey in the Western Approaches of the English Channel, February-March 2005. Unpublished Report. 42pp.

Wiemann, A., Andersen, L.W., Berggren, P., Siebert., U., Benke, H., Teilmann, J., Lockyer, C., Pawliczka, I., Skóra, K., Roos, A., Lyrholm, T., Paulus, K.B., Ketmaier, V. and Tiedemann, R. 2010. Mitochondrial Control Region and microsatellite analyses on harbour porpoise (*Phocoena phocoena*) unravel population differentiation in the Baltic Sea and adjacent waters, *Conservation Genetics* 11: 195–211.

Øien, N. 2005. Report of the Norwegian 2004 survey for minke whales in the North Sea and southern Norwegian Sea. *Paper SC/57/O10, IWC Scientific Committee, May 2005.*

Øien, N. 2010. Report of the Norwegian 2009 survey for minke whales within the Small Management Area EN – the North Sea. IWC SC/62/RMP7: 6pp.

Appendix 1a. Dedicated sightings surveys conducted in the North Sea since 2004

1. Dedicated sightings survey conducted in the NS since 2004

*Target species: species for which the methodology is optimised, most surveys record however all sightings of marine mammals.

Year	Month/season	Dates	Location	Located in ICES area	Institute	Target species*	Method	Methodology	Bias correction (avail. & perc.)	Platform height (m) & type	Study area, km2	Realised effort, km	nbr. HP sightings / certain detections	CV	Density, Ind/km2 (95% CV) / detection per 100km	Abundance (95% CV)	Extra info	References
2012	Nov	14, 16, 18	DCS - BC	IVbc	IMARES	HP	VAE	SP LTS	?	183, P68, bw	59.327	1.157	28				Zone A only partly completed	Geelhoed et al, 2013
2012	Autumn		GPNS	IVb	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	41.009							Anita Gilles, pers. comm.
2012	Autumn		AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Anita Gilles, pers. comm.
2012	Oct	10	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	no	183, BNI, bw	3.600				0,5			Jan Haelters, pers. comm.
2012	Jul-Aug		Channel + TW	VIIde	Pelagis	Mega-fauna	VAE	SP LTS	no	183, BN2, bw	92.874						The coastal stratum (26,682 km2) is covered twice. Recording of birds, fishing effort and trash	Van Canneyt, pers. comm., Pettex et al. 2012
2012	Summer		AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Anita Gilles, pers. comm.
2012	Summer		GPNS	IVb	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	41.009							Anita Gilles, pers. comm.
2012	Jul		Da NS-Skag. 5 SCIs	IVb	DCE/ITAW	HP	VAE	SP LTS	?		15.464							Svedgaard, pers. comm.
2012	Late spring		AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Anita Gilles, pers. comm.
2012	Late spring	15/05-jun	Channel + TW	VIIde	Pelagis	Mega-fauna	VAE	SP LTS	no	183, BN2, bw	92.874						The coastal stratum (26,682 km2) is covered twice. Recording of birds, fishing effort and trash	Van Canneyt, pers. comm., Pettex et al. 2012
2012	Spring		AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Anita Gilles, pers. comm.
2012	May	3, 6-7, 19,26-27	GPNS	IVb	ITAW	HP	VAE	SP LTS, racetrack	?	183, P68, bw	41.009							Anita Gilles, pers. comm.
2012	Mar	6, 13-15, 17	DCS	IVbc	IMARES	HP	VAE	SP LTS	?	183, P68, bw	59.327	3.666	232	0.33	1.12 (0.63-2.20)	66,685 (37,284-130,549)		Geelhoed et al, 2013
2012	Mar	14-15	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	?	183, BNI, bw	3.600				1,6			Jan Haelters, pers. comm.
2012	Jan-Feb	03/01-15/02	Channel + TW	VIIde	Pelagis/ULR & AAMP	Mega-fauna	VAE	SP LTS	no	183, BN2, bw	92.874	11.697	227				The coastal stratum (26,682 km2) is covered twice. Recording of birds, fishing effort and trash	Van Canneyt, pers. comm., Pettex et al. 2012
2011	Nov-Dec	15/11-15/12	Channel + TW	VIIde	Pelagis/ULR & AAMP	Mega-fauna	VAE	SP LTS	no	183, BN2, bw	92.874	11.697	227				The coastal stratum (26,682 km2) is covered twice. Recording of birds, fishing effort and trash	Van Canneyt, pers. comm.
2011	Nov	7-24	Dogger Bank & sNS	IVb	IFAW/MCRI (R/V SoW)	HP	VSB	SP LTS	no	5,5		868	12					IFAW, 2012.
							ACO	2 bb hydrop. array				2.947	561		19		200m towed two-element bb hydrophone array	
2011	Sep		AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw							"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012

