ICES WGBYC REPORT 2016

ICES ADVISORY COMMITTEE

ICES CM 2016/ACOM:27

REF: ACOM

Working Group on Bycatch of Protected Species (WGBYC)

1–5 February 2016

ICES HQ, Copenhagen, Denmark

ICES CIEM
International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

Recommended format for purposes of citation:

ICES. 2016. Working Group on Bycatch of Protected Species (WGBYC), 1–5 February 2016, ICES HQ, Copenhagen, Denmark. ICES CM 2016/ACOM:27. 82 pp.

For permission to reproduce material from this publication, please apply to the General Secretary.

The document is a report of an Expert Group under the auspices of the International Council for the Exploration of the Sea and does not necessarily represent the views of the Council.

© 2016 International Council for the Exploration of the Sea

Contents

Executive summary **1**

1 Opening of the meeting **5**

2 Adoption of the agenda **5**

3 Historical Review of Reg. 812 Bycatch and Effort (ToR B) **5**

4 Review and summarize annual national reports submitted to the European Commission under Regulation 812/2004 and other published documents and collate bycatch estimates of protected species (birds, mammals, reptiles, and fish) in EU waters (ToR A) **5**

4.1 New Format for data reporting on bycatch of protected species 5

4.2 Monitoring under Reg. 812 – Overview 6

4.2.1 Regulation 812 reports 8

4.2.2 Cetacean and other protected species bycatch data from Reg. 812 reports in comparison to data obtained through other monitoring programs. 8

4.3 Observed specimens, bycatch rates and mortality estimates, total and observed effort obtained from Reg. 812 reports. 10

4.4 Protected Species other than cetaceans reported under Regulation 812 11

4.4.1 Germany 11

4.4.2 Ireland 11

4.4.3 Italy 12

4.4.4 United Kingdom 12

4.4.5 Poland 13

4.4.6 France 13

4.4.7 Portugal 13

4.4.8 Netherlands 14

4.5 Auxiliary data (stranding, entanglements and interviews) indicative of bycatch impacts 14

4.5.1 Portugal 14

4.5.2 Belgium 14

4.5.3 Netherlands 14

4.5.4 Spain 15

4.6 Recreational Fisheries 17

5 Evaluation of Bycatch Impacts on Populations (ToR C) **18**

5.1 Bycatch Risk Assessment (BRA) – Evaluate impact of bycatch on relevant species furthering the approach adopted by Workshop on Bycatch of Cetaceans and other Protected Species (WKRev812) 18

5.1.1 Harbour Porpoise 19

5.1.2 Common Dolphin 19

6 Bycatch Mitigation (ToR D) **21**

6.1 Mitigation compliance carried out under Reg. 812 - Mandatory and voluntary mitigation measures. 21
6.1.1 Denmark 21
6.1.2 United Kingdom 21
6.1.3 France 22
6.1.4 Poland 22
6.1.5 Sweden 22
6.1.6 Belgium 23
6.1.7 Latvia and Estonia 23
6.2 Mitigation research carried out by various Member States and the USA 23
6.2.1 Germany 23
6.2.2 Ireland 23
6.2.3 Poland 24
6.2.4 Portugal 24
6.2.5 United Kingdom 25
6.2.6 Sweden 25
6.2.7 Spain 26
6.2.8 Northeast USA 27

7 Improvements and Ongoing Developments to WGBYC Database (ToR G & H) 28
7.1 Cooperation with ICES Data Centre and WGBYC Database Subgroup 28
7.2 Adapting database to be more inclusive of protected or other species of concern data reported via Reg. 812 and other data sources 29

8 Continue to Develop, Improve and Coordinate Methods for Bycatch Monitoring, Research and Assessment within the Context of European Legislation (e.g. MSFD), regional conventions (HELCOM and OSPAR) and targets (ToR E and ToR I) 30
8.1 Anticipated future changes in legislation addressing the problem of cetacean bycatch within European waters 30
8.2 Cooperation with other ICES Working Groups 31
8.2.1 Integrating Bycatch into ICES Advice 31
8.2.2 WGCATCH 34
8.2.3 FishPi 36
8.3 Other Monitoring Projects –ToR E 37
8.3.1 Netherlands 37
8.3.2 Poland 38
8.3.3 Spain - Electronic Monitoring Systems (EMS) 38

9 Develop collaborative research proposal among WGBYC members to pursue research project(s) and funding opportunities in support of researching PETS and target species behaviour in relation to fishing gear (ToR F) 39

10 Review reports and related ToR from other ICES Working Groups/Workshops that may have bycatch of Protected Species under their purview – (intersessional ToR J) 39

11 The definition of a PET is unclear (ToR k) 42

12 Other Business 43

13 Tasks for 2017 Meeting 43

13.1 Intersessional ToR's 43

13.2 WGBYC member attendance at other relevant EG meetings in 2017 44

14 References 44

Annex 1: List of participants 48

Annex 2: Agenda 50

Annex 3: WGBYC draft Terms of Reference for the 2017 meeting 53

Annex 4: Tables 55

Annex 5: Figures 74

Annex 6: Recommendations 76

Executive summary

The Working Group on Bycatch of Protected Species (WGBYC) met in Copenhagen at ICES Headquarters between 1 and 5 February 2016. The meeting was chaired by Marjorie Lyssikatos (USA) and was attended by seventeen members from 12 nations.

Since the commencement of WGBYC in 2009, the WG has been collating, storing and summarizing annual data reported by European member states (MS) affected by Regulation 812/2004 (Reg. 812). This has resulted in the development of a WGBYC database that currently stores nine years (2006–2014) of data on fishing effort, dedicated monitoring effort and observed bycatch of cetaceans (and increasingly of other protected species) as reported to the European Commission (EC) by MS affected by Reg. 812. However, WGBYC's ability to evaluate the magnitude of bycatch mortality of cetaceans and other protected species or species of possible concern continues to be hampered by limited availability of accurate total fishing effort from relevant European waters for gear types covered by Reg. 812. Consequently there continues to be considerable uncertainty in the representativeness of total fishing effort reported in MS Reg. 812 reports submitted to the EC. WGBYC continues to highlight the inconsistent submission and content of annual reports provided by some MS and the shortcomings of Reg. 812 to accurately reflect the magnitude of cetacean bycatch in European fisheries (ICES, 2014a).

Despite the persistent challenges noted above, this year (2016) WGBYC highlights the following achievements:

1) WGBYC now has a framework for automatic data uploading and storage jointly managed with the ICES Data Centre,

2) WGBYC data continues to demonstrate weaknesses in the current Data Collection Framework (DCF) to adequately capture bycatch incidences of rare event species,

3) WGCATCH now formally recognizes the need to address sampling protocol deficiencies for rare event species in the DCF by incorporating an explicit ToR to address this issue at their annual meetings and have expanded their membership to include WGBYC,

4) WGBYC continues to advance our overall understanding of protected species bycatch levels by using its database to (a) now include a summary table of bycatch rates for seabird species in addition to small cetaceans and (b) undertake bycatch risk assessments for harbour porpoise and a new addition in 2016 - common dolphins,

5) Several MS continue with mitigation research projects highlighting the importance of continuing to work toward solutions to difficult bycatch management and conservation issues in the face of challenging data and limited resources.

Brief summaries of each of these accomplishments are provided below.

1) WGBYC continues to cooperate with the ICES Data Centre to make advances towards developing a more comprehensive WGBYC database design and improving access to ICES Data Centre holdings (i.e. Regional Database (RDB) and Inter-catch (Section 7). Last autumn (2015) a Database Subgroup (DbSg) was formed that includes members of both WGBYC and the ICES Data Centre. The DbSg was tasked with identifying current challenges and outlining short versus long-term priorities to address data challenges and develop a robust database to serve WGBYC's expected future data

needs. As a result of the DbSg's efforts the ICES Data Centre successfully implemented an electronic upload procedure of Reg. 812 data from MS reports submitted to the EC or brought to the meeting and intends to build in new features in XML format to facilitate compliance with the excel data entry worksheets. Although the implementation of the new data template and upload procedure did not go as smoothly as initially hoped significant progress has been made laying a solid foundation for ongoing improvements for complete functionality going forward. The DbSg will continue to meet intersessionally to build on this foundation and address its near term priority of completing early MS data entry to facilitate comprehensive data checking and cleaning and the production of routine tables and charts in advance of the 2017 WGBYC meeting. This will allow WGBYC more time at the meeting to engage in meaningful discussions on matters of science related to current and future expectations from WGBYC.

2) Consistent with findings provided in the WGBYC 2015 report (ICES, 2015a) differences are still evident in the numbers of reported bycatch events depending on the type of observation scheme used (Section 4.4.4). In general the number of recorded protected species was greater per dedicated bycatch observer schemes days at sea than per DCF monitoring scheme days at sea. REM data from the Baltic also demonstrated a similar pattern when compared to DCF monitoring. However, it is important to point out that the 2014 data provided under the DCF sampling scheme did report some protected and other rare species bycatch events in contrast to zero reported bycatch events in the 2013 DCF data (ICES 2015a). It is unclear if this apparent increase in reporting of rare bycatch events under DCF is a result of 1) improved reporting on behalf of MS and/or 2) improved monitoring data collection procedures under the DCF monitoring construct or 3) other factors. Although this appears encouraging, it must be stressed that the estimated Northeast Atlantic bycatch rate (all species combined) for towed gears under dedicated monitoring is three times greater (6/187=0.03) than the estimated bycatch rate under the DCF (6/1037=0.01). In addition, the North Sea/Eastern Arctic and Northeast Atlantic combined bycatch rate estimated for static net gears under dedicated monitoring is also approximately three times greater (34/732=0.05) than that estimated under the DCF bycatch rate (3/165=0.02). These results continue to demonstrate that DCF sampling design and data collection protocols do not adequately capture protected species or other rare bycatch events. This is most likely explained by the fact that the observers role under the DCF is focussed primarily on monitoring commercially important and/or quota managed species so less attention is paid to non-commercial species that may be removed or fall from the net before coming aboard and because the main fisheries monitored under the DCF tend to be those with known relatively high discard rates of commercial species such as demersal trawls which generally have relatively low bycatch of some protected species (e.g. marine mammals and birds). This further highlights the importance of designing and optimizing monitoring programs so they can reliably serve multiple purposes including quantifying the bycatch of rare event species (Section 8.2.2), particularly in the absence of existing dedicated bycatch programmes. These findings again reinforce the need for WGBYC to cooperate with relevant groups such as WGCATCH and liaise with Regional Coordination Group (RCG) leaders.

3) WGBYC continues to be proactive in improving coordination with other ICES working groups with the aim of leveraging the expertise within and data collected by those groups (Section 8). In addition, members of WGBYC are engaged in ICES discussions on how best to integrate protected species bycatch advice into stock assessment advice, or regional fisheries or ecosystem overviews. In light of ICES intentions to include information about the bycatch of protected or other species of concern into future advice

sheets, WGBYC is working with WGCATCH to facilitate improving the recording of protected species under existing DCF sampling programmes and in the future in the multi-annual program for data collection (DC-MAP). This is expected to better align information on protected species bycatch from these data sources with the ICES stock advice format. WGCATCH has officially adopted a new ToR to facilitate a more formal evaluation of current sampling schemes and provide guidelines for at sea sampling and recording of bycatches of protected species and rare fish or other species of concern.

4) WGBYC continues to develop a bycatch risk assessment (BRA) approach with the aim of identifying regions, where populations of non-target species could be at risk, in the absence of sufficiently reliable data that would be needed to quantify the bycatch of protected species in a statistically rigorous manner (Section 5). The WG updated its BRA for harbour porpoise in the Kattegat and Belt Seas (3a.21, 3b.23, 3c.22) where a range (high/low) of bycatch levels were estimated. Data for this geographical region suggest it is very unlikely that more than 0.66% of the harbour porpoise population is being removed annually due to bycatch in commercial fisheries.

A preliminary BRA for common dolphins was also undertaken for the northeast Atlantic (Subareas 7, 8 & 9), based on the WGBYC bycatch database. Unfortunately it proved impossible to attain the full dataset for the analysis, because not all of the data provided to WGBYC had been entered prior to commencing the BRA (Section 4.3; Section 7). Consequently, many caveats apply to these BRAs in terms of effort data reliability and the potential for biases which are described in Section 5. Despite these problems, the tabulated data show several important facts. Fishing effort by static nets for example is very high in Subareas 7, 8, and 9. Accepting that there is biased sampling by gear type, in both Subareas 7 and 8, observed bycatch rates of common dolphins are highest in pelagic trawl fisheries, but the lower rates observed in static net fisheries may be equally or even more significant as they could result in similar levels of total bycatch because static net effort is much higher than pelagic trawl effort in these regions. Furthermore, pelagic trawl data are likely to be biased high because of more concentrated sampling in those metiers with observed highest bycatch rates in the past. Further work is needed to validate the data held in the WGBYC database, to stratify the fishing fleets better, to try address other potential biases in the dataset and to investigate precision levels in the bycatch rate estimates in order to undertake a more complete BRA for common dolphins in Subareas 7-9. Nevertheless, the data collated so far are indicative of potentially substantial total annual removals of common dolphins in some European fisheries that may cumulatively exceed safe limits depending on the size of the population from which the bycatch is being taken.

The WG will continue to improve upon and apply the bycatch risk assessment approach to other species/taxa as more data become available. For example, in 2017 WGBYC intend to undertake a BRA for a seabird species (Section 4.3, Section 10);

5) Several MS continue to design and test mitigation methods to minimize bycatch of protected species (Section 6). Current mitigation research includes: continued development of a Porpoise Alarm (PAL) in German waters; development of brochures of best practices for reducing bycatch for circulation to fishermen in Portuguese waters; development of a cetacean friendly device to reduce seal depredation in jigging and gill-net fisheries for pollack and hake respectively off the southwest coast of Ireland; Poland is researching seabird mitigation techniques; the development of alternative fishing gears, such as fish pots, in Swedish and Danish waters to mitigate seal depre-

dation; and Spain and its partners are engaged in several mitigation studies and educating industry on best practices. In addition, several MS continue to utilize pingers to various degrees to mitigate bycatch of small cetaceans and are collecting data to assess the ongoing efficacy of these devices. WGBYC seeks a continued commitment by its members to support and engage in the development and implementation of mitigation research by seeking funding sources and collaborative research proposal ideas.

WGBYC, because of its role in evaluating the magnitude of protected species bycatch in European waters, continues to be confronted by considerable uncertainty in both the near and long-term future. This is primarily due to expected changes in monitoring baselines due to proposed changes in EU marine policy and legislation (Section 8). As a result of these realities, it is important to temper expectations related to future WGBYC products that relate to assessing the bycatch of protected or other species of concern and providing information to the EC and other interested parties because proposed changes to legislation may negatively influence the quality of data available to WGBYC.

1 Opening of the meeting

The Working Group for Bycatch of Protected Species (WGBYC) met at ICES headquarters in Copenhagen 1–5 February 2016. Delegates were welcomed by assisting secretary, Jette Fredslund. A complete list of participants is given in Annex 1. The Terms of Reference (ToRs) are given in Annex 2.

2 Adoption of the agenda

The Draft Agenda was agreed and is also given in Annex 2. Much of the work was accomplished in small groups, with plenary discussion and agreement on major issues.

3 Historical Review of Reg. 812 Bycatch and Effort (ToR B)

This is a ToR that was left over from the 2015 list of ToRs. As a result, WGBYC did not undertake ToR B during its 2016 meeting. Comprehensive reviews of Council Regulation No 812/2004 (hereafter termed Reg. 812) should not occur annually but on an interim schedule more suitable to evaluating changes in trends. WGBYC agreed that it would undertake the next historical review after five years of new data has been collected under the current construct of Reg. 812 or when the monitoring components of Reg. 812 are assimilated into the new DCMAP, or upon any other significant change in legislation affecting bycatch monitoring data collection programs that would necessitate a break in the time series reflecting consistent data collection procedures. WGBYC continues to reiterate that the main limitation in evaluating the magnitude of bycatch mortality since the implementation of Reg. 812 is not having an accurate estimate or census of total fishing effort from relevant European waters. There continues to be considerable uncertainty in the representativeness of total fishing effort reported by Member States (MS) in Reg. 812 reports submitted to the European Commission (EC), in addition to inconsistent submission of annual reports by some MS.

4 Review and summarize annual national reports submitted to the European Commission under Regulation 812/2004 and other published documents and collate bycatch estimates of protected species (birds, mammals, reptiles, and fish) in EU waters (ToR A)

4.1 New Format for data reporting on bycatch of protected species

The future role of WGBYC continues to be shaped by the dynamic changes in European Union (EU) legislation affecting marine policy, in addition to strategic changes within ICES for providing more integrated ecosystem advice across expert working groups for various stakeholders. WGBYC collated 2014 data submitted under Reg. 812 and other data sources in a new format (Section 4.3) to accommodate the new Common Fishery Policy (CFP) movement toward regionalised decision-making, where monitoring and mitigation measures are intended to be tailored to different fisheries and agreed at regional levels. WGBYC's intention is to make it easier to evaluate bycatch levels at a regional or assessment/management unit level and to work towards achieving future consistency across taxonomic groups defined as protected under the Habitats Directive (HD).

At its 2015 annual meeting WGBYC agreed to incorporate additional taxonomic groups where possible into its database commencing in 2017 to begin annual bycatch assessments of selected elasmobranch and other protected fish species, in addition to marine mammals, sea turtles and seabirds where possible given data quality and availability. However, it became apparent intersessionally that more work was needed on modifications to the WGBYC database before other data reported outside of the Reg. 812 reports could be fully incorporated into the WGBYC database. Hence, further evaluation of bycatch on elasmobranch and other protected fish species will not be undertaken in 2017. In addition, WGBYC continues to learn more about the specific duties of other Working Groups (WGs) that already have some protected taxonomic groups or species of concern covered under their respective ToRs (Section 10). Accordingly, as WGBYC continues to learn more about the emphasis of other working groups that may also be considering the impact of bycatch, congruent with emerging data availability, WGBYC will continue to evaluate what taxa/species may be in need of further evaluation for bycatch risk to populations (Section 11).

4.2 Monitoring under Reg. 812 – Overview

The WG was provided with MS annual reports to the EC on observations carried out under Reg. 812 in 2014. Six of the 23 EU coastal MS were not affected by any part of Reg. 812 in 2014 (Bulgaria, Croatia, Cyprus, Greece, Malta, Romania) because they were not fishing in the areas covered by Reg. 812 (Table 1). As in previous years Greece provided a short explanatory report with no data. Reports were received from 13 of the 17 Member States affected by Reg. 812 (Belgium, Denmark, Estonia, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Slovenia and the United Kingdom; Table 1).

Latvia continued its national monitoring program of incidental catches of cetaceans. No incidental catch of cetaceans was observed in 2014. Lithuania reported that no national monitoring program of incidental catches of cetaceans was carried out in 2014 due to lack of funding support through EC Regulation No 1078/2008, and the fraction of the Lithuanian fleet which operates with pelagic trawls and gillnets is relatively small. Lack of space on vessels and other safety reasons are of concern as well. However, Lithuania carried out more than 220 interviews with skippers and crew members during 2014. No incidental catches of cetaceans were reported during these interviews. For Estonia, in 2014 it is reported that there is no observer effort on boats using static gears and that all of these vessels are smaller than 10 m. According to the interviews with fishermen there were no cetacean bycatches.

No reports were provided to the EC by Sweden in 2014 and 2015 (covering monitoring in 2013 and 2014, respectively). However total fishing effort and DCF monitoring effort with on board observers have been submitted to WGBYC. Regarding Articles 4 and 5 of Reg. 812, (monitoring fisheries) Sweden has no sampling schemes with observers dedicated to observe bycatch of marine mammals. The stated reason for this is that Reg. 812 is not serving its purpose to reduce bycatch. Reg. 812 is focusing on monitoring pelagic trawl fisheries in the Baltic. Harbour porpoises are extremely rare in the Baltic and bycatch most often occur in gillnets and not in pelagic trawls. Therefore observing 5% of the trawl fleet in the Baltic will not produce useful bycatch estimates. The likelihood of observing a porpoise bycatch in this fishery is extremely small.

Germany did not submit a 2014 report to the EC but also provided fishing effort and DCF monitoring data at the WGBYC meeting. Finland, which is affected by Articles 4

and 5 of Reg. 812 (monitoring), last submitted a report in 2009 (covering monitoring in 2008).

Spain is affected by Articles 2–5 of Reg. 812 (mitigation and monitoring) and last submitted a report in 2010 (covering monitoring in 2009). Spain's 2009 report documented bycatch by gillnetters of 24 common dolphins in Division 8a and 13 harbour porpoises in Divisions 8ab. The submitted report was produced as part of a pilot project started in 2008 (the Secretaria General de Pesca of the Spanish Ministry of Agriculture, Food and Environment in agreement with the Spanish Oceanographic Institute (IEO)). Since that pilot project there have been no funds to support dedicated monitoring of marine mammals. Observers from the IEO program are dedicated to monitoring discards under the DCF. Therefore they are not focussed on the monitoring requirements of Reg. 812. AZTI, the Basque Institute for Marine and Food Research, coordinates the data recording in relation to the DCF for the Spanish fishing fleet based in Basque ports, as agreed with the Spanish Secretary of Fisheries and IEO. In this context, AZTI has been providing the available information on endangered species (mainly marine mammals) catches from different projects to different groups. From 2003 to 2007 reports were provided to the Working Group on Marine Mammal Ecology (WGMME), in 2008 and 2009 to the Study Group on Bycatch of Protected Species (SGBYC) and more recent years' information on marine mammal incidental catches were submitted to the International Whaling Commission (IWC).

As in previous years, the Portuguese participant stated that the main difficulties in implementing Articles 4 and 5 in the polyvalent fleet are financial and logistical. The sampling target of 5% of fishing effort is almost impossible to attain using observers because of a lack of funding. Another difficulty is related to the dynamic nature of the polyvalent fisheries, which makes effort planning difficult. Also the possibility of switching between gears within a day or of using several gears simultaneously prevents accurately assessing the fishing effort related to each gear type. It is suggested that at least the larger vessels could be required to report landings separated by each metier, which would improve the current situation. It is also important to note that Portugal has provided additional data on bycatch of protected species from fishing gears, outside the scope of Reg. 812, collected within the work of Project Life + MarPro and IPMA's (Portuguese Institute of the Sea and Atmosphere) EU-DFC program, giving the appearance of more bycatch events relative to other MS. However, such comparisons are not valid because other MS only submit to the EC or WGBYC those records required by Reg. 812 and some MS reports are missing entirely. Portugal reiterates that Reg. 812 only requires monitoring of pelagic trawls (single and pair) in the Mediterranean and that monitoring bycatch of protected species in static net fisheries is only required for 115 vessels in this region.

The quality and scope of the information provided by the reports for 2014 is variable, with several MS simply repeating the information provided in previous years.

As with last year the contents of the Reg. 812 reports have been reviewed by the following subjects:

1) Implementation of mandatory mitigation and monitoring of cetacean bycatch, and information on voluntary mitigation and observation schemes (see Section 6 for mitigation).

2) Information on cetacean bycatch (including records of individual bycatch events and extrapolated estimates provided by member states).

3) Information detailing bycatch of non-cetacean taxa.

4) Other relevant issues emanating from the reports.

Further relevant information not found in the 812 reports but provided by participants during the meeting is also included.

4.2.1 Regulation 812 reports

Some MS with active fisheries covered by the monitoring requirements of Reg. 812 as described in Annex 4 have established cetacean monitoring schemes for vessels over 15 m and pilot schemes for vessels under 15 m, meeting Reg. 812 requirements, as well as the requirements of monitoring protected species under the Habitats Directive (HD). However, many reports do not detail the lengths of vessels monitored or the total size of the fleet, which makes an assessment of coverage within those fisheries problematic. Cetacean bycatch monitoring was achieved in 2014 through a variety of observation methods in isolation or in combination, such as dedicated bycatch monitoring programs, other dedicated research projects, DCF observer programs (either with or without a specific cetacean and protected species data protocol) and Remote Electronic Monitoring (REM) trials.

The standard unit of fishing and observer effort across all MS continues to be limited to 'days at sea' with the exception of Germany where effort is reported in hours and is then converted to days at sea. 'Net meter per day' or a similar metric would be a more precise and useful unit for reporting static gear effort than 'days at sea', but this information is rarely reported in fishing effort statistics (Table 2). The European format advised by the EC (following advice from ICES) asks for several fields of fishing effort, one of which was "total soak time" defined as "net meter per hour". We emphasize that the Bycatch Risk Approach (BRA, see Section 5.1) requires a common standard unit of fishing effort. There is often a lack of detail regarding fishing effort for static gears because the fishing time of vessels (days at sea) and the fishing time of static gears (soak time) are not necessarily the same. Additionally, some countries do not differentiate between trammel nets and single panel nets or do not report any information for trammel nets at all, as they are not explicitly mentioned in Reg. 812.

Table 3 collates fishing and observer effort by monitoring type (DCF vs. dedicated) by RCM region based on information contained in the Reg. 812 reports which includes monitoring directly under Reg. 812 and for some MS monitoring to meet the requirements of the HD is also included. The term "dedicated monitoring" is used to define programs that are specifically aimed (through sampling design and data collection protocols) to obtain data for the typically rare bycatch events of protected species (Section 8.2.2). Some additional information not mentioned in the reports but which was available to the WG is included for clarity. Detailed fishing and monitoring effort data available to the WG for 2014 (with and without observed bycatch) is described in more detail in Annex 4 (Table 6).

4.2.2 Cetacean and other protected species bycatch data from Reg. 812 reports in comparison to data obtained through other monitoring programs.

Consistent with information provided in the WGBYC 2015 report (ICES, 2015a) there are differences in the numbers of reported bycatch events depending on the type of observation scheme used. Table 3 summarises the information contained within Reg. 812 reports with regard to monitoring of protected species (PS) bycatch in 2014. The types of monitoring effort have been divided into three categories: i) DCF/log book ii) dedicated observer and iii) Remote Electronic Monitoring. The fishery and monitoring effort were recorded as 'days at sea'. Some data from Germany were not available in

the correct format at the time Table 3 was being compiled and are therefore not included in the comparison.

For towed gears, 1120 days of DCF monitoring resulted in 6 reported records of bycaught PS. In contrast, in 895 days of dedicated monitoring there were 55 reports of bycatch albeit most of these in trawls in the Mediterranean. The 61 records of bycaught species were of 8 species: *Delphinus delphis; Halichoerus grypus; Caretta caretta; Alosa fallax; Thunnus thynnus; Mustelus asterias; Squalus acanthias* and *Pteroplatytrygon violacea*. Fishing effort reported in the Reg. 812 reports across all areas from trawls was 90130 days at sea.

In static nets (including single and multi-panel set nets and drift nets), eight species were recorded totalling 72 specimens. There were 165 and 838 days of monitoring through the DCF and dedicated observers respectively. Fishing effort reported in the Reg. 812 reports across all areas from nets was 177676 days at sea. There were 849 days of Remote Electronic Monitoring in the Baltic RCM that reported 35 bycaught *Phocoena phocoena*. The 37 non Baltic RCM records of bycaught species reported included: *Phocoena phocoena; D. delphis; P. vitulina; H. grypus; Morus bassanus; Puffinus mauretanicus; Phalacrocorax aristotelis; and Larus spp.*

The UK also reported additional dedicated sampling of long line fisheries totalling 39 days. In 21 days monitoring of demersal longlines in Division 6a, 114 seabirds were bycaught. A further 6 birds were recorded as bycatch during 9 days of monitoring in demersal longlines in Division 4a. No seabird bycatch was recorded during 9 days of monitoring in Division 7j.

Similar to data reported in the WGBYC 2015 report (ICES, 2015a), the bycatch rates of PS calculated from dedicated bycatch monitoring are consistently higher than the rates produced from data collected under the DCF programme. The results from REM in the Baltic RCM also show a similar pattern when compared to DCF monitoring.

The UK provided a useful comparison of available data in their Reg. 812 report (2014). Static net data (in Subareas 4, 6, 7 and 8) spanning 2005–2014 were analysed to compare marine mammal (cetaceans and seals) bycatch rates from data originating from two different data collection programmes, a dedicated bycatch programme and the DCF programme (Table 4 and Figures 1–2). The calculated bycatch rates were statistically significantly different and the report concluded 'that attempts to provide accurate advice about fisheries impacts on marine mammals in particular (and potentially other protected or rare event species) would be significantly hampered if only data collected under the DCF in its current form was used'.

However, it is important to point out that the 2014 data provided under the DCF sampling scheme did report some PS and other rare species bycatch events in contrast to zero reported bycatch events in the 2013 DCF data described in the WGBYC 2015 report (ICES, 2015a). It is not clear if this apparent increase in reporting of rare bycatch events under DCF is a result of 1) improved reporting by MS and/or 2) improved data collection procedures under the DCF monitoring construct or 3) other factors. Although it appears encouraging, it must be stressed that the estimated Northeast Atlantic bycatch rate for PS in midwater towed gears under dedicated monitoring is three times greater (6/187 = 0.03) than the estimated bycatch rate under the DCF (6/1037 = 0.01; Table 3). Similarly the North Sea/Eastern Arctic and Northeast Atlantic combined bycatch rate estimated for static net gears under dedicated monitoring is also approximately three times greater (34/732 = 0.05) than the rate estimated using DCF data (3/165 = 0.02; Table 3).

The lack of mandatory monitoring of static gears in the Mediterranean and Black Seas continues to be a significant shortcoming of Reg. 812 requirements (Pace *et al.* 2015). Tonay (2016) reported the bycatch of harbour porpoise and bottlenose dolphins in trammel nets from the Western Black Sea during 2007–2008 and indicated that bycatch of harbour porpoise in the turbot fishery could approach unsustainable levels.

The above findings continue to demonstrate that current DCF sampling protocols do not adequately capture protected species or other rare bycatch event species, given the observers role on board commercial vessels is dedicated to monitoring of commercially important and/or quota driven species and because the main fisheries sampled under the DCF are not always those with significant PS bycatch issues. This further highlights the importance of designing and optimizing monitoring programs so they can reliably serve multiple purposes including quantifying the bycatch of rare event species (Section 8.2.2), particularly in those areas/MS without existing dedicated bycatch programmes.

4.3 Observed specimens, bycatch rates and mortality estimates, total and observed effort obtained from Reg. 812 reports.

A request was issued to WGBYC members before the meeting to input 2014 Reg. 812 report data in a new data format and automated upload procedure to the WGBYC database. The WGBYC database is a work in progress. There were, as expected, some data entry formatting and uploading issues given this was the first attempt at entering and uploading Reg. 812 report data to the new system jointly managed between WGBYC and the ICES Data Centre (Section 7). As a result of these developmental issues, some of the Reg. 812 report data had to be entered, sorted and cleaned, during and in some cases even after the meeting had adjourned. Data from Denmark, France, Germany, Ireland, Italy, Netherlands, Poland, Portugal, Sweden and the UK were automatically uploaded in the appropriate format. Data were also extracted from annual reports from Estonia, Latvia and Lithuania, but no observer data were available for Belgium (Table 1). Greece and Slovenia do not currently have fishing fleets relevant to Reg. 812.

The total number of cetacean bycatch specimens, total fishing and observed effort, aggregated to gear type (metier level 3), RCM and ICES Division in 2014 from MS reports are summarised in Annex 4 (Tables 5–6). A total of 57 cetacean specimens (for two species: 46 *Phocoena phocoena; 11 Delphinus delphis*) were observed bycaught in 2014 providing a total of 14 associated bycatch rates. Bycatch rates were calculated by dividing the total number of observed specimens for a given species by the total number of observed days in each stratum (Table 5). This method was extended to seabird taxa given the increased reporting frequency for seabird bycatch, anticipated future increases in directed monitoring and reporting of seabird bycatch by several MS (e.g. Denmark, UK, Germany and Poland), and concern raised by the Joint ICES/OSPAR/HELCOM Working Group on Seabirds (JWGBIRD) regarding the potential for increased seabird bycatch as a result of the implementation of the EU landing obligation (Section 10). [1]A total of 162 bird specimens and 21 associated bycatch rates

[1] Seabird data reported here may not match with the summary of seabird bycatch in final ICES advice due to addition of two new seabird species (*Fg* and *Lr*) added after advice was drafted for the ACOM.

were reported for 15 bird species (Table 7). A number of bycatch events with and without pingers were observed and these were combined to provide overall bycatch rates for each stratum, which is in line with how the observed effort data are collated.

When compiling information for inclusion in Tables 5–8, there were inconsistencies in relation to how Baltic areas were categorised. For example, some areas were defined using number (e.g. 20–21) while others used ICES Divisions (e.g. 3d). This has been an issue particularly for the Baltic region in the past and will be addressed in future reporting.

A complete compilation of all 2014 monitored strata with and without bycatch estimates are summarized in Table 8. Data were aggregated by ICES Division (apart from one or two entries which are for aggregated Divisions) to provide consistency with Tables 5 and 6 and to improve the accessibility or transferability of the data to other WGs (Section 8.2). Extrapolated bycatch estimates in Table 8 were provided in MS Reg. 812 reports. WGBYC does not itself compute bycatch estimates based on reported numbers of observed specimens and monitored days given the inherent uncertainty associated with total fishing effort reported to WGBYC (ICES, 2014a). Cetacean bycatch estimates provided by MS for 2014 consisted of 334 common dolphins in a seine net fishery in ICES Division 9a, and 4 common dolphins in a pelagic trawl fishery in ICES Division 7b. Notable bycatch estimates for non-cetacean species consisted primarily of a range of bird species including *Larus michaelis* and *Morus bassanus* taken mostly in longline fisheries but also in bottom trawl and seine nets in ICES Division 9a. In contrast to last year (2013 data) no bycatch estimates were provided for elasmobranch species from midwater trawls. Further details on non-cetacean bycatches provided by MS in Reg.812 reports are described in Section 4.4 below.

Given the continued absence of Reg. 812 data from Spain, WGBYC repeats here (Section 4.5.4) the detailed information summarized in our 2015 report (ICES, 2015a) regarding bycatch of cetaceans and other PS from Spanish waters gathered from published literature and other reports to highlight the known bias in reported cetacean bycatch events for the North Atlantic RCM (Table 5).

4.4 Protected Species other than cetaceans reported under Regulation 812

Information on the bycatch of protected species other than cetaceans was reported by several MS in their Reg. 812 reports. The taxa/species involved in 2014 were grey and common seals, sea turtles, seabirds, and protected fish species (elasmobranchs and teleosts; Table 8).

4.4.1 Germany

In Germany sampling was carried out under the DCF observer programs, following the requirements of Reg. 812 as much as possible. Bycatch of 13 grey seals and one common dolphin was observed on board commercial vessels larger than 15 m in 12 hauls with pelagic trawls in ICES Subareas 6, 7 and 8.

4.4.2 Ireland

In Ireland a total of 24 trips comprising 113 days at sea and 240 hauls were observed across a range of fisheries in 2014. A total of 100 days were carried out on board pelagic trawlers under the DCF. A further 13 days were carried on set net vessels as part of a dedicated study examining interactions between set nets and protected species. No bycatch was observed in pelagic trawl fisheries. No cetacean bycatch was observed in set

net fisheries in 2014. A total of 3 grey seals were observed as bycatch in large mesh tangle and trammel nets observed off the south coast in 2014.

4.4.3 Italy

In 2014 Italian midwater pair trawlers operated in GFCM Areas GSA 17 (64 pair teams) and 16 (3 pair teams). The dedicated monitoring programme was seriously impaired in terms of monitoring coverage by the transition between the Italian National Institute for Environmental Protection and Research (ISPRA) and the Marine Sciences Research Institute of the Italian National Research Council (CNR-ISMAR) as monitoring coordinator and the related contract with the relevant Ministry. For this reason 2014 is to be considered as gap year in the data collection, with only 92 days at sea and 324 hauls observed for the GSA 17 (0.9% of fishing effort coverage). No monitoring effort was carried out in GSA 16 where three pairs of midwater trawlers resumed activity in 2014.

In 2014 no cetacean bycatch event was observed; whereas seven bycatch events of loggerhead turtles (*Caretta caretta*), as well as 49 of twaite shads (*Alosa fallax;* La Mesa *et al.*, 2015), In addition a total of 23 bycatch events of elasmobranchs species were recorded (*Mustelus asterias*, *Squalus acanthias*, *Pteroplatytrygon violacea*). It is important to note that given the low monitoring effort, 2014 data cannot be used for comparison with previous years. Italy's Reg. 812 report also included an update of revised annual bycatch estimates of loggerhead turtles (*Caretta caretta*) based on observed bycatch rates between 2007 and 2013. As reported in WGBYC (ICES, 2015a), the percentage of dead or comatose loggerhead turtles taken as bycatch in 2013 was extremely high (20%) compared to the annual average of the previous six years (6%).

4.4.4 United Kingdom

In the UK seal bycatch estimates were produced based largely on bycatch rates calculated from observations in tangle and trammel net fisheries from 2005 - 2014. The point estimate of 417 seals in 2014 is similar to estimates from previous years and there is no evidence of a particular trend in the underlying bycatch rate. All observations in more recent years have been of grey seals, though some observations in the North Sea in earlier years may have included some common seals (also known as harbour seals). Species identification of seals (particularly distinguishing common seals from juvenile grey seals) by observers at that time was questionable. The estimated bycatch of over 200 seals from mostly inshore waters around Southwest England suggests there may be immigration of animals from other areas, as pup production in this region is relatively low compared to adjacent areas including Wales, Southeast Ireland and Scotland. The UK report suggests that the natal origin of bycaught seals in the Southwest of England deserves further investigation.

During 2014 monitoring of longlines under the UK bycatch programme was increased (39 days: 9% of total monitoring), specifically with an interest in seabird bycatch. Although data is limited so far, fulmars (*Fulmarus glacialis*) appear to be the species most frequently taken in UK registered longline operations that occur mainly in Division 6a northwest of Scotland. In static net gears, guillemots (*Uria aalge*) were the most frequently bycaught seabird species and as in previous years, mostly taken in standard (i.e. relatively small meshed) gillnets. Two gull species and a single great northern diver (*Gavia immer*) were also recorded. Although the UK currently refrains from extrapolating seabird bycatch observations because of concerns over the representativeness of sampling efforts, some preliminary analyses were undertaken in a separate project. That study used data collected under the bycatch programme to compare the distribution of observed seabird bycatch rates, fishing effort data and seabird densities

to see if particular areas within the English Channel could be identified that might require further monitoring to help improve the precision of bycatch estimates (Coram *et al.*, 2015).

Six large and/or prohibited species of shark were recorded, with spurdog (*Squalus acanthia*), tope (*Galeorhinus galeus*) and porbeagle (*Lamna nasus*) dominating by number; these were taken in most types of static gear (but noticeably fewer in tangle nets. By contrast bycatches of skates were heavily concentrated in trammel nets, with the greatest number of records of common skate (*Dipturus batis*) and undulate rays (*Raja undulata*). Two shads (spp IND) were also recorded.

4.4.5 Poland

In 2014 the Polish Monitoring Programme of the Incidental Catches of Cetaceans was continued. Under the implementation of the Programme, the observers stayed at sea for 134 days, including 65 days on vessels using towed gears and 69 days at sea using static gears. No cetaceans or other marine mammals were observed bycaught.

4.4.6 France

In France the programme Obsmer manages all the observations at sea required by various fishery regulations, including Reg. 812. This programme is implemented by the Ministry of Ecology (Direction des Pêches Maritimes et de l'Aquaculture) and IFREMER. As in previous years, Reg. 812 monitoring scheme assumes a coverage rate of 10% throughout the year for pelagic trawlers ≥ 15 m, 5% for trawlers < 15 m or set nets vessels ≥ 15 m, and 1% for vessels less than 15 m operating with set nets. Reports on 2013 and 2014 data were made available to meeting participants at this year's meeting. In 2013, 660 days at sea were observed in towed and static gears. Bycatch of *Phoca vitulina* was observed in addition to cetaceans *(Phocoena phocoena*, *Delphinus delphis).* In 2014, 808 days at sea were observed in towed and static gears. Bycatch of *Phoca vitulina* and *Halichoerus grypus* were observed in addition to cetaceans (*Phocoena phocoena*, *Delphinus delphis).* Total bycatch estimates were not provided.

4.4.7 Portugal

In Portugal monitoring of by-catch of cetacean species in Portuguese fisheries has been conducted since 2011 under the framework of the Life + MARPRO project with dedicated observers especially trained for fisheries interactions with protected species combined with observer data from the Portuguese Sea and Atmosphere Institute (IPMA) at-sea observations carried out under the National Biological Sampling Program (PNAB/EU-DCF). All observers are also trained to collect additional data on bycatch of protected species other than cetaceans such as seabirds and turtles. During 2014, bycatch of five species of seabirds were recorded, particularly *Morus bassanus* (n=2), *Larus fuscus* (n=2) and *Puffinus mauretanicus* (n=2) in trammel nets off the Northwestern coast, *Calonectris diomedea* (n=1) and *Phalacrocorax carbo* (n=1) in gill nets off the Northwestern coast, and *Puffinus mauretanicus* (n=3) in gill nets off the Southern coast. Provided bycatch estimates indicate that total catches are in excess of 10 000 birds (this includes an estimated 9500 yellow-legged gulls (*Larus michaelis*) in longlines; 690 and 3800 northern gannets (*Morus bassanus*) in bottom trawls and longlines, respectively; and 205 Balearic shearwaters (*Puffinus mauretanicus*).

4.4.8 Netherlands

In addition to cetaceans, the Netherlands report included bycatch information of other species. Two bluefin tuna (*Thunnus thynnus*) were caught in two pelagic fishery incidents in Division 6a; four grey seals (*Halichoerus grypus*) were caught in three incidents in the pelagic fishery (3 animals in 2 incidents in Division 7b and 1 animal in 1 incident in Division 6a). During one of the trips by a Dutch observer on a German trawler, three basking sharks (*Cetorhinus maximus*) in three incidents were caught in May/June in Division 4a.