2011	Aug	28/07-01/09	Dogger Bank++	IVb	ITAW, IMARES	small cet	VAE	SP LTS - racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	66.768	5.997	771	0,31	1.82 (1.01-3.51)	116,448 (64,423-223,881)	coll. of anthropogenic activities, highest densities west & northeast areas, low density over sandbank	Gilles et al., 2011; Gilles et al., 2012.
2011	Jul		Da NS-Skag. 5 SCIs	IVb	DCE/ITAW	HP	VAE	SP LTS	?		15.464							Sveegaard, pers. comm.
2011	Jul	27/07, 01/08	GPNS - CN	IVb	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	8.024	1.610	183	0,32	1.43 (0.76-2.66)	11,467 (6,124-21,333)		Gilles et al., 2011
2011	Jul	11	AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2011	Jun	10, 15	GPNS - CN	IVb	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	8.024	1.607	531	0,35	4.75 (2.45-9.61)	38,094 (19,664-77,138)		Gilles et al., 2011
2011	Jun	2, 7	AV	IVb, IVc	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2011	May-Jun	23/05-15/06	Channel	VIIed	IFAW/MCRI (R/V SoW)	HP	VSB		no	5,5		1.214	13					IFAW, 2011, Cucknell et al., 2012
							ACO					2.737	12		1,04			
2011	May	5, 10	GPNS - D	IVb	ITAW	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	11.775	2.123	332	0,35	1.59 (0.88-3.22)	18,711 (10,311-37,858)	Highest densities ever recorded in March and May 2011	Gilles et al., 2011
2011	Apr	14, 16	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		110, 85		1.3, 1.3		Piling phase	Haelters et al.; 2012
2011	Apr	9-10	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2011	Mar	24-25, 29	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600	#685 for each	184, 198		2.4, 2.6		Pre-piling phase	Haelters et al.; 2012
2011	Mar	18-19, 21-27	DCS	IVbc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	59.327	5.945	684	0,32	1.44 (0.83-2.79)	85,572 (49,324-165,443)	Density in C nearly twice those of A, B and D	Geelhoed et al., 2011
2011	Mar	6-7, 20	GPNS - D	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	11.775	1.923	126	0,38	1.06 (0.52-2.22)	12,461 (6,134-26,138)		Gilles et al., 2011
2010	Oct-Nov	12-14/10; 19,21, 24/11	DCS	IVbc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	59.327	4.028	137	0,33	0.51 (0.27-0.99)	29,963 (16,098-59,011)	Densities in B and C nearly twice those in A and D	Geelhoed et al., 2011
2010	Oct	12, 17	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934	1.427	74	0,44	0.78 (0.31-1.78)		"alpha ventus" mp, 15 transects with a total length of 1,780 km	Siebert et al., 2011, Dähne et al., 2012
2010	Jul	10, 23	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934	1.493	159	0,39	1.15 (0.56-2.58)		"alpha ventus" mp, 15 transects with a total length of 1,780 km	Siebert et al., 2011, Dähne et al., 2012
2010	Jul	5-6, 8-11, 18-20	DCS	IVbc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	59.327	6.040	263	0,34	0.44 (0.24-0.90)	25;998 (13,988-53,623)	Similar densities in the four areas	Geelhoed et al., 2011
2010	Jul	8	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		30			ca. 1500	First 1/4 year, distribution through BPNS, then restricted offshore and northerly	Haelters et al, 2011b
2010	Jul	3, 9	GPNS - CN	IVb	ITAW/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	8.024	1.622	127	0,33	0.88 (0.49-1.68)	7,021 (3,912-13,496)	Lower summer density for these area since 2002	Gilles et al., 2011
2010	Jun	6, 8	GPNS - CN	IVb	ITAW/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	8.024	1.662	309	0,31	2.12 (1.15-3.91)	17,001 (9,265-31,338)		Gilles et al., 2011
2010	Jun	5, 9	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934	1.304	134	0,41	1.49 (0.66-3.20)		"alpha ventus" mp, 15 transects with a total length of 1,780 km	Siebert et al., 2011, Dähne et al., 2012