4.5 Auxiliary data (stranding, entanglements and interviews) indicative of bycatch impacts

In the absence of dedicated observer programs for monitoring marine mammal bycatch, strandings can help shed light on the existence of incidental catches. However, it is important to note that there can be a lot of uncertainty in strandings data when location and cause of death often can't be determined. Nonetheless, the following is a summary of stranding events from 2014 MS Reg. 812 reports from Portugal, Belgium and the Netherlands.

4.5.1 Portugal

The 2014 report states that strandings data collected by the National Stranding Network recorded 348 cetaceans (341 in the mainland – ICES Division 9a; 4 in the Azores – ICES Subarea 10 and 3 from Madeira- outside the ICES area). In the mainland, strandings data recorded by Life+ MarPro teams indicated that mortality due to confirmed bycatch was recorded for 99 individuals, corresponding to 31.2% of the recorded animals (n = 317). The three species with higher percentage of mortality due to incidental capture are common dolphin, harbour porpoise and bottlenose dolphin. Most stranded animals with evidence of bycatch showed signs of interaction with fixed gears, either gillnets or trammel nets. These strandings attributed to bycatch in static gears supports the need to improve at-sea monitoring of static gears to properly assess the relative impact of the different net types.

4.5.2 Belgium

The report states that in 2014, strandings records included 130 harbour porpoises of which 6 were alive. Preliminary findings established the cause of death: as grey seal attack (in 11 specimens) and drowning in fishing gear (13 specimens). It is suspected that some of these specimens were caught in recreational gillnets which were set from the beach (see Sec. 4.6).

4.5.3 Netherlands

In 2014, 21 stranded porpoises were necropsied by the department of Pathobiology of Utrecht University (IJsseldijk and Gröne, 2015) where 14% (n = 3) of the stranded animals were considered bycaught, divided into the category very likely (n = 1) and likely (n = 2). Net marks or nicks of nets were visible on all 3 animals. In 2014, 571 porpoises were reported stranded at www.walvisstrandingen.nl. Because of uncertainties regarding budget only 'very fresh' animals have been studied. In 2014 a significantly lower number of stranded animals compared to 2008–2013 (100–150 per year) were studied due to a decreased budget.

4.5.4 Spain

In 2014, a report compiling the bycatch incidence of threatened cetacean species in Spanish waters was produced under request by the Spanish Ministry of Agriculture, Food and the Environment (Vázquez *et al*., 2014). The report reviews historical information and publications but also incorporates new data and recent studies that can provide a clearer picture of bycatch in Spanish waters. Results are summarized here by geographical region (six distinct regions within the Atlantic coast, including the Canary Islands, and three regions within the Mediterranean coast), because in many cases regional authorities compile bycatch and strandings data in slightly different formats and, in addition, available time series vary by region. Furthermore, findings are grouped by the method used to estimate bycatch incidence, that is; 1) bycatch signs in stranded specimens, 2) programmes of on-board observers and, 3) interviews with fishermen. Below we summarize relevant findings from this report.

Bycatch estimates from strandings

Vázquez *et al.* (2014) report stranding data in:

1) the region of Galicia (NW Spain) has the longest time series of bycatch-sign documentation in stranded individuals. Vázquez *et al.* (2014) reports at least 13 different cetacean species registered in the stranding record between 1990 and 2013. The specimens reported as definite bycatch in this time period were: 1 True beaked whale (*Mesoplodon mirus*), 603 common dolphins, 18 Risso's dolphins (*Grampus griseus*), 9 Minke whales (*Balaenoptera acutoristrata*), 36 harbour porpoises, 32 bottlenose dolphins, 23 pilot whales (*Globicephala melas*),
2) the region of Asturias (NW Spain) a total of 200 stranded individuals from which 70 (35%) showed signs of bycatch. No species-specific information is provided,
3) the Basque Country (N Spain) during the period 2000–2006 included 168 strandings from at least 11 species. From those, 12 individuals showed signs of bycatch,
4) the Atlantic coast of Andalusia (SW Spain), 39 individuals across eight cetacean species were reported as bycaught between 1996–2013,
5) the Mediterranean coast of Andalusia (SE Spain), 140 individuals from seven cetacean species were reported as bycaught between 1996–2013,
6) the coast of the Balearic Islands (E Spain), 29 individuals from four cetacean species were reported as bycaught between 1998–2013,
7) the coast of Valencia and Cataluña (NE Spain), 49 individuals from seven cetacean species were reported as bycaught between 1990–2009,
8) the coast of the Canary Islands, 68 individuals from 8 cetacean species were reported as bycaught between 1990–2009. It was noted that higher bycatch rates in the Canary Islands were observed in the months of March, April and May which coincides with the main peak of sightings in the region as well as the main fishing season for some pelagic fish species such as Clupeidae and Scombridae.

Bycatch estimates from at-sea observers

A study published in 2003 (López *et al*., 2003) registered no bycatch incidents during 67 observer days along Galician waters. However, the authors highlight that the observer coverage was not sufficient to monitor the full fishing capacity of the study area.

In 2012 the project LIFE-IDEMARES reported results from a programme of on-board observers in which 171 trips (192 observer days at sea) were conducted in Galicia (NW Spain) when bycatch incident were not reported (López *et al.*, 2012).

Fernández-Contreras *et al*. (2010) report 891 days at sea on-board pair trawlers in NW Spain during which observers registered 29 bycatch events, all of common dolphin. The majority of events included 1 or 2 individuals but 7 and 15 animals were also caught in two independent events. Young males showed a higher probability of being bycaught. Fernández-Contreras estimated a total of 394 (95% CI 230–632) bycaught individuals between 2001 and 2002 and three main factors were identified as influential in bycatch: depth, season and time of the day. The authors suggest that operational measures could reduce bycatch incidents in this fishery, especially if fishing in waters shallower than 250 m is restricted. The authors suggest that fishermen would likely accept this operational measure since the main target species, blue whiting (*Micromesistius poutassou*) is more common in deeper waters.

Various observer programmes were carried out within the last 15 years in the Balearic Islands. Between 2001 and 2003 observers evaluating the interaction between bottlenose dolphins and artisanal fisheries registered the bycatch of two bottlenose dolphins over a total of 1014 hauls. Considering that this number of hauls constitutes approximately 3% of the annual artisanal fishing activity in the Balearic Islands, an approximated annual mortality of 60 individuals due to bycatch was suggested (Brotons *et al.*, 2008). In 2001, a pilot project assessing the effect of pingers in artisanal gillnet fisheries surveyed 55 hauls (27 with active pingers, 16 with inactive pingers and 12 controls) and registered no bycatch incident (Gazo *et al.*, 2008). An additional study carried out in 2005, evaluated the effect of pingers of different commercial brands in the artisanal gillnet fishery and 1193 hauls (743 with active pingers) were monitored without recording any bycatch event (Brotons *et al*., 2008). Gonzalvo *et al*. (2008) in a study assessing interactions between cetaceans and trawlers collected data from 75 hauls and while dolphins were observed around the fishing vessels during 55 hauls, no bycatch was registered.

Bycatch estimates from interviews to fishermen

A first estimate of bycatch incidence from interviews to fishermen in Galicia was published in 2003 (López *et al.*, 2003) where 499 interviews were conducted. Estimates from this study resulted in 210 (95% CI 23–556) annual bycatch events for coastal waters where gillnets had the highest incidence, 1518 (95% CI 464–3375) bycatch events in deep waters where both gillnets and trawlers had the highest bycatch incidence, and 350 (95% CI 43–904) in the Celtic Sea where trawlers had the highest incidence. Estimated bycatch numbers per species were: 1575 small dolphins, 53 bottlenose dolphins, 100 pilot whales, and 100 mysticete whales.

López *et al*. (2012) conducted 1274 interviews throughout the Spanish North-Atlantic coast (Galicia, Asturias, Cantabria and Basque Country) between 2009 and 2011. 93.7% of fishermen reported that they usually observed cetaceans, 29.1% identified cetaceans to species level and 62.2% acknowledge the occurrence of bycatch. Based on these data, 3023 cetaceans were estimated to be bycaught each year in the region; 24.3% of which were estimated to be taken by trawlers, 31.3% by artisanal fisheries, 24.8% by purse seiners, 8.2% by longliners and 11.6% by drift-netters. Estimated bycatch numbers per species were: 2328 common dolphins, 454 bottlenose dolphins, 91 pilot whales, 61 porpoises, 30 Risso's dolphin, and 60 mysticete whales. The results indicate that only 32.7% of cetaceans survived.

Goetz *et al*. (2014) conducted 283 interviews in Galicia between 2008 and 2010 and 100% of fishermen reported that they usually observed cetaceans, 73.5% identified cetaceans to species level and 8.8% acknowledge the occurrence of bycatch.

The authors estimated 1707 bycatch events per year (159 common dolphins, 136 bottlenose dolphins, 73 pilot whales, 40 porpoises and 1299 unidentified cetaceans). The authors suggest that bycatch levels for common and bottlenose dolphins are most likely unsustainable.

Aguilar (2002) based on interviews focussed in the Basque country (N Spain), highlighted the existence of direct captures of small cetaceans for human consumption and estimated annual catches of 143 bottlenose dolphins and 69 common/striped dolphins.

Vélez (2014) presented results of cetacean and marine turtle bycatch estimates from interviews conducted in the Atlantic coast of Andalusia (Cádiz and Huelva provinces, SW Spain) within a Master's Thesis using a similar methodology to Goetz *et al* (2014). Bottlenose dolphin and loggerhead turtle are the species most affected by bycatch. Vélez (2014) estimated that 18 bottlenose dolphins died annually due to bycatch. Given that the current population estimates of the local population of bottlenose dolphins in the area is 397 (95% CI 300–562; Santos *et al*., 2012), the annual removal would be 5%, over the sustainable recommendations of 1.7% established by ASCOBANS.

Other relevant information

It is important to note the special case of interaction between killer whales (*Orcinus orca*) and the artisanal longline fisheries (Almadraba) targeting bluefin tuna (*Thunnus thynnus*) in the area of the Straits of Gibraltar. Previous studies have registered increased calf survival and improved reproductive state for the social groups that interact with the tuna fishery as opposed to those groups that do not benefit from it (Esteban, 2008). Although no direct aggression from the fishermen towards the whales has been registered, the authors suggest that the high density of hooks could have an impact on the regional groups of killer whales.

4.6 Recreational Fisheries

There is a working group for recreational fisheries (WGRFS). The current specification of the DCF requires recreational catch estimates for some individual species (cod, salmon, sea bass, eels, bluefin tuna and more recently "sharks" (all sharks and skates/rays listed by region in Commission Decision 2010/93/EU)).

..Discards of unwanted bycatch species and target species are high in both commercial and recreational marine hook and line fisheries in Europe. The European eel and some elasmobranch species are protected in many countries so must be discarded, and target species that are under the legal minimum size must also be returned…

It was noted by WGRFS that data on bycatch of elasmobranchs is very scarce and it is not possible to raise the data to estimate bycatch for the whole Recreational Fisheries. WGBYC discussed its relevance within the context of overall impacts and determined that given the high priority on improving quality of monitoring data and access to commercial fishing effort, we are not in a good position presently to provide a critical evaluation of recreational fishing impacts on protected species. Nonetheless, the following MS have provided some qualitative information on potential impacts to protected species from bycatch in recreational fisheries.

Netherlands

The impact on population level of recreational gill net fisheries in Dutch waters is unknown and the Dutch ministry has been advised recently to get more information on the impact. The concern, raised at a stakeholder meeting in The Netherlands, is based on the fact that there is little or no data on the impact.

There have been a few incidents of reported porpoise bycatch in nets set from the beach (2011, 2014). However, it is unknown if these incidents perhaps occur at regular interval. Currently there is no monitoring and no enforcement. The 2014 incident appeared to be in nets that were set in a way that was not allowed.

Recreation gill net fisheries with nets set from the coast in The Netherlands is allowed under certain conditions although it was one of the recommendations of the harbour porpoise conservation plan (Camphuysen and Siemensma, 2011) to prohibit all recreational gill net fisheries. Recreational gill net fisheries using boats is not allowed. There is a generic exemption for the Wadden Sea. Small-scale recreational gill net fisheries are allowed in several municipalities bordering the North Sea based on cultural-historical reasons and only with a license. Several conditions have been set for both areas. For the Wadden Sea net length is restricted to max. 100 m; a registration number on the nets is required, floaters attached to net, at low tide net flat on the bottom. For the North Sea municipalities where recreational coastal gill netting is allowed conditions are set: net type (max. net length of 30 m and max. net height of 110 cm.; a limit of one net per person; mesh size > 105 mm.; no multi layered nets; no monofilament); attachment at the bottom; net is between high tide and low tide borders; obligatory to check nets every 24 hours and report porpoise bycatch at the municipality.

Municipalities are responsible for registration, control and enforcement. Based on a questionnaire in 27 municipalities held by the ministry in 2013 some quantitative data have been collected. Summarizing the questionnaire, per municipality between 5 and 20 persons are registered, with the exception of 4 which have over 50 persons registered. Five municipalities did contract additional personnel for monitoring and enforcement.

Belgium

In 2015 the national law has been changed such that the use of recreational gillnets set from the beach is restricted (Section 4.5.2).

5 Evaluation of Bycatch Impacts on Populations (ToR C)

5.1 Bycatch Risk Assessment (BRA) – Evaluate impact of bycatch on relevant species furthering the approach adopted by Workshop on Bycatch of Cetaceans and other Protected Species (WKRev812)

The essential idea of ToR C is to use an estimate of total fishing effort for the fisheries of concern in a specific region, together with some estimate of likely or possible bycatch rates that might apply for the species of concern, in order to evaluate whether or not the total bycatch in that area might be a conservation issue.

5.1.1 Harbour Porpoise

In the report from last year (ICES, 2015a) a BRA was completed for harbour porpoise where estimates of potential percentage of bycatch mortality were provided for subdivisions in the North Atlantic. For the inner Danish waters (3a21, 3b23, 3c22) the abundance used for this estimate was based on data from 1994 (Hammond *et al*., 2002). More recent abundance estimates have been applied this year and the bycatch rates (using pooled data from 2010–2014) have been updated with 2014 fishing effort as well as observer coverage (Viquerat *et al*., 2014). The range of potential mortality rates for the harbour porpoise population due to bycatch in 2014 in areas 3a21, 3b23 and 3c22 presented below was estimated following the same method described in ICES 2015a. Results for the Kattegat and Belt Seas ((3a21, 3b23, 3c22) suggest that it is most likely that < 1% of the harbour porpoise population is being taken in this region. However, many caveats apply in terms of the effort data reliability. Fishing effort data are likely to be underestimated as effort from smaller vessels is not fully represented in both areas. In this respect the bycatch range may be underestimated. The magnitude of this potential downward bias in fishing effort and bycatch numbers is unknown.

Harbour Porpoise Assessment Region	Year	Fishing Effort (days at sea)	Estimate of bycaught porpoises (Low-high)		Best Estimate Of Abundance	% mortality using lower bycatch estimate	% mortality using higher bycatch estimate
KATTEGAT AND BELT SEAS –3a21, 3b23, 3c22	2014	10 625	165	263	40 000	0.41%	0.66%

5.1.2 Common Dolphin

The working group agreed that it would be useful to attempt a BRA for common dolphins in the Northeast Atlantic (Subareas 7, 8 and 9), based on the WGBYC bycatch database. This proved impossible to attain fully during the meeting, due mainly to the fact that the database is not yet fully operational (Section 4.3; Section 7) and not all relevant data had been uploaded when the BRA commenced. Data from some countries had been submitted late or had been omitted for one reason or another and much validation is still required throughout the database, notably with respect to clarifying the gear types that are referred to in the database (dating back to 2009) by a variety of different terms, but also because records from earlier years were not always provided by ICES Division.

Queries were run to extract fleet fishing effort (days at sea) for all member states that reported fishing effort in Subareas 7 to9 only, by gear type to 'Level 4' of the Nantes criteria. These generally only relate to gear types that have been monitored under Reg. 812, because they are drawn from MS Reg. 812 annual reports submitted to the Commission, meaning fleet effort for several gear types is incomplete (Section 4.2).

Additionally the number of days *sampled* for each division, country and gear type were extracted, as were the number of incidents involving common dolphin capture, and the number of individual common dolphins taken.

These data would need to be interpreted with extreme caution as 1) the dataset is not fully validated; 2) records are included from hauls with and without pingers; 3) gear types have been grouped such that metiers with known high bycatch levels in the past (the English Channel bass pair trawl fishery), and fisheries with relatively high current bycatch rates (certain static net fisheries) are included in summary effort statistics for gear

types that include metiers with known low levels of bycatch. Further work will be needed to stratify these fishing gear types more appropriately.

Despite these caveats, the tabulated data show several important facts. Fishing effort by static nets for example is extremely high in Subareas 7, 8, and 9. If trammel nets and set gillnets are combined, then in 2013 over 100 000 days at sea are reported by four MS in Subarea 7, over 140 000 days in Subarea 8 and more than 100 000 in Subarea 9. These are underestimates, because several MS reports do not necessarily contain effort by all small vessels. Spanish effort for example is explicitly stated to include only vessels of 8 m and over. Table 9 is only a partial summary of fishing effort by gear type, and may be most complete for gillnets and midwater trawls, which are the explicit focus of Reg. 812, though bycatch of cetaceans is observed in several other gear types which have been subject to somewhat patchy monitoring. Bottom trawls in particular is very poorly represented in Table 9, though dolphin bycatches are known to occur in this gear type in Subarea 8 at least.

Monitoring under Reg. 812 has been extensive and currently over 13 000 days at sea have been monitored by the nations that fish in the region. Monitoring has been most extensive in Subarea 7 and less so in Subareas 8 and 9. France and the UK are responsible for the majority of the sampling in Subarea 7 and France for most in Subarea 8. It is not clear to what extent any monitoring in Spain has been focused on protected species bycatch, and how much Spanish sampling simply reflects DCF data collection which is known to under-represent protected species bycatch (Section 4.2.2).

Accepting the biases and unrepresentative sampling by gear type, in both Subareas 7 and 8, observed bycatch rates of common dolphins are highest in midwater trawl fisheries, but the somewhat lower rates observed in static net fisheries may be equally significant as they would result in similar levels of total bycatch because static net fisheries are so much larger than pelagic trawl fisheries (Table 10). Furthermore, midwater trawl fishery bycatch data are – as was stated above – biased by focused sampling in those metiers with the highest bycatch rates in the past.

Further work is needed to validate the data held in the WGBYC database, to stratify the fleets better or to try to address potential biases in the dataset, and to investigate precision in the bycatch rate estimates in order to undertake a full BRA for this species in Subareas 7–9. Nevertheless the data collated so far are indicative of potentially substantial total annual removals of common dolphins in European fisheries that may exceed safe limits depending on the size of the population from which the bycatch is being taken (Tables 9–10).

ICES advised a single assessment unit (AU) for common dolphin that covers OSPAR regions II, III, and IV because only one population of short-beaked common dolphin exists in the Northeast Atlantic, ranging from waters off Scotland to Portugal (ICES, 2014b). As a species which occurs both on and off the shelf edge, this AU (Figure 3) only covers part of this species range and we know that common dolphin distribution extends into OSPAR region V (CODA, 2009), but the geographical extent and expected densities are poorly known. The north western boundary of the AU also poses problems for the BRA which relies on assigning bycatch rates and abundance estimates to ICES areas/subareas. For these reasons and with these caveats, the WGBYC BRA has been applied to the ICES Subareas 7, 8 and 9.

Abundance estimates for common dolphins were available from SCANS-II (Hammond *et al*. 2013), CODA (CODA, 2009) and summaries within WGMME 2015 (Santos *et al*. 2012). Estimates of densities from the survey blocks were pro-rated by area for the ICES Divisions. In some ICES areas, there were no overlaps with survey data and density

estimates were 'borrowed' from the nearest available; there are no density data for Division 9b for example. Based on this approach, the abundance estimates for each Subarea are shown below. Given these abundance estimates and the application of the ASCOBANS limit of 1.7% to anthropogenic removals, then the total bycatch level that should not be exceeded (the conservation reference limit) is also calculated.

ICES Subarea	Mean density (CV)	Abundance (CV)	1.7% of estimate of best available abundance
7	0.05	84390 (0.25)	1434
8	0.05	114836 (0.28)	1952
9	0.09	59306 (0.24)	1008

6 Bycatch Mitigation (ToR D)

6.1 Mitigation compliance carried out under Reg. 812 – Mandatory and voluntary mitigation measures.

6.1.1 Denmark

Denmark has continued its use of pingers. However, in areas 3d24/3c22 only three percent of the fleet is covered by Reg. 812, whereas the pinger regulation in areas 3a and 4 covers 38% of the fleet. With regard to pinger spacing the general obligation to use acoustic deterrent devices of set 1 (Reg. 812, Annex II) with a maximum spacing of 200 m was derogated by the Danish Administrative Act No. 203 of 6 March 2007 for AQUAmark100, whereby a maximum distance of 455 m was introduced for this pinger type. The derogation has to be extended and approved every second year. The current derogation expires in March 2017 unless extended with the approval of the Commission. According to monitoring no trials have been conducted in the pelagic fishery. In the North Sea gillnet monitoring observer trials were conducted according to the DCF. 0.9% was covered in area 27.3a and 0.2% in area 27.5 where a single harbour porpoise bycatch was observed.

Denmark recommends, that for the coming annual report for 2015, Member States indicate infringements in relation to national fishing vessels as well as other Member States fishing vessels. Thereby, all infringement cases will be reported to the Commission. Furthermore, Denmark notes that even though the quality and lifespan of pingers have in many cases been fairly low and the handling on board the fishing vessels at times difficult, many fishermen have over time gained experience with the use of the pingers. The fishers have reported positively to the Danish AgriFish Agency about the advantages of pingers.

6.1.2 United Kingdom

In the UK, the Royal Navy and relevant national marine enforcement officers have been checking for compliance with the pinger requirements of Reg.812 whilst carrying out at-sea inspections; this is a task which is included as a regular inspection requirement in the relevant fishing areas. Inspections of over 12 m gill netting vessels are carried out according to a risk based enforcement approach.

During 2014, thirty seven over 12 m gill netting vessels were inspected at sea and in port. Inspections took place in Subarea 4, 6 and 7 by Scottish, Welsh and English authorities.

Scotland's Marine Protection Vessels (MPVs) made a total of sixteen inspections of gill netters in Subarea 4 (North Sea), covering 11 different vessels and resulted in the detection of four infringements, three of which related to the use of pingers.

During these inspections a number of different pinger types were noted to be in use, although no model details were recorded. Inspection officials did check pinger certificates on board but reported that most inspected vessels were using a mix of both "type 1" and "type 2" devices as set out in Annex II of Reg. 812. As a consequence of one inspection regarding bycatch, a case has been submitted to the Procurator Fiscal.

Following the initial boarding and inspections on gillnet vessels, when some infringements were detected, there was a notable improvement in levels of compliance during 2014 by the vessels concerned in the carriage and use of pingers. Additionally, shore based fishery officers witnessed pingers being loaded on some vessels whilst in port.

The Marine Management Organisation (MMO) in England has also taken steps to employ the use of the ETEC detector, however the small range of some deterrent devices limit the platforms from which the ETEC detector can be effectively used. Options to fully utilise this device will continue to be explored, but at sea vessel inspections are the primary monitoring tool in the short term.

6.1.3 France

France reiterated similar to previous years, the requirement to use pingers under Reg. 812 remains a problem for the French fleet. Concerns listed again include 1) a limited mitigation efficiency (only working with harbour porpoises); 2) the reported unreliability of existing marketed models and; 3) an excessive maintenance and/replacement costs. The 2013 report refers to the new pinger Fishtek BP154 that was thought to solve most of these problems. However, no mention of any trials was presented in the report on 2014 monitoring programme. Finally, the potential "dinner-bell" effect for seals in specific areas and the discrimination between vessels over 12 m and below, which is not sustained by a difference in bycatch rate in these two categories were highlighted again.

6.1.4 Poland

Poland reported in 2014 that 16 vessels could use pingers purchased by the Ministry of Agriculture and Rural Development in 2008 (AQUATEC AQUAmark 100). During the inspection in ports in 2014–2015, located under the jurisdiction of the Sea Fisheries Regional Inspectorate in Szczecin (OIRM) – controlling the Polish part of the ICES 24 area, no cases of absence of pingers were recorded. Ship owners of fishing vessels in ports being under the jurisdiction of OIRM Szczecin were also not punished by foreign inspection authorities for not using pingers.

6.1.5 Sweden

In Sweden, regarding the implementation of pingers as laid down in Reg. 812, Article 2 and Annex I, pingers are most likely not being implemented in regulated fisheries. An interview of fishermen that fish in areas where the use of pingers is obligatory was carried out. None of the fishermen reported buying new pingers. Some fishermen reported only using pingers during shorter time periods. However, since no fishermen

has bought new pingers since 2007, most likely the pingers are not functional. Some fishermen found the pingers to be a safety risk and/or found them hard to handle. Due to low priority in the inspection plan for 2014 regarding compliance with provision on pingers, no infringement was reported during 2014.

6.1.6 Belgium

In Belgium no pingers are being used. Only one vessel (out of 3–5) would be required to use acoustic deterrent devices according to the Reg. 812. No National legislation was introduced so no on board monitoring of bycatch of cetaceans was carried out. For the establishment of MPA's it was attempted to estimate the number of harbour porpoises in Belgium waters. The density of harbour porpoises in 2013 was 0.84 specimens/km^2 in January, 0.94 in February, 1.72 in May and 0.61 in September. In another study the usability of different acoustic deterrent devices was studied. Among the testers there was general agreement that the devices were not user friendly.

6.1.7 Latvia and Estonia

Scientific studies assessing the use of acoustic deterrent devices or other mitigation measures were not carried out by Latvia in 2014. Estonia also stated that there are no pingers required as there is no fishery in area 24.

6.2 Mitigation research carried out by various Member States and the USA

6.2.1 Germany

The project to develop and test a new type of acoustic deterrent device ('Porpoise Alarm' (PAL), carried out by the Thünen Institute of Baltic Sea Fisheries (Rostock) and F^3:Forschung.Fakten.Fantasie (Kiel), was continued in 2014. For background information on the project see the WGBYC report 2015 (ICES 2015a). To test their practicality and effectiveness, PAL devices were deployed on a small number of German and Danish commercial gillnet vessels while carrying out their normal fishing activities in the Baltic and North Sea.

For the trials, specifically those fisheries were selected that are active in areas where higher bycatch rates of harbour porpoises could be expected. During these trials, in the Baltic bycatch of nine harbour porpoise in control nets only (without PAL) was observed in 2014. In the North Sea, results were mixed, with observed bycatch of three harbour porpoises in control nets compared to two individuals in nets fitted with PAL devices. Due to the trials setup, the very limited number of observed fishing vessels and the small number of documented bycatch events, it is not possible to further extrapolate the results. First results concerning practicability and effectiveness of PAL are promising, but further development and trials are necessary. This work will be continued until May 2017.

6.2.2 Ireland

Development of a cetacean friendly device to reduce seal depredation (Cosgrove *et al*. 2015) in fisheries - In collaboration with SMRU and Dr Michelle Cronin who heads up the marine ecology group at Marine Renewable Energy Ireland (MAREI) in Cork, BIM tested a cetacean friendly acoustic seal deterrent system in jigging and gill-net fisheries for pollack and hake respectively off the southwest coast of Ireland in late summer 2015. Depredation was effectively eliminated in the jigging fishery on days when the device was deployed. The vessel skipper reported major losses of fish catches and gear

in days when the device was not deployed. Further tests were carried out during a week's gill-netting trip off the Kerry and Clare coastline. Results were inconclusive with little difference observed between hauls when the acoustic signal was deployed and not deployed. However, in contrast to observations of gradually increasing levels of depredation in the previous BIM study, we observed a gradual decline in depredation over the course of the trip to a few individual damaged fish per haul. Further experimental development work in relation to this device is planned in 2016.

6.2.3 Poland

Currently the National Marine Fisheries Research Institute (NMFRI) takes part as a sub-contractor in a pilot project of seabird bycatch mitigation measures conducted by the BirdLife International in a coastal GNS fishery. This project includes at-sea testing of gill nets with attached lights supposed to mitigate bycatch of sea birds. The testing will be performed at fishing grounds of the Puck Bay and Pomeranian Bay during the periods of wintering and mating concentrations of marine birds in these areas.

6.2.4 Portugal

A presentation was provided by Portugal on *Monitoring Fisheries Interactions along the Portuguese Continental Coast: Improvements and Mitigation.* Work being done in Portugal regarding monitoring fisheries interactions with protected species (cetaceans and marine birds) and mitigation testing within the framework of the running project Life+MarPro (2011–2016) was presented. Results on bycatch estimates for cetaceans interacting with the Portuguese purse seine fishery and bycatch estimates of marine birds interacting with several Portuguese fisheries were also presented (Marcalo *et al*. 2015; Oliveira *et al*. 2015). This works also provided bycatch rates and estimates of marine protected species (cetaceans and marine birds) in the area and were a joint work of several projects (SafeSea-EEAGrants 2008–2010; FAME - Future of the Atlantic Marine Environment 2010–2012; MarPro 2011–2016) and also IPMA´s EU-DCF program.

Under the context of MarPro it is the objective of Portugal to define protection areas and management plans for harbour porpoises, bottlenose dolphins and balearic shearwaters to fulfill the Habitat and Birds Directives. The main actions of MarPro are: 1. Developing a GIS tool to accommodate and harmonize all the data; 2. Evaluate baseline estimates and distribution of target species populations through coastal, aerial and offshore boat surveys; 3. Evaluate the conflict between target species and fisheries and present solutions; 4. Implement Good Practice and bycatch mitigation measures by developing manuals of good practices and test mitigation devices (e.g. pingers for cetaceans; devices for marine birds).

Concerning monitoring, focus has been centered on improving vessel coverage observation effort, which has been known to be always low due to logistics (not enough funding to monitor such a large fleet) and leading to under or over estimation of bycatch rates. Even by combining DCF monitoring effort conducted by the Portuguese Institute of the Sea and Atmosphere combined with dedicated onboard observer effort from other running projects (SafeSea-EEAGrants 2008–2010 and MarPro- 2011–2016), coverage has been low (< 1%) for all gears monitored. In order to improve this situation, Electronic Monitoring (EM) systems have been acquired in 2013 and are in use. One exercise relating observation effort reported annually in the Portuguese Reg. 812 reports (DCF/dedicated) and common dolphin bycatch versus observation effort from EM systems and common dolphin bycatch for both polyvalent vessels using set-nets and purse seining was presented. Results showed how increased coverage coming from EM systems brings down bycatch rates providing evidence that these systems are

a reliable tool to monitor bycatch of protected species and improve monitoring of large fleets in a cost effective way.

Preliminary results on mitigation trials using Fumunda F10 and F70 pingers for cetaceans in purse seining and gill-net fisheries were also presented. Within the same context, mitigation devices for marine birds, such as alarm sound devices (megaphone) and laser bird repellents are also being tested.

In Portugal, within the scope of one of the actions from Life+ MarPro project, the strategy to implement best practices/mitigation measures in the different fisheries passed in 2014 by restarting pinger trials that will continue until 2016 at which time legislative or administrative measures will be implemented if necessary. These trials are testing pingers on gill-nets, trammel-nets and purse-seines. Fishermen are voluntarily using pingers and participating in the trials. The pingers used are Fumunda (both F10 and F70) and experiments compare results in boats using nets with active pingers and controls (no pingers) in the same fishing day. For 2014, these trials took place in southern Portugal (Algarve region) using F10 pingers. The trial on the purse seine fishery used a fleet from one fishing port (Portimão), while the trial on gill-nets was performed in one polyvalent boat that operates with gill-nets off another southern port (Olhão). Although preliminary, mixed results were obtained in both trials for the two different fisheries. In purse seining, interactions and mortality were observed only with common dolphins and the rate was higher with boats using pingers in their nets. For the gill-net trial, higher interactions and mortality with bottlenose dolphins was observed once more in the net using pingers. In both fisheries, landings of targeted fish and also CPUE was higher in nets with pingers. In the years that follow, pinger trials will be repeated using different experimental designs that will consider number of pingers per net, distance between pingers, and type of pingers used (F10 only, F70 only or a mix/alternate F10/F70). These devices will also be tested in trammel nets.

6.2.5 United Kingdom

The UK conducted an exploratory analysis of the potential impact of Reg. 812 on harbour porpoise bycatch levels by calculating bycatch estimates under different pinger use scenarios (Northridge *et al.*, 2015). Results indicated that more than 200 porpoise bycatches would have been avoided during 2014, assuming that all UK vessels covered by Reg. 812 used pingers in accordance with agreed operating guidelines. A full description of the analysis is provided in the UK Reg. 812 report for 2014.

6.2.6 Sweden

In the Swedish small-scale coastal fisheries, alternative fishing gear has been, and is still being, developed. Pontoon traps for fishing salmon, white fish, trout and vendace are used in commercial fisheries in Northern Baltic. The main reason for the fishing gear development is the seal inflicted damages to fishing gear and catch which threatens an economically viable gillnet fishery. Traps and pots are types of fishing gear where it is possible to protect the catch from seals. In traps and pots, the catch can be gathered in closed compartments which in turn can be designed using a solid construction and a strong material which ensures a seal-safe fishing gear. However, a pot or trap fishery could also result in a high bycatch of seals or other protected species such as certain cetaceans or bird species. In order to prevent bycatches, especially of seals that are attracted to the catch inside the pot, pot entrances can be equipped with seal exclusion devices (SEDs) without this affecting the pots catch efficiency. The development of cod pots is still in progress. Since 2014 Sweden and Denmark have been cooperating in developing cod pots as an alternative to the gillnet cod fisheries in the

southern Baltic. Recent years' research in this area has focused on trying to find out what parameters affect the catch rates for baited fishing gear in different areas. The behaviour of the species targeted in alternative fishing gears is also a major focus area to identify what characteristics in the fishing gear affect the fish behaviour and thereby the efficiency of the gear.

Seine net has been tried as alternative fishing method to gillnet fisheries for flatfish, herring and vendace in the Baltic Sea. Seine netting for flatfish and vendace showed potential and the method is being further developed.

6.2.7 Spain

Monitoring of the Spanish Mediterranean surface longline fishery targeting swordfish (LLSWO) confirms that the use of fish bait and deep fishing (over 80 fathoms), adopted by the fishers since 2008 has reduced sea turtle bycatch per unit effort (BPUE) by over 95% (pers. comm. Sagarminaga). However, this same fleet operating the surface longline fishery targeting albacore tuna with small hooks in shallow waters still has a very high risk during the summer months with bycatch rates of approximately 4 turtles per 1000 hooks. In contrast with this data rich bycatch problem, other potential risk fisheries are still being assessed. In the ICES areas, these concern mainly the longline fleets in the Atlantic, tuna pound nets around the Strait of Gibraltar and lobster nets in the Balearic Islands.

Several pilot studies and projects have focused on mitigating bycatch of several protected or other species of concern. Most of these efforts have focused on improving trawling gear selectivity as well as fish aggregating devices and longline fisheries targeting tuna and swordfish.

6.2.7.1 Sharks

CALVO and MAREXI are developing and testing the "Calvoshark" ROV for herding sharks away from FADs prior to casting of tuna purse seines. http://www.marexi.com/MUSE/calvoshark.html. CHELONIA Association has been developing and testing electromagnetic gear for mitigating shark bycatch in longlining and UNDAMAR has developed an EFF – SGP / Fundación Biodiversidad project focusing on the mitigation of shark bycatch risk.

6.2.7.2 Cetaceans

There is no utilization of pingers in the Spanish fleet. A few longliners have been trying them out to assess their utility for depredation problems, but mostly the fleet sees this as a tool that does not work. MAREXI has been working on the development of new pinger that conforms with Reg. 812 – Annex II. ALNITAK, ORPAGU and CEPESCA are testing artificial bait (squid and fish shaped plastics) filled with fish by-product oils as a means to mitigate depredation of longlining bait by cetaceans.

6.2.7.3 Seabirds

Current use of mitigation, technological developments and testing include the REGAL GROUP fishing vessels operating longlines and using mitigation measures such as Tori lines, died bait, lighting limitation; and SEO Birdlife and the Universities of Balearic Islands, Barcelona and Valencia have been developing EFF – SGP / Fundación Biodiversidad projects focusing on the assessment and mitigation of bycatch risk for seabirds in longline fisheries.

6.2.7.4 Sea turtles

Mitigation measures for surface longlining includes the use of Bait: fish or artificial; deep fishing techniques: LLSWO – Yes, LLALB – No; Line cutters – Yes; and taking turtles to recovery centres. The development of technological measures and testing projects are numerous including: ALNITAK is currently testing the use of LED lighting to mitigate sea turtle bycatch in lobster nets; CHELONIA Association has tested the use of turtle excluder devices (TED) in bottom trawl fishing vessels in the Mediterranean. No turtles were caught during experiments; ORPAGU, CARBOPESCA and ALNITAK have been developing EFF – SGP / Fundación Biodiversidad projects focusing on the development of artificial baits and bait lights to mitigate the risks of sea turtle bycatch and cetacean depredation of surface longlining. This testing aims at looking at the CPUE of the fleet. It is unlikely to obtain an adequate sampling for looking at BPUE. This is a large fleet of very small vessels and bycatch risk assessment is currently controversial and based on interviews; ALNITAK is currently testing the use of artificial bait to mitigate the risk of loggerhead turtle bycatch in the Mediterranean LLALB:

The Spanish Mediterranean surface longline fishery targeting swordfish has adopted (2008 onwards) changes in bait (from squid to mackerel) and depth (from the surface to over 80 fathoms). Bycatch of loggerhead turtles has been reduced by over 95% whereas target catch has been maintained or increased (less catch but bigger individuals). ALNITAK has been monitoring the use of these measures both on fishing trips and by checking gear at sea.

Although the measures have had a positive impact on the LLSWO fishery that had a bycatch rate of around 2 turtles / 1000 hooks, this same fleet (approx. 100 vessels) still has an important bycatch risk (up to 4 turtles / 1000 hooks) when shifting to LLALB targeting *Thunnus alalunga* using small hooks close to the surface.

The IOOS www.socib.es and ALNITAK are working on the modelling of loggerhead turtle satellite tracking and oceanographic data to develop "bycatch risk zoning maps" to guide the longlining fleet, identifying areas of turtle aggregation and depths of high risk.

The following best practices are being implemented by several groups in Spain by holding workshops and activities in ports and on board fishing vessels to develop capacity and raise awareness on ecological sustainability and bycatch mitigation. With regards to longlining special emphasis has been made on cutting the line as close to the sea turtle beak as possible either with line cutters or by hauling the turtle on board with a dip net. ALNITAK, CEPESCA and the USFWS have developed a "service to fisher" site where fishers can find course materials, information, links for purchasing gear as line cutters, etc. New findings by Jose Luis Crespo of the Oceanografic Valencia on "Decompression sickness in turtles" constitutes an important turning point for the handling and release of turtles with "comatose" symptoms found in bottom trawls and fixed nets.

6.2.8 Northeast USA

The National Oceanic Atmospheric Administraion (NOAA) Northeast Fisheries Science Center (NEFSC) Protected Species Branch (PSB) has continued to conduct various research trials with the aim of reducing bycatch across several gear types that interact with various protected species or species of concern

(http://www.nefsc.noaa.gov/read/protspp/PR_gear_research/). The NEFSC PSB gear research program aims to work cooperatively with commercial fishermen to develop innovative and viable solutions for reducing unintended bycatch while maintaining a commercially viable fishing industry.

Bycatch mitigation studies have been conducted since 2004. Most recent workshops and research studies include: design and testing of a tow time data logger (Matzen *et al*. 2015); gillnet bycatch reduction workshop in 2013 aimed at developing solutions for reducing bycatch of sea turtles and Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in gillnets (NMFS, 2013), topless bottom trawl gear research aimed at reducing bycatch of sea turtles and retaining target flounder catches (Gahm *et al*., 2014), improving Cusk (*Brosme brosme*) survivorship in the Gulf of Maine lobster trap pot fishery (Chen and Runnebaums, 2014), design and testing low profile gillnets for reducing bycatch of sea turtles and Atlantic sturgeon in a large mesh gillnet fishery (He and Jones, 2013; Fox *et al*., 2013), and the design and implementation of a sea scallop deflector dredge (Smolowitz *et al*. 2012).

7 Improvements and Ongoing Developments to WGBYC Database (ToR G & H)

7.1 Cooperation with ICES Data Centre and WGBYC Database Subgroup

WGBYC continued to work with staff from the ICES Data Centre intersessionaly to build on progress made during 2014. In autumn 2015 a database subgroup (DbSg) was formed including members from both WGBYC and the ICES Data Centre to identify current challenges and outline short versus long-term priorities to address data challenges and develop a robust database to serve WGBYC's future expected data needs. The first Skype meeting was held 7 December 2015 followed by intermittent email correspondence. As a result of DbSg efforts the ICES Data Centre successfully implemented an electronic upload procedure of MS Reg. 812 data and continued to build in new features in XML format to facilitate compliance with excel data entry worksheets. For the first time, WGBYC members were given the opportunity to enter Reg. 812 data in advance of the meeting. Al Kingston provided an overview presentation of DbSg goals and activities during Plenary when WGBYC convened 1 February 2015. However, as expected, implementing these new advances were still met with challenges during the meeting as members got used to new data entry formatting and upload procedures. During 2016 WGBYC DbSg should be well poised to request entry of Reg. 812 data for calendar year 2015 several months in advance of the 2017 WGBYC meeting. This will minimize requirements for data cleaning and processing during meeting time and allow WGBYC more plenary time to discuss other important topics. Next steps for the DbSg to work on intersessionally include 1) working with ICES Data Centre too develop data screening and auditing procedures, 2) cleaning and fully incorporating historical records for years 2006–2013, 3) improving data entry and upload instructions , 4) developing a flow chart outlining the components of various data sources and how they would flow into one comprehensive database, and 5) continuing discussion of options for long-term data storage of monitoring and total commercial effort data in a standalone WGBYC database or integrating the WGBYC database into the ICES RDB.