2010	May	11, 14	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934	1.534	178	0,41	1.10 (0.52-2.41)		15 transects with a total length of 1,780 km	Siebert et al., 2011, Dähne et al., 2012
2010	Mar	23-24, 30	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		39			ca. 2000	First 1/4 year, distribution through BPNS, then restricted offshore and northerly	Haelters et al, 2011b
2010	Mar	16	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934	611	52				"alpha ventus" mp, 15 transects with a total length of 1,780 km	Siebert et al., 2011, Dähne et al., 2012
2010	Mar	2-3, 9-11	DCS - B+C+D	IVbc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	49.700	2479		0,34	1.33 (0.67-2.57)	66,328 (32,745-125,220)	Density 0.66 in B, 1.11 in C, 2.01 in D	Scheidat et al. 2012
2010	Feb-Mar	17/02, 02/03	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		44			ca. 2000	First 1/4 year, distribution through BPNS, then restricted offshore and northerly	Haelters et al, 2011b
2010	Jan	7	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		10			ca. 550	First 1/4 year, distribution through BPNS, then restricted offshore and northerly	Haelters et al, 2011b
2009	Nov-Dec	30/11-01/12	DCS - C+D	IVc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	20.800	1.223		0,32	1.51 (0.91-3.08)	31,515 (18,976-64,157)		Scheidat et al., 2012
2009	Aug	10, 14	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2009	Aug	4-5	DCS - C+D	IVc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	20.800	947		0,69	0.28 (0.02-0.85)	5,795 (458-17;642)		Scheidat et al., 2012
2009	Aug	4-5	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		3		0.05 (0.02-0.15)	186 (62-554)	First 1/4 year, distribution through BPNS, then restricted offshore and northerly	Haelters et al, 2011a
2009	Jun/Jul		North & central NS	IVa, IVb, IVc	IMR	MW	VSB	DP LTS, *but IOP minke*	no	>11, >6	453.577	2.854	10				zone EN1, EN2 EN3)	Øien, 2010
2009	Jun/Jul	22/06-05/07	GPNS	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	41.009	4.500	507	0,32	1.32 (0,73-2,54)	54,227 (30,079-104,186)	Changes in spatial distribution vs. previous surveys, with higher density in A and B, lower density in C, lowest density in D	Gilles & Siebert, 2010
2009	May	23	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2009	May	14, 20	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		12		0.15 (0.07-0.33)	556 (261-1,184)		Haelters et al, 2011a
2009	Apr/May	23/04, 01/05	GPNS - D	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	11.775	1.844	96	0,39	0.55 (0.25-1.17)	6,482 (2,969-13,784)	Pile driving started at the moment of survey	Gilles & Siebert, 2009
2009	Apr	11-12	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2009	Apr	3	DCS - C	IVb	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	12.000	615		0,53	0.52 (0.11-1.26)	6,291 (1,366-15,159)	Frisian Front	Scheidat et al., 2012
2009	Mar/Apr	20/03, 01/04	GPNS - D	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	11.775	1.603	114	0,35	0.90 (0.46-1.79)	10,625 (5,373-21,109)		Gilles & Siebert, 2009
2009	Feb-Mar	04/02, 18/03	DCS - D	IVc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	20.800	1.328		0,33	1.47 (0.78-2.70)	30,534 (16,265-56,161)	Bruine Bank	Scheidat et al., 2012
2009	Feb	18-19	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600		20		0.63 (0.40-1.00)	2,265 (1,429-3,592)		Haelters et al, 2011a
2009	Feb		Iroise+	VIIe, VIIIa	LEMM	small cet	VAE	SP LTS, racetrack	no	183, P68, bw	7.076	712	0				No observation	Stephan & Hassani, 2009ab