Henrik Kjems-Nielsen from the ICES Data Centre gave a brief presentation to WGBYC contrasting the characteristics of ICES InterCatch database with the ICES Regional Database (RDB). InterCatch includes both commercial catch and effort in addition to DCF sampling data. Dedicated bycatch monitoring data of protected or other rare bycatch species of concern are not yet included in the InterCatch database. The data in InterCatch are more aggregated and hence less precise than the data in the RDB. The Regional Coordination Groups (RCG) (e.g. Baltic, North Sea and Eastern Arctic and, North Atlantic) are using the RDB to support their assessments. The RDB includes commercial landing, effort and sampling (i.e. DCF) of all metiers (level 6) for all vessels > 12 m. However, the new data call for 2009–2015 data will include effort from vessels < 12 m from those MS that are willing and able to provide effort data from their small vessel fleets but it will probably not represent a complete census of all under 12 m vessel activity.

WGBYC is continuing to request commercial effort data through the annual Working Group on Spatial Fisheries Data (WGSFD) 'Data Call' process for obtaining total effort data across all European fleets from 2009–2014 (Annex 6) from vessel logbooks. The 2009–2015 data records are expected to be available to working groups by the end of March 2016. Where possible, WGBYC intends to compare (intersessionally) total effort reported through Reg. 812 to effort from the data call to evaluate magnitude of expected bias in reporting of effort through Reg. 812.

7.2 Adapting database to be more inclusive of protected or other species of concern data reported via Reg. 812 and other data sources

The WGBYC data entry procedure was adapted to accommodate additional data sources to compliment as much data as possible coming from MS Reg. 812 reports (e.g. DCF, Habitat's Directive, other at-sea or electronic monitoring programs). New fields were added to help facilitate the compilation and query of data records with the aim of moving toward one integrated database. The new data fields added were: Monitoring type (1-Reg812; 2-DCF; 3-Reg812/DCF; 4-Other; 5-Unknown) and Sampling Protocol (M=marine mammals; C=Cetaceans; B=Sea Birds; T=Sea Turtles; F=Fish; E=Elasmobranchs; P=PETS; A=all).

Given WGBYC DbSg current focus on refining data entry and uploading procedures of Reg. 812 data to the WGBYC database it was not considered an appropriate time to move forward with incorporating additional bycatch records from other monitoring programs (e.g. DCF) into the database beyond that which has historically been provided to WGBYC.. As such, the WGBYC was asked not to collate and upload additional observer data (ToR H) at the 2016 meeting to maintain consistency going forward until the DbSg is in a better position to manage and analyse additional data records coming primarily from respective MS DCF monitoring programs. This was also agreed as a precautionary approach given continued uncertainty in whether dedicated monitoring for rare bycatch species may be incorporated into future DCMAP data collection protocols at the RCM level.

8 Continue to Develop, Improve and Coordinate Methods for By-catch Monitoring, Research and Assessment within the Context of European Legislation (e.g. MSFD), regional conventions (HELCOM and OSPAR) and targets (ToR E and ToR I)

8.1 Anticipated future changes in legislation addressing the problem of cetacean bycatch within European waters

Given the continued relevance and uncertainty associated with changes to legislation affecting data collection for bycatch of cetaceans, the following summary from WGBYC 2015 (ICES, 2015a) report is repeated here to keep these issues in the forefront for ICES and to temper expectations related to future WGBYC products that relate to assessing bycatch of protected or other species of concern to the European Commission and other interested parties.

The Commission has reviewed Regulation (EC) 812/2004 on two occasions since its introduction, in 2009[2] and 2011[3]. The conclusions from these reviews were broadly similar. There have been improvements in the frequency and consistency of reporting by most MS which has increased the knowledge of the extent of bycatch. There is now a better understanding of fisheries where incidental catches are evident and others where monitoring shows there is no bycatch issue.

Despite this, Reg. 812 still has a number of weaknesses. It is not necessarily targeted at the right fisheries or in the right areas and there remains an over reliance on the use of acoustic deterrent devices to mitigate bycatch. These devices have not delivered the desired results. They have been found to be effective at reducing incidental catches of one species in one gear type (i.e. harbour porpoise in gillnet fisheries) but ineffective for other cetacean species (e.g. common dolphins) or for other gear types (e.g. pelagic trawls). Additionally only vessels greater than 12m are required to use these devices, yet there is scientific evidence that shows that significant numbers of cetaceans are incidentally caught by smaller vessels fishing in inshore waters. The result has been that incidental catches of cetaceans remain in a number of fisheries.

The Regulation has recently been amended by Regulation (EU) 579/2014. This was not an attempt to overhaul Reg. 812 but was a technical alignment of it with the Treaty on the Functioning of the European Union (TFEU). This amendment does include two changes to Reg. 812 which should be noted. Firstly it allows the amendment of the Annex detailing the technical specifications and conditions for using Acoustic Deterrent Devices (ADD's), although the Commission has no immediate plans to amend this annex. MS are using the derogation in Article 2 to use different types of ADDs which deviate from the specifications contained in the Annex. The other amendment was the inclusion of a legal obligation on the Commission to carry out a further review of Reg. 812 by the end of 2015. The review clause contained in Article 7 states:

> *"By 31 December 2015, the Commission shall review the effectiveness of the measures provided for in this Regulation and shall, if appropriate, submit to the European Parliament and to the Council an overarching legislative proposal for ensuring the effective protection of cetaceans"*

It remains unclear as to whether the Commission has made any decision regarding the content and format of this review or whether an overarching legislative proposal is required. However,

[2] COM(2009) 368
[3] COM(2011) 578

the Commission has indicated previously that it sees little merit in amending Reg. 812. A full review would take too long and would require an impact assessment and consultation process before any proposal could be tabled. This would take upwards of 2 years to complete and lead undoubtedly to prolonged political discussion and possible watering down of provisions. In any case continuing to have detailed rules for managing cetacean bycatch agreed under a co-decision regulation of the Council and the European Parliament runs contrary to the objective under the new CFP, of moving to regionalised decision-making, where measures are tailored to different fisheries and agreed at regional level.

The Commission's long-term intention is to move away from a central regulation and incorporate the main elements of Reg. 812(i.e. monitoring and mitigation) into other regulatory frameworks. Once this has been achieved Reg. 812 could be repealed. The new CFP also seeks to ensure better alignment with broader environmental and ecological policy objectives, as in the Marine Strategy Framework directive (MSFD) and NATURA 2000. This devolved approach will ensure that monitoring and mitigation are targeted in the areas and for the species most under threat. Improved mitigation measures will be incorporated under the new technical measures framework that will be developed as part of the reform of the CFP. This would set out the scope and management targets to be met in relation to incidental catches of cetaceans, with the possibility for MS to develop mitigation measures for specific areas and fisheries. The monitoring requirements will be incorporated into the revised DCF, in line with a move to a wider ecosystem approach to fisheries monitoring which would include incidental catches of non-target species such as cetaceans, seabirds and benthic organisms. Proposals for both the technical measures and DCF will be tabled during 2015.

Related to the management of cetaceans and, as part of its Smart Regulation policy, the Commission is to undertake a Fitness Check (REFIT) of the EU Nature Legislation, in particular the Birds Directive and the Habitats Directive (Nature Directives) which will require a comprehensive assessment of whether the current regulatory framework is "fit for purpose". To support the European Commission's Fitness Check, an Evaluation Study of the Birds and Habitats Directives is currently being carried out. It will assess the effectiveness, efficiency, coherence, relevance and EU added value of the EU nature legislation and present conclusions and serve as a basis for the European Commission to prepare the Fitness Check Report on the two Directives. The collection of data and information constitutes a critical part of the Evaluation study and therefore the consultation will involve a wide range of stakeholders.

8.2 Cooperation with other ICES Working Groups

8.2.1 Integrating Bycatch into ICES Advice

Last year ICES began experimenting with proposals for providing summary advice sheets that would include bycatch estimates of protected species occurring incidental to target fisheries under the purview of respective ICES stock assessment working groups. This effort is intended to facilitate compliance with an ecosystem approach under the MSFD. ICES is still in the development stage to achieve the most practical and scientifically sound outcome advice sheets as possible with the expectation that the process will adapt over time.

A member of WGBYC (Simon Northridge) provided presentations to the WGNSSK (Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak) and WGBIE (Working Group for the Bay of Biscay and the Iberian Waters Ecoregion) in April 2015. In both cases people were interested and prepared to engage. This initiative was however constrained by process where most of the work for the Working Groups (WG) had already been done by the time of the April meetings. As a result, it

was determined that there would be little opportunity to get more work done at the WG meetings or alter the format of the Stock Advice or Stock Annex. Therefore, WGBYC needs to be mindful of the process before moving forward with options for integrating bycatch into advice. Below is a summary of the current process and ideas for integrating bycatch information into this process.

At present ICES fish stock advice is provided through stock Advice Sheets for individual fish stocks, with advice provided in terms of a proposed maximum catch or landed weight of fish. Advice sheets are drafted according to a template decided by ACOM, on the basis of methods contained in the stock annex which is drafted under the aegis of the respective WG. Data supplied to respective WG to compile their respective advice sheets comes mainly from InterCatch (Section 7.1). One of the key issues in this process is that detailed information on fishing effort by fishery unit (or fishery or metier) is lost during the compilation of data for the single stock advice. Without information on effort by gear type it is not possible for WGBYC to provide any advice on bycatch concerns.

Three approaches described below are being contemplated by WGBYC to integrate bycatch concerns into the advice stream.

The first approach that could be both easy and quick is to simply incorporate some opinion or remarks into the advice sheets. There used to be a box on advice sheets for environmental concerns. It was dropped recently by ACOM because these considerations are now intended to be included in fisheries and ecosystem overviews. Below is an example of a November 2014 Advice Sheet:

Effects of the fisheries on the ecosystem

Trawling impacts the benthos, as summarized in the North Sea ecosystem overview. Trawl gear are also relatively non - selective in terms of species caught, and trawl fisheries have a bycatch of non -commercial species that are important components of the North Sea ecosystem. Reduced benthic biomass is found more often in areas of bottom trawl activity than in unfished areas. Since 2001, effort reductions in this fishery have likely led to a decrease in bycatches.

WGBYC could provide information that is more useful within the context of bycatch of protected or other species of concern. But this requires information on the specific gears being used to prosecute the fishery, **as *bycatch impacts are gear specific, not fish stock specific.*** It also presumes we know something about bycatch rates in the gears used to prosecute a fishery; generally we do. But gears may not be present in all Advice Sheets. As such WGBYC would need to extract from the stock annex or from Intercatch a simple description (e.g. table with % catch by fishery unit) of the fishery complex that is involved with the stock being addressed. The risk table that WKBYC (ICES, 2013b) produced could then be used as a look up to determine what species groups are likely to be impacted to what extent. Qualitative information could then be provided relatively easily for example by:

1) Species A thought to be impacted by fishery Unit X
2) Species A (or species group) known to be taken relatively often, sometimes, infrequently, by fishery unit A, B…
3) Other formats?

This approach requires limited detail from effort data and some information on which species are likely to be affected by those fishing units in this area. However, the working groups cannot do this unless mandated by ACOM.

The second approach delves into the stock annexes which contain much more detailed data than appear in the advice sheets along with supportive text that describe concerns. This could be a good place to discuss bycatch issues but Stock Annexes are not update annually. But again WG's are partly constrained by what the Benchmark says should be in the Stock Annex. Some stock annexes have a table of fishing units that show which units are catching the assessment species in an area, but there is little evidence of fishing effort in the stock annexes. In the absence of effort data a list of fishery units involved would enable the stock annex to make a list of the vulnerable species likely to be impacted in a qualitative way as proposed above in the first approach.

If effort data were tabulated properly, one could apply data available in the WGBYC database to provide a quantitative or semi-quantitative assessment of the scale of by-catch of protected species within the fishery units involved in the fishery at current effort levels. Data on protected species bycatch rates by fishery unit (Nantes type metier) are collated by WGBYC. Data can be accumulated by stages of increasing level of detail for different taxa. For example:

1) Absence of any information.
2) No useful level of bycatch monitoring of the relevant fishing units in this area, but inferred bycatch from neighbouring areas.
3) Bycatch and effort observed but in analogous unit within this area (e.g. different country) -> bycatch rate (or some likely range of rates) can be inferred.
4) Bycatch and effort observed over several years by relevant fishery unit are available to generate specific bycatch rates with confidence limits for the species / fishery units
    a. May include some level of monitoring with no observed bycatch – still provides UCL
    b. May include monitoring with minimal bycatch observed -> wide CLs on catch rates

Stage 1 is rare. Stage 2 data can often be construed at least in a qualitative manner – e.g. bycatch likely to be high / medium / low (relative to that observed elsewhere); this approach will require expert opinion and only highlights areas that require further examination – but these are important to identify. Stage 3 and 4 data are more widespread than realized, notably for cetaceans in Subareas 4 and 7. Stage 3 or 4 would provide a basis for generating an idea of the magnitude of bycatch by fishery units targeting the stock being assessed.

Output for the second approach would be an effort table explaining the scale of the bycatch (by taxon) assuming current fishing effort levels. Where possible, WGBYC should aim to provide estimates with levels of precision. For some species/areas WGBYC can say what the effect of an increase in effort would be on particular protected or other species or concern (assuming there is some way of linking changes in catch to changes in effort). This might be an important new task for the WGs – i.e. make predictions about how effort will change by fishing unit (metier) under proposed changes to catch limits.

The third and longer term approach contemplates integrating bycatch assessments with stock assessments. It should be feasible to look in more detail at known bycatch rates and trends to make predictions. Predictions under various stock trend scenarios would provide managers with data to determine how changes in catch limits are likely

to impact bycatch of protected or other species of concerns. Presently Advice is given solely in terms of proposed changes in total catches. This is regardless of fishery unit, or effort by metier. In the absence of fishery specific effort management, one could assume relative stability in effort among the fishery units concerned. If this was an acceptable assumption, a +/- percent change in TAC would translate into an identical +/- change in proportional effort by fishery unit. Consequently, this would be translated into a quantifiable change in bycatch mortality. This would however require working groups to get much more involved in the process. This approach necessitates thinking about optimising management to manage PET species impacts, but this will require a longer term approach on how to balance impacts on one species against impacts on another for example by changing fishing gears – while maintaining catches and profitability. This is an approach currently being investigated under MYFISH.

Last year it was suggested that WGBYC coordination with WGMIXFISH-METH would be a good test case given they address assessments by metier and not by stock which is more in line with how WGBYC evaluates bycatch. Consequently a recommendation was made to WGBYC to consider how bycatch advice could be integrated into WGMIXFISH advice. Subsequently, WGMIXFISH-METH provided its own approach as example as to how one could move forward with providing advice on bycatch (ICES, 2015b). WGMIXFISH-METH example provides a lot of detail that is not likely practical in most cases in the near term given bycatch data limitations but could be possible in the long-term as data sets become more robust. However, given more recent discussions, a high level of detail for bycatch advice in the ecosystem context may not be necessary. The WGECO (Working Group on the Ecosystem Effects of Fishing Activities) was tasked by ACOM to develop a framework for integrating bycatch of protected species into ICES advice. WGBYC was informed (pers. comm. Mark Dickey-Collas and Eskild Kirkegaard) that ICES is leaning toward integrating bycatch into Fisheries or Ecosystem overview advice by ecoregion at relatively high level of aggregation (e.g. region, metier, season). WGBYC agreed it should be well suited to provide advice at this level of aggregation relatively easily. Nonetheless, presently it is not clear to WGBYC where and the format of how bycatch advice is expected to be integrated into ICES products.

In the short term WGBYC awaits agreement from ACOM on where to include bycatch advice and some guidance as to what this advice should look like. In the longer term WGBYC should aim to provide advice that says "if you increase catch limits of Sp X by N% - you will have the following impacts on non-target species …." and a range of options involving management of effort by fishing unit. Overall, the main immediate task is to ensure that **information on fishing effort by gear type is made explicit through the assessment stream**. Linking the WGBYC database to such tables is essential to providing information on catch rates of non-target species (the WGBYC DbSg is poised to assist in achieving this goal – Section 7.1). This also requires better co-ordination between the various sampling schemes (e.g. dedicated protected species monitoring vs. current DCF) which is now developing between WGBYC and WGCATCH (Section 8.2.2 below).

8.2.2 WGCATCH

During the meeting of WGBYC in 2015, it was decided to continue to seek cooperation with and make a recommendation to WGCATCH to evaluate current sampling schemes and provide guidelines for at sea sampling and recording bycatch of protected or other species of concern. Bram Couperus attended part of the WGCATCH meeting by video conference.

In the light of ICES intentions to include information about the bycatch of protected or other species of concern in future advice sheets, WGBYC is working with WGCATCH to facilitate improving the recording of protected species under existing DCF sampling programmes and – in the future - the multi-annual program for data collection (DCMAP). This is expected to better align information on protected species bycatch from other sources with the ICES stock advice format. At present the main data source available to inform ICES advice on bycatch of protected species, is the WGBYC database which holds the data from the yearly reports on the implementation of Reg. 812. As has been pointed out in the past, this Regulation does not cover the right metiers and is often practically impossible to fulfil. As a result, some MS's do not carry out dedicated monitoring programs. In cases where dedicated monitoring for protected or other rare event species of concern takes place, the observer effort is mostly combined with DCF sampling. An additional flaw in the Regulation is that it only covers cetaceans, no other taxa. Consequently, the database contains large gaps where no national monitoring was carried out and is biased toward data on cetaceans. The EC has recognized the shortcomings of Reg. 812 and has expressed its intention to include the sampling of protected species in DCMAP. However, the DCMAP itself will not prescribe the target metiers and taxa to be monitored: these will be given by the Regional Coordination Groups (RCG's). When incorporating monitoring of protected species in the DCMAP, the emphasis should therefore be on improving on board sampling protocols to ensure bycatch of protected or other rare event species of concern are captured within the data recording system and to alter downstream data handling systems to ensure the bycatch records are easily accessed by end users.

SGPIDS (Study Group on Practical Implementation of Discard Sampling Plans, 2015) and WGBYC (ICES, 2013a; 2013c) have noted that the current DCF programme is not optimised for the sampling of rare species, however it is recognized that altering existing survey designs to improve monitoring of rare species, would likely lead to additional costs. Although there is a wish to monitor a broad range of species, covering several taxa, an overarching design that adequately covers all taxa within the DCF is not realistic.

In November 2015 a presentation on the improvement of on board sampling protocols with regard to protected species in the catch was presented by Bram Couperus via video to WGCATCH. The response of WGCATCH was generally positive. However it was felt that the expertise in that group to deal with rare events was lacking. Therefore members of WGBYC were invited to attend meetings of WGCATCH. In order to assess the degree to which National sampling protocols adequately sample bycatch of protected or other species of concern (i.e. rare events), it was suggested to carry out an intersessional survey amongst the members of the group. For this purpose an example table (survey-form) has been designed (Figure 12). The results will be presented and discussed at the WGCATCH meeting in November 2016.

WGCATCH adopted a re-occurring ToR to address the monitoring of protected species:

Document current sampling and estimation practices for Protected, Endangered and Threatened Species (PETS) and rare fish species. Evaluate limitations of current data and communicate them to main end users.

The recognition that it is difficult to design an overall sampling plan that adequately covers all taxa of rare species does not mean that the sampling focus of the new DCF could not be altered to better reflect patterns of protected species bycatch. Sampling under the existing DCF can contribute to the assessment of bycatch if rare event species

are properly documented but is not sufficient on its own as currently implemented to make a full assessment of the impact of fisheries on protected species. For example, in cases where sampling under the DCF is carried out by means of sampling in harbours (market sampling), obviously the bycatch of protected species is not covered at all because they are not routinely returned to shore. Also the coverage of fleets is not tuned to the metiers where there is a high risk of incidental bycatch. An assessment carried out by ICES (2013b) showed that bottom trawling is generally oversampled with respect to monitoring of protected species, while in some areas static nets, longlines and purse-seines are under sampled. For cetaceans, seabirds and turtles in particular, priority should be given to monitoring static nets in the Baltic, North Sea and North Atlantic, and in long-line fisheries in the Atlantic and Mediterranean/Black Sea.

One approach to help address some of these issues may be to use data collected under the DCF/DCMAP or other sources to help identify areas, seasons and/or metiers with relatively high protected species bycatch rates. Based on initial assessments of the data at this larger scale, relevant Member States or RCG's may then need to carry out more focussed surveys to fully assess the scale and patterns of protected species bycatch in specific fisheries. This approach would require Member States or RCG's to identify additional fisheries and/or species requiring sampling and should include, as a minimum, species listed in the (annexes of) legislations, conventions and action plans: OSPAR, HELCOM, ASCOBANS (Agreement on the Conservation of small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas), IUCN (International Union for Conservation of Nature), ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area), ICCAT (International Commission for the Conservation of Atlantic Tunas), Birds Directive, Habitats Directive, CMS (Bonn Convention) and UNCLOS (United Nations Convention on the Law of the Sea). As such, WGBYC recommends the following to the future RCG's: Sampling under the current DCF can contribute to the assessment of bycatch of protected or other species of concern, but is largely insufficient on its own as currently implemented by Member States. An assessment carried out by WKBYC (ICES, 2013b) showed that bottom trawling is generally relatively oversampled with respect to monitoring of protected species bycatch, while in some specific fishing areas set-nets, longlines, and purse-seines are under sampled. For cetaceans, seabirds and turtles priority should be given to monitoring in trammel nets and set gillnets in the Baltic, North Sea, and North Atlantic, and in set longline fisheries in the Atlantic and Mediterranean/Black Sea.

WGBYC will continue to seek cooperation with WGCATCH to evaluate current sampling schemes and provide guidelines for at sea sampling and recording of protected species bycatch events. Bram Couperus will be the contact person for WGCATCH.

WGBYC recommends to WGCATCH...

...to continue implementing the collection of data on incidental bycatch of, Protected, Endangered and Threatened Species (PETS) and rare fish species in the sampling protocols of national catch- and discards sampling schemes, including incorporation of appropriate fields in National databases, data processing, data validation and synchronization with the regional database.

8.2.3 FishPi

The FishPi project is a collaboration involving scientific institutions in 13 EU member states, ICES and external experts aimed at developing regional fisheries sampling designs. The project is funded by the EU. A written summary and presentation was provided to WGBYC to educate the WG on ties between FishPi initiatives and data

collection on protected species. Unfortunately, due to lack of time WGBYC was not able to discuss the FishPi project in plenary. Nonetheless, a brief summary is provided below based on material kindly provided to WGBYC by Estanis Mugerza, a main contributor to the FishPi project and a member of WGCATCH.

Regional sampling designs will improve the collection of data from shared fish stocks in regional seas (e.g. North Sea and Eastern Arctic, the North Atlantic and the Baltic) that are fished on by fleets of many different nations. The coordination of data collection practices used, harmonisation of data codes and formats, and identification of necessary mechanisms for international cooperation are all considered. In particular the application of statistically sound sampling and estimation procedures is a key objective which will ensure that collectively the fisheries data used for assessment and management advice is of the best possible quality. The collection of new data related to small scale fisheries, fisheries data for MSFD requirements, and data on protected species such as cetaceans and seabirds are also considered under work plan 3 (WP3). WP3 pertains to regional sampling programs for fisheries and ecosystem impact data not currently collected.

An improved regional sampling of relevant variables would allow improving the understanding of fisheries impacts on the ecosystem and aligning the DC-MAP with obligations under other existing EU legislative instruments such as EU MSFD (EU, 2008) which highlights the relevance of the ecosystem approach (CBD, 2000; Browman *et al.*, 2004; Foster *et al*., 2005; Apitz *et al*., 2006) for ensuring the conservation of the marine systems and reform of the Common Fisheries Policy (EU, 2013) which emphasizes the importance of the existing trophic relations between species and the need for including specific alternative conservation measures based on ecosystem approaches for an appropriate assessment of fish species. Current information taken under the DCF is insufficient to achieve these goals. New requirements have been proposed by end users mainly focused on the collection of stomach contents and PETS bycatch information. Although some MS already collect this information, it is not included in the current DCF and sampling is not coordinated at a regional scale.

The main objective of WP3 is to define a future regional sampling programme to collect data on bycatch of PETS and stomach contents of fish. The second objective of WP3 is to review the current sampling suitable to estimate ecosystem indicators, the current sampling on small scale and recreational fisheries, and identify areas for future sampling coordination. The different steps in designing and implementing a regional sampling program data collection scheme to meet end-user needs are illustrated in Figure 4. Once the different steps needed are identified (e.g. in the case of PETS bycatch), a work plan to go into more detail is planned. This work plan in the case of PETS bycatch is shown in Table 12. Different case studies are going to be used as real examples of the different stages identified under the possible future regional sampling programs.

8.3 Other Monitoring Projects –ToR E

8.3.1 Netherlands

A workshop on Remote Electronic Monitoring (REM) with regards to bycatch of small cetaceans was organized by the 22nd ASCOBANS Advisory Committee Meeting and took place in The Hague on 2 October 2015. The aim of this workshop was to discuss the current status, potential shortcomings and new developments of REM techniques that could be used to help improve cetacean bycatch monitoring. The main topics discussed were stakeholder involvement, statistical survey design and data collection and analysis.

One of the main conclusions of the workshop was that from a technical perspective REM could be used successfully to monitor small cetacean bycatch, but decisions on whether REM was the best and most cost-effective option would depend on the specific situation. This was influenced by the type of monitoring being conducted, the fishing fleet that was targeted as well as personnel and technical costs which could vary greatly between countries.

The workshop participants concluded that the EU DCF, in its current form, was not adequate for monitoring small cetacean bycatch, mainly because most sampling effort (fleet, gear-type, area) under the DCF was currently targeted at fisheries (mainly demersal trawls) where small cetacean bycatch was not likely to be a major concern. In addition DCF sampling protocols were not designed to quantify the bycatch of large non-commercial species, especially animals that fall out or were removed from the net outside the vessel. If monitoring bycatch of cetaceans was to be included in the DCF, these shortcomings would need to be addressed. REM techniques and other additional techniques could be a way forward in collecting cetacean bycatch data along with data on commercial catches.

When considering a new REM project, a number of key points need to be considered. These include stakeholder involvement, sampling design, data collection and analysis as well as the use of the most appropriate technique for addressing the questions being asked. A list of best practices in the report reflect the outcomes of the workshop. Link to the report: http://www.ascobans.org/en/meeting/WS-REM-2015
(ASCOBANS, 2015).

8.3.2 Poland

Hel Marine Station (HMS) IOUG (Institute of Oceanography University of Gdansk) focused on assessing the scale of the risk arising from the use of gillnets (in situ) in the areas of occurrence of harbor porpoises (especially in protected Natura 2000 areas) and (ex situ) based on the information from fishery logbooks and trying to find ways to avoid bycatch.

HMS also collects bycatch data from all monitoring/observers programs (not connected to Reg. 812). Additionally, some scientists continue to collect opportunistic data on the bycatch of species such as: sturgeon, twaite shad and sea lamprey.

8.3.3 Spain – Electronic Monitoring Systems (EMS)

OPAGAC and SATLINK have developed an "Electronic Observer Programme" (similar to the Archipelago EM system). This EMS will be equipped on all Spanish tuna fishing vessels (Purse seiners) in 2016. Additionally, ALNITAK is running a project in 2015–2016 to test the use of an EMS adapted for small fishing vessels (Flywire). This project focuses on the surface longline fisheries (LLSWO and LLALB) and the lobster trammel net fishery in the Mediterranean. Also of note, that the Secretary General for Fisheries Fishery Control Division in 2014, with the assistance of KAI marine worked on including a button for recording sea turtle bycatch. We have no feedback on the use of this tool at this time.

9 Develop collaborative research proposal among WGBYC members to pursue research project(s) and funding opportunities in support of researching PETS and target species behaviour in relation to fishing gear (ToR F)

NOAA will have a call for proposals for funding through the National Bycatch Reduction Engineering Program. The main purpose of the call is to develop technological solutions and investigate changes in fishing practices designed to minimize bycatch of fish and protected species. Proposals that specifically reduce impacts to protected species will be prioritised. Researchers from SLU, DTU and the University of St Andrews are planning to send in a preproposal for funding. The aim of the project is to develop alternative fishing gear to help replace gillnet fisheries and thereby decrease the bycatch of the endangered Vaquita in the Gulf of California, Mexico. There will be a focus on developing gear for catching Pacific Sierra (*Scomberomorus sierra*), Blue and Brown shrimp. The study will include practical fieldwork with new developed fishing gear as well as in situ studies of fish and shrimp behaviour in relation to the alternative fishing gear.

10 Review reports and related ToR from other ICES Working Groups/Workshops that may have bycatch of Protected Species under their purview – (intersessional ToR J)

Several members of WGBYC provided summaries of their investigations into the work of ten ICES workshops, working groups, and other higher level groups to evaluate where there may or may not be overlapping interests with WGBYC. Below are summary highlights and outcomes from these evaluations:

Joint OSPAR/HELCOM/ICES Working Group on Seabirds (JWGBIRD)

JWGBIRD recently met in Copenhagen last November 2015. The agenda addressed five topics: 1) OSPAR and HELCOM indicators (of bird conservation status), 2) impacts of windfarms on seabirds and the need for strategic studies in this regard, 3) the effects of the new CFP Landings Obligation on sea birds, 4) effects and scale of non-native predators on seabird nesting sites and, 5) fishery driven ecological changes and consequences for seabirds. Bycatch is mentioned a number of times in the report but is nowhere a focus of the group.

OSPAR indicator (B1) abundance of seabirds should be of primary interest to WGBYC as sustainable level of takes does not appear to be on the radar of JWGBIRD. B1 - "Annual estimates of abundance of each species are compared against thresholds. For the EcoQO to be achieved, the abundance of 75% or more species needed to be above these thresholds". An additional topic of concern raised by JWGBIRD is the effect of the Landing Obligation on foraging patterns of seabirds due to expected reductions in discarding/offal at sea and the mitigation of seabird bycatch. These issues certainly fall under the competencies of WGBYC. There was also mention of developing a central database with ICES representing additional opportunity for synergy between WGBYC and seabird database (e.g. overwintering populations of seabirds or counts of birds on land at breeding colonies).

WGBYC intends to monitor further developments and has submitted a recommendation to JWGBIRD (Annex 6). It was agreed that WGBYC would increase attention on the bycatch of seabirds next year due to increasing 1) monitoring data availability, 2)

funding toward seabird bycatch and mitigation, and 3) synergies with needs identified by JWGBIRD. In preparation for this a table of seabird bycatch rates was assembled for early evaluation on data availability (Table 7).

Elasmobranchs Species

Several groups directed at various topics around elasmobranchs have been convened over time. WGDEEP convened in 2011 in part to address the splitting of deep water shark historical catch data. More recently, WKSHARKS met in early 2016 so a report was not available to WGBYC. However, the working group on elasmobranch fisheries (WGEF) appears to have assimilated the work of former groups such as WGDEEP (deep water sharks) or WKMSEL (looking at maturity stages). WGEF provides fishing opportunities advice for 26 species of sharks, skates and rays. From these, at least four species are prohibited: basking shark, *Cetorhinus maximus*, (protected by CITES and some European Countries), white skate, *Rostroraja alba,* angel shark, *Squatina squatina,* (protected by EU), and undulate ray (*Raja undulata*) that is a prohibited species in ICES Subareas 6 and 10. A small Total Allowable Catch (TAC) was established recently for undulate ray stocks in the English Channel and the Bay of Biscay.

WGEF notes that elasmobranchs are mainly a bycatch fishery. This, together with other WGEF data limitations (e.g. misidentification, highly seasonal and patchy distributed species), calls for a dedicated forum for exploring and analysing these data.

In WGEF 2015 (ICES, 2015c) report Section 10.1, the current ICES experts groups of relevance to the WGEF are listed. However, WGBYC is not mentioned. WGBYC determined that it will monitor the activities of WGEF but no recommendation was warranted at present.

Working Group on Ecosystem Effects of Fishing Activities (WGECO)

At its 2015 meeting WGECO identified risk based advice method for sensitive species as a topic ***in need for immediate advice*** (ICES, 2015d)**.**

> *'Sensitive species are a key component of ecosystems and form an important component of biodiversity (MSFD Descriptor 1). An indicator of sensitive fish has been developed by the Working Group on Biodiversity Science (WGBIODIV) and taken up by OSPAR, and this led the group to a general review of the appropriate methods to identify species sensitive to pressures, the estimation of exposure and the combination of these aspects in a risk based advice framework.'*

Sensitive within the context of pressures was defined by WGECO as "the degree to which a species or population may be negatively impacted by exposure to a particular pressure. This includes the potential of a species or population to recover from adverse effects and/or adapt to new conditions or ways of life and is a property of the inherent biological traits expressed by the species".

In addition WGECO stated that '*Sensitive species are potentially covered by several legislative decisions, not all of which provide the same definition of appropriate management. With regards to fishing activity, a sensitive species may also be a harvested species. Harvested species are referred to both in the CFP and the MSFD, with the CFP article 2(2)*

It was noted that the framework developed by WGECO for potentially identifying sensitive species could prove useful to WGBYC and other ICES WG in identifying species of concern that are not otherwise afforded protection under National legislation (Section 11).

Workshop on Lampreys and Shads (WKLS):

The purpose of the WKLS (ICES, 2015e) was to assess the status and trends of lamprey and shad stocks bringing together experts from countries where the bulk of these species tend to occur, specifically Portugal, France, Spain, UK and Ireland. The main focus was on the species that are commercially exploited, for lampreys, the *Petromyzon marinus (*sea lamprey) and *Lampetra fluviatilis (*European river lamprey), and for shads *Alosa alosa* (Allis shad) and *Alosa fallax (*Twaite shad). General outcomes from the group were, providing species distribution, population delimitation, and the dynamics of lampreys and shads in the North Atlantic, determine the current status of habitat recovery and relevant conservation efforts and concerns, causes of lamprey and shad mortality across the North Atlantic and the level of monitoring data available to support management decisions, propose future directions for the sustainable exploitation of these resources and the recovery of populations and habitats, determination of alarming population status in some areas of their distributional range. There was also the conclusion that the marine phase is the part of the life history having the largest knowledge gaps.

WKLS stated that the establishment of a new expert group on lampreys and shads occurred because under ICES, these species are currently treated by WGBYC in the context of protected species. However, there exists a group of scientists on both sides of the Atlantic with dedicated research and conservation action that is unrelated to the main thematic areas of WGBYC. WKLS states that diadromous fish although part of Annex II in the HD, have regional economic importance and their major capture is in estuarine and river waters, being targeted by artisanal fisheries of very long tradition in several European countries which calls for a dedicated group to treat this information.

WKLS reports directly to WGRECORDS (Working Group on the Science Requirements to support Conservation, Restoration and Management of Diadromous Species) and in the report, WGBYC is referred as a linkage group since there are mutual interests, thus groups may use/support each other and consult each other´s reports. On Section 3.2.3 concerning shad bycatch, a table is presented showing shad bycatch data retrieved from the member states DCF program compiled from the WGBYC reports.

Data Information Group (DIG)

The Data Information Group (DIG) covered the exchange of data between ICES expert groups (EGs) at its last meeting in May 2015. Several problems were identified, among those a lack of knowledge about what data are actually being used by the different EGs, practical restrictions where data cannot be shared as well as conflicting results produced for the same data. Many of these problems are caused by a separation between data producers and users. DIG concluded that better data availability for EGs is needed, instead of data transfer between groups. To do so, clear descriptions of data, i.e. metadata about the different data sets held by EGs are needed, including a description of the methods and tools used.

To move forward, DIG developed first steps to get insight on the data and data products from ICES expert groups. As a start, a template was developed to collect necessary information. It was planned to create an online facility at the ICES data center to enter this information and metadata. DIG identified eight EGs, including WGBYC, as test candidates to start a pilot project. The whole process was intended to start at the end of 2015.

Working Group on Spatial Fisheries Data (WGSFD)

In 2015 WGBYC formulated and forwarded a request for all commercial effort data (i.e. all fleets and areas) from vessel logbooks for the years 2009–2013. Based on data available, WGSFD could only partially answer this request. First, the data set was incomplete, because not all countries responded to the ICES data call. Secondly, the data call asked for logbook data only for vessels less than 15 m in length (prior to 2012) and less than 12 m from 2012 onwards. In addition, the results of VMS and logbook data sets could not be combined, as fishing effort was given differently in hours (VMS data set) and days-at-sea (logbook data). These problems should be overcome with a new, adapted data call that will include logbook data from all vessels.

WGBYC considered that WGCHAIRS (Annual Meeting of Advisory Working Group Chairs) could be another means of communicating and identifying synergies with other ICES EGs that have overlapping or similar needs.

11 The definition of a PET is unclear (ToR k)

'ADGBYC considered that it would be useful for WGBYC to recommend criteria for defining PETS, and then the relevant expert group be asked to apply those criteria (regionally if necessary) to arrive at a draft list. A discussion on who should compile information/contribute to future advice should follow.'

PET is an acronym for 'protected, endangered and threatened' species, so the basic meaning of the term (PET) is not unclear. However, the specific terms 'endangered' and 'threatened' are not consistently defined across the EU so are open to interpretation. This is further complicated by the fact that a threatened or endangered species in one region may not be considered threatened or endangered in a different, even adjacent, region.

The term 'protected' on the other hand is more clearly defined under various international legislative instruments (such as EU HD, USA MMPA, and Canada's SARA). Accordingly, bycatch of marine species afforded official protection under national and/or international legislation should be the main criteria for initially forming a list of species relevant to various ICES EGs.

However, WGBYC considered that there are likely to be other 'species of concern' or 'at risk species' that may fall under the labels of 'threatened' or 'endangered' that are not currently afforded official protection. For example, there may be populations that may be at risk due to fisheries bycatch (and/or other human induced impacts) due to their life history characteristics, abundance, vulnerability to fishing gears, or other relevant factors. This led to a discussion that concluded that criteria for identifying other species at risk of population decline due to bycatch could be developed and considered by WGs.

WGECO (ICES, 2015d) has recently developed a framework for identifying sensitive species which could also be applied or provide a foundation for further evaluating species at risk due to pressure from incidental bycatch in commercial fisheries.

However, in general WGBYC considered that the development of criteria with the aim of assembling a prescribed list of PETS was not particularly helpful to the mission of WGBYC itself. The rationale for this was that having a working list of PETs (the reason for developing criteria) is not what distinguishes WGBYC from other groups. WGBYC

works on the entire problem of bycatch of protected or other species of concern but those species are defined elsewhere before WGBYC focuses its attention on resolving bycatch issues related to them. WGBYCs original ToRs address mitigation and methods of estimating and monitoring bycatch of PS. This brought to the discussion the issue of the origin of the term 'PET', as opposed to PS, within the purview of WGBYC's evolving annual terms of reference. For the reasons stated above it is WGBYCs preference to return to the term 'protected species' within the context of its own work which will also now explicitly take into account 'other species at risk of population decline due to incidental bycatch in commercial fisheries'.

Please note that significant limitations on bycatch monitoring and total effort data quality and availability has largely dictated WGBYC's ability to evaluate bycatch for a given species and this will likely be the case for the foreseeable future. Given this reality WGBYC is being proactive on several fronts (Sections 7, 8 and 10) to build a framework so that WGBYC will be in a better position to evaluate the magnitude and impact of bycatch of other species of concern that may not currently be officially protected.

12 Other Business

The 2017 WGBYC meeting it set to be held in the USA at the NOAA Northeast Fisheries Science Centre in Woods Hole, Massachusetts. The 2017 meeting will be held in May or June (dates yet to be determined).

Two new members of WGBYC representing France and Spain have been confirmed.

Current Chair term is set to expire in 2017. A new Chair (term 2018–2020) will be nominated before or during the 2017 WGBYC meeting.

13 Tasks for 2017 Meeting

13.1 Intersessional ToR's

2017 Tor D –

Report back to WGBYC in 2016 the status of other EG's level of involvement assessing and quantifying bycatch of protected or other species of concern.

Regional coordination meetings (RCM) – Related to ToR D, it is incumbent upon all members of WGBYC to network with their relevant peers who are engaged in the RCM process to educate and stress the need for proper sampling design amendments or modifications under the DCF for robust data collection on PETs to support bycatch mortality analyses carried out by WGBYC.

2017 Tor F –

Intersessional DbSg work includes 1) working with ICES Data Centre to develop data screening and auditing procedures, 2) incorporating historical records for years 2006–2013, 3) improving data entry instructions , 4) developing a flow chart outlining the components of various data sources and how they would flow into one comprehensive database, 5) comparing commercial effort from ICES Data Call to effort provided through Reg. 812 reports, and 6) continuing discussion of options for long-term data

storage of monitoring and total commercial effort data in a standalone WGBYC database or integrating the WGBYC database into the ICES RDB. Communicate intersessionally on status and progress of this project.

2017 ToR G –

Continue cooperation with other advisory working groups and ACOM, to develop a process and format for integrating bycatch advice into ecosystem and fisheries advice.

2017 ToR H –

Continue to review reports and related ToR from other ICES Working Groups/Workshops that may have bycatch of protected species under their purview. The goal is to not duplicate work, but to leverage expertise when needed and develop collaboration.

13.2 WGBYC member attendance at other relevant EG meetings in 2017

Working Group on Commercial Catches (WGCATCH) – Bram Couperus will attend WGCATCH in autumn 2017 to continue advocating on behalf of WGBYC our mutual interest and stake in proper sampling protocols for the collection of rare event bycatch data such as protected or other species of concern.