2008	Nov	29-30/11	DCS - C	IVb	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	12.000	817		0,42	1.02 (0.34-2.10)	12,227 (4,038-25,285)		Scheidat et al., 2012
2008	Sep	18-19	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2008	Aug-Sep		Iroise+	VIIe, VIIIa	LEMM	small cet	VAE	SP LTS, racetrack	no	183, P68, bw	7.076	1.109	25	0,35	0,13	931 (453-1,914)		Stephan & Hassani, 2009ab
2008	Aug	15-16	AV	IVb, IVc	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	10.934						"alpha ventus" mp, 15 transects with a total length of 1,780 km	Dähne et al., 2012
2008	Jul/Aug	24/07, 04/08	GPNS - CN	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	7.441	1.455	212	0,32	2.28 (1.26-4.30)	16,953 (9,360-32,016)	Very high density in north & west of SOR	Gilles & Siebert, 2009
2008	May-Jun		Iroise+	VIIe, VIIIa	LEMM	small cet	VAE	SP LTS, racetrack	no	183, P68, bw	7.076	1.010	0				No observation	Stephan & Hassani, 2009ab
2008	May	11-12	DCS - D	IVc	IMARES	HP	VAE	SP LTS	.37/.14, Scheidat et al 2008	183, P68, bw	20.800	1.045		0,53	0.29 (0.06-0.72)	6,303 (1,270-14,941)		Scheidat et al, 2012
2008	May	5	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw		265	5	2,95	0.29 (0.05-1.80)	3,697 (2,330-5,867)		Haelters, 2009; Haelters et al, 2011a
2008	Apr	08-09	BPNS-	IVc	MUMM-RBINS	HP	VAE	SP LTS	0.45, Hiby 2008	183, BNI, bw	3.600	657	40	2,95	1.03 (0.65-1.63)	3,697 (2,330-5,867)	Also partial surveys conducted on May 5th, and in May 9 and July with bad conditions and few sightings.	Haelters, 2009; Haelters et al, 2011a
2007	Nov-Dec	12/11, 13/12	Da NS-SCIs	IVb	DMU	birds	VAE		no									Teilmann et al, 2008
2007	Jun		GPNS - CN	IVb	FTZ/DMM	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	7.441							Gilles et al, 2011
2006	Jul-Aug		Da NS-Skag	IVb	DMU / NOVANA	birds	VAE		no									Teilmann et al, 2008
2005	Aug		FPEC	VIIe, VIIIa	LEMM	HP	VAE	SP no precision	?	183, P68, bw		1.478	24				Sighting rate1.62 sighting/100 km. Sightings concentrated on the north-western coast with 5.8 si/100 km	Jung et al., 2009; Stephan & Hassani, 2009b
2005	Jul	27/06-29/07	NS +	IV, VIIde	SCANS II	HP; MI	VAE	SP LTS, racetrack for HP	yes, both	183, P68, bw							Dealing only with NS area here, but total area was wider	SCANS II 2008, Hammond et al in press
							VSB	DP LTS. BT meth.	yes, both									
2005	Feb/Mar	17/02-26/03	WAEC	VIIe	WDCS	Cet	VSB	DP LTS: BT only partial		11,3 / 19,5	8.872		6				Information on fishing effort	WDCS, 2005
2004	Jul		northern NS	IVa, IVb	IMR	MW	VSB	DP LTS, *but IOP minke*				2.495	96				Blocks NS and NSCII only are relevant	Øien, 2005
2006, 2005, 2004, 2003, 2002	Autumn		GPNS	IVb	FTZ	HP	VAE	SP LTS, racetrack	.37/.14, Scheidat et al 2008	183, P68, bw	41.045	12.773	411	0,33	0.38 (0.22-0.72)	15,394 (8,906-29,470)	Data pooled over years, description of hot spots: Sylt Outer Reef (SOR) and Borkum Reef Groud (BOR)	Scheidat et al, 2004; Gilles et al, 2006, 2007, 2008a, 2009.
	Summer											17.128	1.826	0,33	1.21 (0.71-2.35)	49,687 (29,009-96,385)		
	Spring											14.338	1.932	0,30	1.34 (0.79-2.48)	55,048 (32,395-101,671)		

2. Localised surveys/monitoring: Moray Firth (MF)

2011	Aug-Nov	06/08-07/11	MF	IVa	IBES-light	Cet	Hi-def video												Thompson et al. 2012
2010	Aug/sep	17/08-27/09	MF			Cet	VAE	SP LTS			183, P68, bw			tot: 230				Four strata: North and South coasts, blocks (2), 1 transect	Thompson et al. 2011
2009	Jun/Oct	3/06-14/10	MF			Cet	VSB	SP LTS	n	n			A#130, B#267					Six surveys of offshore baseline survey transect and 3 surveys in the larger seismic survey area	Thompson et al. 2010
2001-2012	May-Oct		Outer southern MF	IVa	CRRU	Cet	VAE	SP LTS			3,5	880	#1932 km / year	>90 / year				4 standardised routes positioned parallel to the shore	Robinson et al, 2007; Robinson pers. commn.
2008	Nov		Outer MF	IVa	WDCS	MM	VSB	SP LTS			3.3 / 2.3		434	9					Eisfeld et al., 2009
2008	Aug		Outer MF			MM	VSB	SP LTS			4.2 / 2.3		469	53					
2008	May		Outer MF			MM	VSB	SP LTS			3.3 / 2.3		568	51					
2008	Feb		Outer MF			MM	VSB	SP LTS			>3.3/ >2.3		451	23					

3. Localised surveys/monitoring: Lower Saxony

2010	May	26, 28	National Park Wattenmeer	IVb	FTZ	MM	VAE	SP LTS, racetrack	y	y	183, P68, bw	5.469	930	28	0,39	0,24	1,291 (568-2,677)		Gilles et al, 2010
	Apr	7, 14											991	18	0,50	0,19	1,051 (289-2,515)		
2008	May	6											675	17	0,43	0,43	2,363 (972-5,382)		Gilles et Siebert, 2008
	Apr	8-9											970	57	0,71	0,71	3,866 (1,995-7,987)		

4. Localised surveys/monitoring: "Alpha Ventus" testfield, south-western GPNS and Northern DCS

2008-2011	Aug 2008, Mar 2009, Apr 2009/2010/2011		alpha ventus	IVb	FTZ-ITAW/DMM	Hp	VSB	DP BT	y			2.116	760-1355						Siebert et al, 2011; Dähne et al 2012, Gilles, Pers. commn.
							ACO												

5. Localised surveys/monitoring: Southern Bight of the North Sea (SBNS) and eastern English Channel eEC) (French territorial waters)

2011-2012	Summer, fall, winter, spring		TW	IVc, VIIe	OCEAMM, BIOTOPE, PICARDIE NATURE	MM	VSB	SP LTS	n	n				60				14 transects covered once each season. Highest density in winter, with less and more coastal observations in summer	DREAL NORD 2012
2009-2011	Spring, summer, fall				OCEAMM	Hp	VSB	SP LTS	n	n									Bouveroux et al 2012

Appendix 1b. List of abbreviations used in the appendices

BPNS-	Belgian part of the North Sea minus a 5 km nearshore strip.
DCS	Dutch continental shelf, including 4 zones A, B, C and D (see fig. 5)
GPNS	German part of the North sea, including zone A, B, C_north (CN), C_south (CS), D (incl. D_east & D_west) (See fig. 5)
AV	Alpha Ventus, german monitoring area for Alpha Ventus, the aerial survey zone extends on the south west GPNS and northern BPNS (see fig. 5)
sNS	South North Sea
TW	Territorial waters (coastal waters extending at most 12nm/22km from the mean low-water mark)
Da NS-SCIs	Danish North Sea Sites of Community Importance (SCI)
Da NS-Skag	Danish North Sea & Skagerrak
FPC	French part of the Channel
FPEC	French part of the eastern Channel
MM	Marine mammals
Cet	Cetaceans
HP	Harbour porpoises
MW	Minke whales
VSB	Visual shipbased sightings survey
VAE	Visual aerial sightings survey
ACO	Acoustic survey
SP LTS	Single platform line transect survey
P68	Partenavia 68
NBI	Norman Britten Islander
bw	Bubble windows
sp	spring
su	summer
au	autumn