14 References

Aguilar, A., 2002. Acciones para la conservación del delfín mular. GRUMM- Grup dèstudi i conservacio de mamífers marins. Departament de Biología Animal. Universidad de Barcelona. 179 pp.

Apitz, S. E., Elliott, M., Fountain, M., and Galloway, T. S. 2006. European Environmental Management: Moving to an Ecosystem Approach. Integrated Environmental Assessment and Management, 2: 80-85.

ASCOBANS. 2015. Report of the Workshop on Remote Electronic Monitoring with Regards to Bycatch of Small Cetaceans. ASCOBANS, The Hague, Netherlands, 2 October 2015. WS/REM/2015 Report.

Brotons, J.M., Grau, A.M. and Rendell, L. 2008. Estimating the impact of interactions between bottlenose dolphins and artisanal fisheries around the Balearic Islands. Marine Mammal Science, 24, 1, 112-127.

Browman, H. I., Stergiou, K.I, Cury, P.M., Hilborn, R., Jennings, S., Lotze, H.K., Mace, P.M., Sissenwine, M., Murawski, S., Zeller, D., Pauly, D., 2004. Prespectives on ecosystem-based approaches to the management of marine resources. Marine Ecology progress series, 274: 269-303.

Camphuysen C.J. & M.L. Siemensma. 2011. Conservation plan for the Harbour Porpoise Phocoena phocoena in The Netherlands: towards a favourable conservation status. NIOZ Report 2011-07, Royal Netherlands Institute for Sea Re- search, Texel.

CBD 2000. Convention on Biological Diversity, COP 5, Decision V/6: The Ecosystem Approach.

Chen, Y. and Runnebaums J., 2014. A preliminary study for Improving survivability of cusk bycatch in the Gulf of Maine lobster trap. [Final report; 15 p.] NOAA NMFS Contract No. EE1333F12SE2038.

CODA, 2009. Cetacean Offshore Distribution and Abundance. Final Report. 43pp.

Coram, A., Kingston, A. and Northridge S. 2015. Seabird bycatch in static nets along the south coast of England. Contract Report to the RSPB.

Cosgrove R, Gosch M, Reid D, Sheridan M, Chopin N, Jessopp M, Cronin M. 2015. Seal depredation in bottom-set gillnet and entangling net fisheries in Irish waters, Fisheries Research 172: 335–344.

Esteban, R., 2008. Abundancia, estructura social y parámetros de historia natural de la orca (Orcinus orca) en el estrecho de Gibraltar. MSc Thesis, Univeristy of Cádiz, 73 pp.

EU 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008, establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Union L164, 19–40.

EU 2013. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Official Journal of the European Union, L 354/22.

Fernández-Contreras, M. M., Cardona, L., Lockyer, C. H., and Aguilar, A. 2010. Incidental bycatch of short-beaked common dolphins (*Delphinus delphis*) by pairtrawlers off northwestern Spain. ICES Journal of Marine Science, 67, 8: 1732-1738.

Foster, E., Haward, M., and Coffen-Smout, S. 2005. Implementing integrated oceans management: Australia's south east regional marine plan (SERMP) and Canada's eastern Scotian shelf integrated management (ESSIM) initiative. Marine Policy, 29: 391-405.

Fox, DA, Armstrong JL, Brown LM, Wark K. 2013. Year Three, the Influence of Sink Gillnet Profile on Bycatch of Atlantic Sturgeon in the Mid-Atlantic Monkfish Fishery. [Report; 27 p.] NOAA NMFS Contract No. EA-133F-12-RQ-0697.

Gahm M, DeAlteris J, Parkins C. 2014. Evaluation of a Topless Bottom Trawl Design with a 160 foot Headrope and Two Restrictor Lines for Fish Capture in the Summer Flounder Fishery. [Final report; 36 p.] NOAA NMFS Contract No. EA-133F-12-SE-2141.

Gazo, M., Gonzalvo, J. and Aguilar, A. 2008. Pingers as deterrents of bottlenose dolphins interacting with trammel nets. Fisheries Research, 82: 70-75.

Goetz, S., Read, F. L., Santos, M. B., Pita, C., and Pierce, G. J. 2014. Cetacean–fishery interactions in Galicia (NW Spain): results and management implications of a face-to-face interview survey of local fishers. ICES Journal of Marine Science, 71, 3: 604-617.

Gonzalvo, J., Valls, M., Cardona, L. and Aguilar, A. 2008. Factors determining the interaction between common bottlenose dolphins and bottom trawlers off the Balearic Archipelago (western Mediterranean Sea). Journal of Experimental Marine Biology and Ecology, 367(1), 47-52.

Hammond, P. S., P. Berggren, H. Benke, D. L. Borchers, A. Collet, S. Heimlich, and A. R. Hiby. 2002. Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. Journal of Applied Ecology 39:361–376

Hammond, P. S., Macleod, K., Berggren, P., Borchers, D. L., Burt, L., Cañadas, A., Vázquez, J. A. (2013). Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. Biological Conservation, 164, 107–122. http://doi.org/10.1016/j.biocon.2013.04.010

He P, Jones N. 2013. Design and Test of a Low Profile Gillnet to Reduce Atlantic Sturgeon and Sea Turtle Bycatch in Mid-Atlantic Monkfish Fishery. [Final Report; 40 p.] NOAA NMFS Contract No. EA133F-12-SE-20

ICES. 2013a. Report of the Working Group on Bycatch of Protected Species (WGBYC), 4–8 February, Copenhagen, Denmark. ICES CM 2013/ACOM:27. 73 pp.

ICES. 2013b. Report of the Workshop on Bycatch of Cetaceans and other Protected Species (WKBYC), 20-22 March 2013, Copenhagen, Denmark. ICES CM 2013/ACOM: 36. 55pp.

ICES. 2013c. Report of the Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS), 24 June – 28 June 2013, Lysekil, Sweden. ICES CM 2013/ACOM:56. 142pp.

ICES. 2014a. Report of the Working Group on Bycatch of Protected Species (WGBYC), 4–7 February 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:28. 96 pp.

ICES. 2014b. OSPAR request on implementation of MSFD for marine mammals. *In* Report of the ICES Advisory Committee 2014. ICES Advice, 2014. Book 1, Section 1.6.6.1.

ICES. 2015a. Report of the Working Group on Bycatch of Protected Species (WGBYC), 2-6 February 2015, ICES Headquarters, Copenhagen, Denmark. ICES CM 2015\ACOM:26. 82 pp.

ICES. 2015b. Report of the Working Group on Mixed Fisheries Advice Methodology (WGMIXFISH-METH), 5–9 October 2015, DTU-Aqua, Charlottenlund, Denmark. ICES CM 2015/ACOM:22. 51 pp.

ICES. 2015c. Report of the Working Group on Elasmobranch Fishes (WGEF), 17–23 June 2015, Lisbon, Portugal. ICES CM 2015/ACOM:19. 711 pp.

ICES. 2015d. Report of the Working Group on the Ecosystem Effects of Fishing Activities (WGECO), 8-15 April 2015, ICES Headquarters, Copenhagen, Denmark. ICES CM 2015\ACOM:24. 122 pp.

ICES. 2015e. Report of The Workshop On Lampreys and Shads (WKLS), 27–29 November 2014, Lisbon, Portugal. ICES CM 2014/SSGEF:13. 206 pp.

IJsseldijk, L.L. & Gröne, A. (2015) Postmortaal onderzoek van Bruinvissen (Phocoena phocoena) uit Nederlandse wateren 2014. Intern rapport 2015, Departement Pathobiologie, Faculteit Diergeneeskunde, Universiteit Utrecht.

La Mesa G, Annunziatellis A, Filidei Jr. E, and Fortuna CM. 2015. Modeling environmental, temporal and spatial effects on twaite shad (Alosa fallax) by-catches in the central Mediterranean Sea. John Wiley & Sons Ltd Fish. Oceanogr. doi:10.1111/fog.12093

López, A., Pierce, G.J., Santos, M.B., Gracia, J., ad Guerra, A. 2003. Fishery by-catches of marine mammals in Galician waters: results from on-board observations and an interview survey of fishermen. Biological Conservation, 111: 25-40.

López, A., Vázquez, J.A., Martínez-Cedeira., J.A., Marcos-Ipiña, E., Laria, L., Maestre, I.,Carbo, A., Llanova, A., Fernández, M., Díaz, J.I., Santos, L., Ruano, A., Fernández, R., y Méndez, P. 2012. Bases para el desarrollo de los planes de conservación de las especies de cetáceos protegidas en la Demarcación Marina Noratlantica. Volumen 2 Impactos. Ministerio de Agricultura, Alimentación y Medio Ambiente – Fundación Biodiversidad.

Marcalo, A., Katara, I., Feijo´, D., Arau´jo, H., Oliveira, I., Santos, J., Ferreira, M., Monteiro, S., Pierce, G. J., Silva, A., and Vingada, J. 2015. Quantification of interactions between the Portuguese sardine purse-seine fishery and cetaceans. – ICES Journal of Marine Science, doi: 10.1093/icesjms/fsv076.

Matzen E, Milliken H, Lowell N. 2015. Development and testing of a tow time data logger to monitor and enforce tow time restrictions in trawl fisheries. NOAA Tech Memo NMFS NE-234; 15 p.

NMFS [National Marine Fisheries Service] and Atlantic States Marine Fisheries Commission. 2013. Workshop on Sea Turtle and Atlantic Sturgeon Bycatch Reduction in Gillnet Fisheries. Jan 22-23, 2013, Ocean City, MD. 48 pp.

Northridge S, Kingston A, Thomas L. 2015. Annual report on the implementation of Council Regulation (EC) No 812/2004 during 2014.

Pace DS, Tizzi R, Mussi B (2015) Cetaceans Value and Conservation in the Mediterranean Sea. J Biodivers Endanger Species S1: S1.004. doi:10.4172/2332-2543.S1.004

Oliveira N, Henriques A, Miodonski J, Pereira J, Marujoa D, Almeida A, Barros N, Andradea J,Marçalo A, Santos J, Benta Oliveira I, Ferreira M, Araújo H, Monteiro S, Vingada J, Ramírez I. 2015. Seabird bycatch in Portuguese mainland coastal fisheries: An assessment through

on-board observations and fishermen interviews. Global Ecology and Conservation, 3: 51-61.

Santos, M.B., Read, F., Saavedra, C., Lens, S., De Stephanis, R., Gimenz, J., Vervough, P., Gauffier, P., Esteban., R., Garcia-tiscar, S., Salazar-Sierra, J.M.., Jímenez, C., López, A., Martínez-Cedeira, J., Llanova, A., Covelo, P., Vázquez, J.A., C., Laria, L.,Marcos,E., Maestre, I., Cañadas, A., Moreno, P., Murcia, J.L., Martín, V., Raga, J.A., Gozalbes, P., Aguilar, A., Pierce,G.J., Learmonth, J., Fernández, R., Sagarminaga, R., Urquiola, E., Ruano, A. and J.J. Areces. 2012. Estrategias Marinas. Grupo Mamíferos Marinos. Evaluación Inicial y Buen Estado Ambiental. MAGRAMA. NIPO: 280-12-175-8. 448 pp.

Smolowitz R., Milliken HO, and Weeks M. 2012. Design, Evolution, and Assessment of a Sea Turtle Deflector Dredge for the U.S. Northwest Atlantic Sea Scallop Fishery: Impacts on Fish Bycatch. North American Journal of Fisheries Management, 32:1, 65-76

Tonay A.M. 2016. Estimates of cetacean by-catch in the turbo fishery on the Turkish Western Black Sea Coast in 2007 and 2008. J. of the Mar. Bio. Assoc. of the UK. 6pp. doi:10.1017/S0025315416000060

Viquerat, S., Herr H., Gilles A., Peschko V., Siebert U., Sveegaard S., Teilmann, J (2014). Abundance of harbour porpoises (Phocoena phocoena) in the western Baltic, Belt Seas and Kattegat. Marine Biology **161**(4): 745-754.

Vélez, M. 2014. Interacciones entre cetáceos, tortugas y pesquerías en el Golfo de Cádiz. MsC Thesis, Univeristy of Cádiz, 65 pp.

Vázquez, J.A., Cañadas, A., MartÍnez-Cedeira, J., López, A., Tejedor, M, Gauffier, P., Gazo, M., Brotons, J.M., 2014. Docuemento técnico sobre la incidencia de la captura accidental de especies de cetáceo amenazadas en artes de pesca. Informe realizado para el Ministerio de Agricultura, Alimentación y Medio Ambiente, 95 pp.

Annex 1: List of participants

NAME	INSTITUTE	COUNTRY	EMAIL
Adam Woźniczka	National Marine Fisheries Research Institute	Poland	awozniczka@mir.gdynia.pl
Al Kingston	University of St. Andrews	United Kingdom	ark10@st-andrews.ac.uk
Ana Marçalo	Portuguese Wildlife Society	Portugal	amarcalo@gmail.com
Bram Couperus	Wageningen IMARES	Netherlands	bram.couperus@wur.nl
Carlos Pinto	ICES Secretariat		carlos@ices.dk
Caterina Maria Fortuna	National Institute for Environmental Protection and Research ISPRA	Italy	caterina.fortuna@isprambiente.it
Christian von Dorrien	Thünen Institute of Baltic Sea Fisheries	Germany	christian.dorrien@ti.bund.de
Estanis Mugerza *By correspondence*	AZTI Sukarrieta	Spain	emugerza@azti.es
Finn Larsen	DTU Aqua	Denmark	fl@aqua.dtu.dk
Kelly Macleod	Joint Nature Conservation Committee	United Kingdom	kelly.macleod@jncc.gov.uk
Lotte Kindt Larsen	DTU Aqua	Denmark	lol@aqua.dtu.dk
Lukasz Dziemian	National Marine Fisheries Research Institute MIR	Poland	lukasz.dziemian@mir.gdynia.pl
Marije Siemensma *By correspondence*	Coastal and Marine Union	Netherlands	m.siemensma@msandc.nl

Marjorie Lyssikatos Chair	National Marine Fisheries Services Northeast Fisheries Science Center	United States	marjorie.lyssikatos@noaa.gov
Ricardo Sagarminaga van Buiten	Spanish Cetacean Society	Spain	ricardo@alnitak.info ric@kaimarineservices.com
Ronan Cosgrove	Irish sea Fisheries Board BIM West Coast	Ireland	cosgrove@bim.ie
Ruth Fernandez	Secretariat		Ruth.fernandez@ices.dk
Sara Königson	Swedish University of Agricultural Sciences	Sweden	sara.konigson@slu.se
Simon Northridge	Scottish Oceans Institute University of St Andrews	United Kingdom	spn1@st-andrews.ac.uk
Wojciech Gorski	Hel Marine Station Institute of Oceanography University of Gdańsk	Poland	ocewgo@ug.edu.pl

Annex 2: Agenda

WGBYC – Working Group on Bycatch of Protected Species

The **Working Group on Bycatch of Protected Species** (WGBYC), chaired by Marjorie Lyssikatos, USA, will meet at ICES HQ in Copenhagen Denmark, 1–5 February 2016 to:

a) Review and summarize annual national reports submitted to the European Commission under Regulation 812/2004 and other published documents and collate PETS bycatch rates and estimates in EU waters;

b) Evaluate and report on trends in bycatch rates and estimates of protected species where possible from MS reporting under 812 and from DCF;

c) Evaluate the range of (min/max) impacts of bycatch on cetacean species where possible by assessment unit. , furthering the bycatch risk approach to assess likely conservation level threats and prioritize areas where additional monitoring is needed;

d) Collate and review information from National 812 reports and elsewhere relating to the implementation of bycatch mitigation measures and ongoing bycatch mitigation trials, compile recent results and coordinate further work on protected species bycatch mitigation;

e) Continue to develop, improve and coordinate methods for bycatch monitoring, research and assessment within the context of European legislation (e.g. MSFD), regional conventions (HELCOM and OSPAR) and targets;

f) Develop collaborative research proposal among WGBYC members to pursue research project(s) and funding opportunities in support of researching PETS and target species behaviour in relation to fishing gear;

g) Continue, in cooperation with the ICES Data Centre, to develop, improve, populate, and maintain the database on bycatch monitoring and relevant fishing effort in European waters. Adapt the WGBYC d-base to accommodate the incorporation of other PETS bycatch data as reported through the DCF and other sampling schemes (intersessional);

h) Collate DCF and other monitoring scheme records relevant to total observer effort and bycatch of PETS (intersessional);

i) Adopt new structural changes to tabular output of PETS bycatch and associated effort data necessary to meet emerging data needs and requests from other ICES Working Groups (i.e. stock assessment WG's and WGMME (intersessional);

j) Review reports and related ToR from other ICES Working Groups/Workshops that may have bycatch of PETS under their purview. The goal is to not duplicate work (intersessional).

k) The definition of a PET is unclear. ADGBYC considered that it would be useful for WGBYC to recommend criteria for defining PETS, and then the relevant expert group be asked to apply those criteria (regionally if necessary) to arrive at a draft list. A discussion on who should compile information/contribute to future advice should follow.

WGBYC agenda, 1-5 February 2016, Copenhagen

01 Feb – Monday

- P.M. 13:30 – 17:30 Plenary
  - Review Terms of Reference (ToR) & Draft Agenda
    - Not addressing Tor-b & Tor-h this year
  - Intersessional Updates:
    - Tor-e:
      - WGCATCH/WGBYC Coordination (Bram);
        - WGCATCH 2015 Report (small scale fisheries;
        - FishPi Project coordination (Estanis by correspondence)
    - 14:30 Tor-g: ICES Data Centre & WGBYC DbSg activities (Allen, Carlos, Ronan, Marjorie)
      - Integration of Bycatch Advice into SA Advice
        - WGNSSK & WGBIE? (Simon);
        - WGMIXFISH-METH (Mark)
      - WGMME updates
      - OSPAR IA (interim assessment mm bycatch - HP)
      - Netherlands (Ascobans Workshop on Best Practices-Marije by correspondence)
  - Housekeeping – please post all draft text on Sharepoint in the /2016 Report/ToR folders
  - Task Assignments for MS reports (ToR a & d) – all MS covered?
    - Follow same format as 2015 report
      - Tables 1-3 need to be reproduced
      - Summary tables 4-5 (ToR-i): add new taxa in addition to small cetaceans from last year
  - Form Subgroups for (ToR-c & ToR-f & ToR-k)

02 Feb – Tuesday

- A.M. 8:30-12:30
  - ToR-a/i & ToR-d & ToR-c
  - 11:00 Henrik from Ices Data Centre
- Lunch 12:30-13:30
- P.M. 13:30-16:30
  - ToR-a/i & ToR-d & ToR-c
- Plenary 16:30-17:30

03 Feb – Wednesday

- A.M. 8:30-12:30
  - ToR-d Mitigation
    - Poland Seabird bycatch presentation: Adam

        - Portugal (pinger trials, monitoring improvements, other mitigation devices – Project Life + MarPro): Ana
        - Predicting HP bycatch from EM
        - Cod pots/seal depredation (Sara/Lotte)
    - Lunch 12:30-13:30 (12:30 DbSg meeting)
- P.M 13:45 – 14:45
        - Seal Depredation setnets jigging fisheries (Ronan)
        - Mexican Vaquita Workshop (C. Glass by correspondence)
        - Tow duration sensor (US NOAA Tech memo publication on Sharepoint /background documents/ToR-d/)
- 14:45 – 17:30
    - Finish up tasks/write-up sections for report
- 18:30 Group Dinner Reservation @ Wagamama

04 Feb – Thursday

- A.M. 8:30 – 12:00 in Plenary
    - ToR-j: Other ICES WG's with tasks similar to WGBYC
        - Birds (Simon)
        - Elasmobranchs (Allen)
        - WGEF & WGRFS (Ruth)
        - WKLS (Ana)
        - ICES DIG, WGSFD,
    - 12:30-13:30 Lunch
- P.M. 13:30-15:30 in Plenary
    - ToR-j continued…
        - WGMIXFISH, DCF (Christian)
        - WGECO (Marjorie)
    - ToR-k – Developing Criteria to support list of PETS
- 15:30-17:30 (finish up tasks/write-up sections for report)

05 Feb – Friday

- A.M. 8:30 – 12:30
    - 2016 Recommendations
    - 2017 ToRs
    - 2016 WGBYC Report due Feb. 26
    - 2016 Reg. 812 Reports (i.e. 2015 Data entry/upload)
    - Membership updates: France (Jerome Spitz) & Spain (Camilo Saavedra)
    - EC policy/legislation connection (Alexander Stein)
    - Planning 2017 meeting in the USA
        - Solicit for new Chair (and optional co-Chair) to be nominated in 2017 (2018-2020 term)
- 12:30-13:30 Lunch
- P.M. (finish up tasks/write-up sections for report)
    - 14:30-16:00 Plenary
- Adjourn 16:00

Annex 3: WGBYC draft Terms of Reference for the 2017 meeting

The **Working Group on Bycatch of Protected Species** (WGBYC), chaired by Marjorie Lyssikatos, USA, will meet in Woods Hole Massachusetts, USA , x–x May 2017 to:

a) Review and summarize annual national reports submitted to the European Commission under Regulation 812/2004 and other published documents and collate bycatch rates and estimates in EU waters;

b) Evaluate the range of (min/max) impacts of bycatch on protected species where possible by assessment unit furthering the bycatch risk approach to assess likely conservation level threats and prioritize areas where additional monitoring is needed;

c) Collate and review information from National 812 reports and elsewhere relating to the implementation of bycatch mitigation measures and ongoing bycatch mitigation trials, compile recent results and coordinate further work on protected species bycatch mitigation;

d) Continue to develop, improve and coordinate with other ICES WG's on methods for bycatch monitoring, research and assessment within the context of European legislation (e.g. MSFD) and regional conventions (intersessional);

e) Continue to develop collaborative research proposals among WGBYC members to pursue research projects and funding opportunities in support of researching protected and target species behaviour in relation to fishing gear;

f) Continue, in cooperation with the ICES Data Centre, to develop, improve, populate, and maintain the database on bycatch monitoring and relevant fishing effort in European waters (intersessional);

g) Continue, in cooperation with other advisory working groups and ACOM, to develop a process and format for integrating bycatch advice into ecosystem and fisheries advice. (intersessional);

h) Continue to review reports and related ToR from other ICES Working Groups/Workshops that may have bycatch of protected species under their purview. The goal is to not duplicate work (intersessional).