Appendix 2: Surveys grouped by year and season - winter not included

Year	Months	NO	DK	GE		Dogger Bank+	NL	BE	FR	
				GPNS	**Alpha ventus**		**DCS**	**BPNS**	**Channel**	**Other**
2004	3, 4, 5,			A,B,CN,CS,D						
	6, 7, 8	NS + NSCII		A,B,CN,CS,D						
	9, 10, 11			A,B,CN,CS,D						
2005	3, 4, 5,			A,B,CN,CS,D						
	6, 7, 8			A,B,CN,CS,D					FPC+	
	9, 10, 11			A,B,CN,CS,D						
2007	3, 4, 5,									
	6, 7, 8			CN						
	9, 10, 11									
2008	3, 4, 5,						D	Y		**IROISE**
	6, 7, 8			CN	y					**IROISE**
	9, 10, 11				y		C			
2009	3, 4, 5,			D	y		C,D	y		
	6, 7, 8	EN1, EN2, EN3		A,B,CN,CS,D	y		partC,D	y		
	9, 10, 11						C,D			
2010	3, 4, 5,				y		B,C,D	y		
	6, 7, 8			CN	y		A,B,C,D	y		
	9, 10, 11				y		A,B,C,D			
2011	3, 4, 5,			D	y		A,B,C,D	y		
	6, 7, 8		y	CN	y	y				
	9, 10, 11									
2012	3, 4, 5,			A,B,CN,CS,D	y		A,B,C,D	y		
	6, 7, 8		y	A,B,CN,CS,D	y				y	
	9, 10, 11			A,B,CN,CS,D	y		A,B,C,D	y		
2013	3, 4, 5,			D	y		A,B,C,D	y		
	6, 7, 8		y	CN	y		A,B,C,D	y		
	9, 10, 11				y			y		

With two possibilities for 2013, as the period of the eventuel second Dutch survey is not yet fixed

2013a	3, 4, 5,			D	y		A,B,C,D	y		
	6, 7, 8		y	CN	y		A,B,C,D	y		
	9, 10, 11				y			y		

2013b	3, 4, 5,			D	y		A,B,C,D	y		
	6, 7, 8		y	CN	y			y		
	9, 10, 11				y		A,B,C,D	y		

Appendix 3: Plans 2012-2015 for sightings surveys in the North Sea: with on TOP OF IT ALL: SCANS III in 2015 :-)

	Programme	Institute	Target	Main Plan			Details						Reference
NO	**IWC RMP**	**IMR**	**MW**	**2015?**	VSB	NS small area, ?like in 2005							Nils Øien, pers. comm.
SE				**2012**		None communicated							no plan yet established (Dec. 2012)
				2013									
				2014									
				2015									
DK	**De Mp Natura 2000, NOVANA**	**DCE/ITAW**	**HP**	**2012**	VAE	5 NS/Skagerrak SCIs in July							Signe Sveegaard, pers. comm.; Anonym, 2012; http://naturerhverv.fvm.dk/natura_2000.aspx?ID=44244
				2013	VAE	5 NS/Skagerrak SCIs in July							
				2014	VAE	5 NS/Skagerrak SCIs in July							
				2015	VAE	5 NS/Skagerrak SCIs in July							
GE	**Ge Mp Natura 2000**	**ITAW**	**HP**				**A**	**B**	**Cnord**	**Cest**	**Dwest**	**Deast**	Anita Gilles, pers comm.; http://www.bfn.de/habitatmare/en/monitoring.php
				2012	VAE	GPNS	sp+su+au	sp+su+au	sp+su+au	sp+su+au	sp+su+au	sp+su+au	
				2013	VAE	Cnord + Dwest + Deast			su		sp	sp	
				2014	VAE	Cnord + Dwest + Deast			su		sp	sp	
				2015	VAE	GPNS	su	su	su	su	su	su	
	Ge Mp Alpha Ventus			**2012**		swGPNS + nDuPNS, 4-5/year							
NL	**Shortlist Masterplan Wind programme**	**IMARES**	**HP**				**A**	**B**	**C**	**D**			Steeve Geelhoed, pers. comm.
				2012	VAE	DCS	sp+su+au	sp+su+au	sp+su+au	sp+su+au			
				2013	VAE	DCS	sp+su/au	sp+su/au	sp+su/au	sp+su/au			
				2014									
				2015									
BE	**Offshore Windfarm Impact Assessment**	**MUMM-RBINS**	**HP**	**2012**	VAE	BPNS (- 5km ns strip) - 4/year							Jan Haelters, pers. comm.
				2013	VAE	BPNS (- 5km ns strip) - 4/year							
				2014	VAE	BPNS (- 5km ns strip) - 4/year							
				2015	VAE	BPNS (- 5km ns strip) - 4/year							
FR	**Fe Mp Natura 2000 - SAMM**	**PELAGIS-ULR**	**Megafauna**	**2012**	VAE	Channel (+ 12 nm zone)							Olivier Van Canneyt, pers. commn.
				2013		called off							
				2014									
				2015									
UK			**HP**	**2012**									
				2013									
				2014									
				2015									