WGBYC will report by xxxx to the attention of the XXXXX Committee.

Supporting Information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem affects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Scientific justification	
Resource requirements	
Participants	
Secretariat facilities	
Financial	

Linkages to advisory committees	
Linkages to other committees or groups	
Linkages to other organizations	

Annex 4: Tables

Table 1. Summary table of MS by RCM regarding the status of Reg. 812 report submissions to the European Commission (Green = Yes for report with data on observer effort (either days at sea or other measurement, e.g. effort per haul or set); Gray = Yes for report with no data on observer effort (either days at sea or other measurement); Yellow = no report submitted; Cross-hatch = no report (no monitoring required); Empty = not in the EU; * Two trawlers that were monitored in 2012 have since been scrapped. As a result, in 2013 no vessels are affected by the regulation; ** An independent scientific non-profit nongovernmental organization monitoring set nets indicated the bycatch of one bottlenose dolphin; * Germany provides reports on observations made under DCF to the Commission which include information on cetacean bycatch. Some of this information was made available at the meeting; **** Data made available at the meeting; *****Data made available to the meeting in 2016.**

RCM	Coastal Member State of the EU	Monitoring (Art. 4-5)	Submission Status of Reg. 812 Report to the EC								
		Fishing in areas affected	2006	2007	2008	2009	2010	2011	2012	2013	2014
Baltic	Estonia EE	Yes									
Baltic	Finland FI	Yes									
Baltic	Latvia LV	Yes									
Baltic	Lithuania LT	Yes									
Baltic	Poland PL	Yes									
Mediterranean & Black Sea	Italy IT	Yes									
Mediterranean & Black Sea	Slovenia SI	Yes							*	**	**
North Atlantic	Portugal PT	Yes									
North Atlantic	Spain ES	Yes									
North Atlantic, Baltic	Germany DE	Yes		***							***
North Atlantic, North Sea & Eastern Artic	France FR	Yes								*****	
North Atlantic; North Sea & Eastern Arctic	Ireland IE	Yes									
North Atlantic; North Sea & Eastern Arctic	Netherlands NL	Yes									
North Atlantic; North Sea & Eastern Arctic	United Kingdom UK	Yes									
North Sea & Eastern Arctic, Baltic	Belgium BE	Yes									
North Sea & Eastern Arctic, Baltic	Denmark DK	Yes									

RCM	Coastal Member State of the EU	Monitoring (Art. 4-5)	Submission Status of Reg. 812 Report to the EC								
		Fishing in areas affected	2006	2007	2008	2009	2010	2011	2012	2013	2014
North Sea & Eastern Artic; Baltic	Sweden SE	Yes		****						****	****
Mediterranean & Black Sea	Bulgaria BG (MS since 2007)	NO									
Mediterranean & Black Sea	Croatia HR (MS since 2013)	NO									
Mediterranean & Black Sea	Cyprus CY	NO									
Mediterranean & Black Sea	Greece GR	NO									
Mediterranean & Black Sea	Malta MT	NO									
Mediterranean & Black Sea	Romania RO (MS 2007)	NO									

Table 2. Summary table of MS by RCM regarding proper reporting of observer effort in 'days at sea' in Reg. 812 report submissions to the EC (Green = MS Reg. 812 reports provided observed effort in days at sea; Gray = MS Reg. 812 reports provided no effort or if provided it was not in the format of days at sea; Cross-hatch = no report, monitoring not required; Empty = not in the EU * Relevant fishery no longer exists; ** No report but information provided by participant at the corresponding WGBYC meeting.

RCM	Coastal Member State of the EU	Monitoring (Art. 4-5)	Effort (days at sea)								
		Fishing in areas affected	2006	2007	2008	2009	2010	2011	2012	2013	2014
Baltic	Estonia EE	Yes									
Baltic	Finland FI	Yes									
Baltic	Latvia LV	Yes									
Baltic	Lithuania LT	Yes									
Baltic	Poland PL	Yes									
Mediterranean & Black Sea	Italy IT	Yes									
North Atlantic	Portugal PT	Yes									
North Atlantic	Spain ES	Yes									
North Atlantic, Baltic	Germany DE	Yes									**
North Atlantic, North Sea & Eastern Artic	France FR	Yes									
North Atlantic; North Sea & Eastern Arctic	Ireland IE	Yes									
North Atlantic; North Sea & Eastern Arctic	Netherlands NL	Yes									
North Atlantic; North Sea & Eastern Arctic	United Kingdom UK	Yes									
North Sea & Eastern Arctic, Baltic	Belgium BE	Yes									
North Sea & Eastern Arctic, Baltic	Denmark DK	Yes									
North Sea & Eastern Artic; Baltic	Sweden SE	Yes								**	**
Mediterranean & Black Sea	Slovenia SI	(No*)Yes							*	*	*
Mediterranean & Black Sea	Bulgaria BG (MS since 2007)	NO									

RCM	Coastal Member State of the EU	Monitoring (Art. 4-5)	Effort (days at sea)								
		Fishing in areas affected	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mediterranean & Black Sea	Croatia HR (MS since 2013)	NO									
Mediterranean & Black Sea	Cyprus CY	NO									
Mediterranean & Black Sea	Greece GR	NO									
Mediterranean & Black Sea	Malta MT	NO									
Mediterranean & Black Sea	Romania RO (MS 2007)	NO									

Table 3. Collation of fishing and monitoring effort by gear group (Metier level 2; trawls=predominantly pelagic trawls; nets=set and drift nets) and RCM areas and bycatch of protected species (PS) as defined by the Habitats Directive (HD) and seals for the year 2014. The fishing and monitoring data are extracted from the 2015 annual reports on the implementation of Reg. 812/2004 for the year 2014. Fishing and monitoring effort are reported in days at sea (das); *=excludes data from Germany; REM=remote electronic monitoring; RCM Areas: NS + EA = North Sea and eastern Arctic; NA = North Atlantic; Med = Mediterranean & Black Sea. Protected species (PS): ***Phocoena phocoena (Pp); Delphinus delphis (Dd); Halichoercus grypus (Hg); Phoca.victulina (Pv); Caretta caretta (Cc); Alosa fallax (Af); Thunnus thynnus (Tht); Mustelus asterias (Ma); Squalus acanthias (Sa); Pteroplatytrygon violacea (Ptv).; Fulmaris glacialis (Fg); Larus marinus (Lr); Morus bassanus (Mb); Puffinus mauretanicus (Pm); Phalacrocorax aristotelis(Pa) and; Larus spp. (Lsp.).*** **'No. Bycatch' is number of animals.**

			DCF monitoring			Dedicated monitoring			REM		
Metier level 2	**RCM area**	**Fishing effort (das)**	**das**	**No. By-catch PS & seals**	**Species**	**das**	**No. Bycatch PS & seals**	**Species**	**REM (das)**	**No. Bycatch PS & seals**	**Species**
Trawls	Baltic	15911	0	0		377	0		0	0	
	NS+EA	25397*	83	0		49	0		0	0	
	NA	29723*	1037	6	2Tth; 3Hg;1Dd;	187	6	6Dd;	0	0	
	Med	19099	0	0		282	79	7 Cc; 49 Af; 3 Ma; 16 Sa; 4 Ptv;	0	0	
	TOTAL	90130	1120	6	2Tth; 3Hg;1Dd;	895	85	7 Cc; 49 Af; 3 Ma; 16 Sa; 4 Ptv; 6Dd.	0	0	
Nets	Baltic	12513	0	0		106	0		849	35	35Pp
	NS+EA	35639*	48	1	1Pp;	145	4	3Pp;1Pv;	0	0	
	NA	129524*	117	2	1Mb; 1Lsp.	587	30	8 Dd; 3Pm; 2Mb; 2Lsp; 1Pa; 5Hg; 1Pv; 8Pp;	0	0	
	Med	0	0	0		0	0		0	0	
	TOTAL	177676	165	3	1Pp;1Mb; 1Lsp.	838	34	11Pp; 8Dd; 3Pm; 2Mb; 2Lsp; 1Pa; 5Hg; 2Pv;	849	35	35Pp

Table 3 (continued from previous page). Collation of fishing and monitoring effort by gear group (Metier level 2) and RCM areas and bycatch of protected species (PS) as defined by the Habitats Directive (HD) and seals for the year 2014. The fishing and monitoring data are extracted from the 2015 annual reports on implementation of Reg. 812/2004 for the year 2014.. Fishing and monitoring effort are reported in days at sea (das); *=excludes data from Germany; REM=remote electronic monitoring; RCM Areas: NS + EA = North Sea and eastern Arctic; NA = North Atlantic; Med = Mediterranean & Black Sea. Protected species (PS): ***Phocoena phocoena (Pp); Delphinus delphis (Dd); Halichoerus grypus (Hg); Phoca vitulina (Pv); Caretta caretta (Cc); Alosa fallax (Af); Thunnus thynnus (Tht); Mustelus asterias (Ma); Squalus acanthias (Sa); Pteroplatytrygon violacea (Ptv).; Fulmaris glacialis (Fg); Larus marinus (Lr); Morus bassanus (Mb); Puffinus mauretanicus (Pm); Phalacrocorax aristotelis(Pa) and; Larus spp. (Lsp.).*** **'No. Bycatch' is number of animals.**

			DCF monitoring			Dedicated monitoring			REM		
Metier level 2	**RCM area**	**Fishing effort (das)**	**das**	**No. By-catch PS & seals**	**Species**	**das**	**No. Bycatch PS & seals**	**Species**	**REM (das)**	**No. Bycatch PS & seals**	**Species**
Lines	Baltic	0	0	0		0	0		0	0	
	NS+EA	Unknown	1	0		10	6	6 Fg	0	0	
	NA	Unknown	17	0		30	114	113 Fg; 1 Lr	0	0	
	Med	0	0	0		0	0		0	0	
	TOTAL	Unknown	18	0		40	120	119 Fg; 1Lr	0	0	

Table 4. Marine mammal and cetacean bycatch rates reported by the UK in static nets by monitoring type (dedicated=observing for bycatch of cetaceans, non-dedicated=observers focused on observing commercial catches; bycatch rates were aggregated over all marine mammal or cetacean species; bycatch rates=number of bycaught animals per haul) as reported in the UK's 2015 Report on Reg. 812.

Monitoring Type	No. Observed Hauls (2005–2014)	No. of Marine Mammals observed (2005–2014)	Marine Mammal Bycatch Rates (2005–2014)
Dedicated	7433	188	0.025
Non-dedicated	3142	6	0.002

Table 5. Total number of cetacean bycatch specimens and rates (number of specimens/day at sea) in 2014 reported by MS under Reg. 812. Bycatch numbers and rates are grouped by gear type, RCM region, and ICES fishing area (Pp, *Phocoena phocoena*; Dd, *Delphinus delphis*).

Metier Level 3	RCM	Fishing Area (ICES Division)	Total Observed Effort (Days at sea)	Dd (number of specimens)	Dd (bycatch rate per day at sea)	Pp (number of specimens)	Pp (bycatch rate per day at sea)
Nets	Baltic	27.SD22	334			21	0.06
		27.SD23	407			14	0.03
	North Atlantic	7a	16			1	0.06
		7e	156			5	0.03
		7f	29			1	0.03
		7g	36	1	0.03		
		7h	26	1	0.04		
		8a	115	2	0.02		
	North Sea and Eastern Arctic	27.IV	25			1	0.04
		4c	23			3	0.13
Pelagic trawls	North Atlantic	7b	53	1	0.02		
		7k	65	1	0.02		
Polyvalent	North Atlantic	9a	50	3	0.06		
Seines	North Atlantic	9a	43	2	0.05		

Table 6. Total 2014 commercial fishing effort and observer effort in days at sea aggregated by gear type, RCM and ICES fishing area reported by EU Member States in their Regulation 812/2004 report submitted to the European Commission.

Gear Type (Metier Level 3)	RCM Region	Fishing Area (ICES Division)	Total Fishing Effort (Days at sea)	Total Observed Effort (Days at sea)
Bottom trawls	Baltic	20–21	14093	88
		22–24	437	9
		25–32	3562	46
		3AN	253	0
		3AS21	35	0
		3c	5852	6.5
		3d	7673	0
	Mediterranean & Black Sea	Med	10484	107
	North Atlantic	14a	20	0
		14b	376	0
		5a	49	0
		9a	12312	71
	North Sea and Eastern Arctic	1	49	0
		18–19	843	0
		1c	13	0
		2a	53	0
		2b	154	54
		4a	656	17
		4b	28400	32
		4c	393	10
Dredges	North Sea and Eastern Arctic	4b	209	0
Longlines	Baltic	3c	14	0
		3d	1473	0
	North Atlantic	9a	7600	4
Nets	Baltic	20–21	4099	0
		22–24	4559	0
		25–32	27325	0
		27.IIIa	3155	29
		27.SD22	2540	334
		27.SD22–23	7889	0
		27.SD23	4997	407
		27.SD24	2756	108
		27.SD24–32	2756	0
		3AN	59	0
		3AS21	5	0
		3c	9198	14
		3d	13039	74
	North Atlantic	6a	426	0
		6b	451	0

		7a	721	16
		7b	538	0
		7c	549	0
		7e	20307	156
		7f	4472	29
		7g	2937	36
		7h	2595	26
		7j	3747	2
		7k	975	0
		8a	29748	115
		8b	19102	178
		8c	163	0
		8d	554	0
		8e	3	0
		Far South	82	0
	North Sea and Eastern Arctic	27.IV	6522	25
		4a	1082	0
		4b	648	2
		4c	10624	23
		7d	30988	89
Pelagic trawls	Baltic	20–21	252	0
		22–24	27	0
		25–32	2542	0
		27.IIIa	1168	0
		27.IIId	6162	280
		27.SD22–23	161	0
		27.SD24–32	1189	0
		3AN	2	0
		3c	177	0
		3d	12472	145
	Mediterranean & Black Sea	GSA 16	996	0
		GSA 17	9828	92
		Med	668	10
	North Atlantic	10b	15	0
		12c	26	0
		14b	50	0
		27.V–VIII	822	0
		5b	60	0
		6a	1651	93
		6b	17	0
		7a	456	7
		7b	828	53
		7c	190	16
		7d	71	3
		7e	1191	51
		7f	6	0

		7g	287	20
		7h	281	14
		7i–j	41	0
		7j	811	35
		7k	1337	65
		8a	3430	39
		8b	873	8
		8c	27	0
		8d	105	10
		8e	5	0
		Far South	25	0
	North Sea and Eastern Arctic	18–19	248	0
		27.IV+VIId	3736	0
		2a	147	2
		2b	17	0
		4a	1633	104
		4b	510	2
		4c	343	1
		7d	2205	51
Polyvalent	North Atlantic	9a	60192	50
Rods and Lines	Baltic	3c	19	0
Seines	Baltic	20–21	117	0
		25–32	82	0
		3AN	27	0
		3d	49	0
	North Atlantic	9a	7110	43
	North Sea and Eastern Arctic	18–19	95	0
		4a	371	0
		4b	136	0
Traps	Baltic	3c	431	7
		3d	662	0
	North Atlantic	12	45	0
		6b	119	0
		7b	4	0
		7c	25	0
		7i–j	7	0
		8c	5	0
	North Sea and Eastern Arctic	4b	162	0

Table 7. Total number of seabird bycatch specimens and rates (number of specimens/day at sea) in 2014 reported by MS under Reg. 812. Bycatch numbers and rates are grouped by gear type, RCM region, and ICES fishing area(Am, *Aythya marila*; Cd, *Calonectris diomedea;* Ch, *Clangula hyemalis;* Fg, *Fulmaris glacialis;* Lf, *Larus fuscus;* Lr, *Larus marinus;* Lm, *Larus michaelis;* Mf, *Melanitta nigra;* Mb, *Morus bassanus;* Pa, *Phalacrocorax aristolelis;* Pc, *Phalacrocorax carbo;* Pm, *Puffinus mauretanicus;* Sm, *Somateria mollissima;* Ua, *Uria aalge)*. Note: reporting of seabird bycatch is not a mandatory requirement of the Reg.812 reporting format so the numbers shown here are not necessarily a full record of seabird bycatch observations. *Seabird data reported here may not match with the summary of seabird bycatch in final ICES advice due to addition of two new seabird species (*Fg* and *Lr*) added after advice was drafted for the ACOM.

Gear Type (Metier Level 3)	RCM Region	ICES Fishing Area	Observed effort (Days at sea)	Am	Cd	Ch	*Fg	Lf	*Lr	Lm	Mf	Mn	Mb	Pa	Pc	Pm	Sm	Ua
				Number of Specimens														
Bottom trawls	North Atlantic	9a	71										4					
Longlines	North Sea and Eastern Arctic	4a	9				6											
	North Atlantic	6a	21				113		1									
		9a	4							5			2					
Nets	Baltic	3c	14									1			1		1	
		3d	74	1		7					1	1						1
Polyvalent	North Atlantic	9a	50		1			2		1			3	1		3		
Seines	North Atlantic	9a	43		3								1			1		
Traps	Baltic	3c	7												1			

Gear Type (Metier Level 3)	RCM Region	ICES Fishing Area	Observed effort (Days at sea)	Am	Cd	Ch	*Fg	Lf	*Lr	Lm	Mf	Mn	Mb	Pa	Pc	Pm	Sm	Ua
					Number of Specimens													
Bottom trawls	North Atlantic	9a	71										0.06					
Longlines	North Sea and Eastern Arctic	4a	9				0.66											
	North Atlantic	6a	21				5.38		0.04									
		9a	4							1.25			0.50					
Nets	Baltic	3c	14									0.07			0.07		0.07	
		3d	74	0.01		0.09					0.01	0.01						0.01
Polyvalent	North Atlantic	9a	50		0.02			0.04		0.02			0.06	0.02		0.06		
Seines	North Atlantic	9a	43		0.07								0.02			0.02		
Traps	Baltic	3c	7												0.14			

Table 8. All 2014 bycatch species (cetaceans, elasmobranchs, seabirds, seals, Teleost spp., and sea turtles), observed effort, number of specimens, and bycatch estimates reported by EU Member States under Regulation 812/2004. Data are aggregated by taxa, species, RCM region, ICES fishing area, and gear type. Note: reporting of non-cetacean PS bycatch is not a mandatory requirement of the Reg.812 reporting format so the numbers shown here are not necessarily a full record of bycatch observations for those taxa.; †Reported bycatch estimate from statistical modelling of multi-annual seal bycatch rates and 2014 fishing effort for aggregated areas covering all UK net fisheries.

Taxa	Species	RCM Region	Fishing Area (ICES Division)	Gear Type (Metier Level 3)	Total Observed Effort (Days at sea)	Total No. Specimens	Reported Bycatch Estimate
Cetacean	*Delphinus delphis*	North Atlantic	7b	Pelagic trawls	53	1	4
Cetacean	*Delphinus delphis*	North Atlantic	7g	Nets	36	1	
Cetacean	*Delphinus delphis*	North Atlantic	7h	Nets	26	1	
Cetacean	*Delphinus delphis*	North Atlantic	7k	Pelagic trawls	65	1	
Cetacean	*Delphinus delphis*	North Atlantic	8a	Nets	115	2	
Cetacean	*Delphinus delphis*	North Atlantic	9a	Polyvalent	50	3	
Cetacean	*Delphinus delphis*	North Atlantic	9a	Seines	43	2	334
Cetacean	*Phocoena phocoena*	Baltic	27.SD22	Nets	334	21	
Cetacean	*Phocoena phocoena*	Baltic	27.SD23	Nets	407	14	
Cetacean	*Phocoena phocoena*	Baltic	3d	Nets	74	1	
Cetacean	*Phocoena phocoena*	North Atlantic	7a	Nets	16	1	
Cetacean	*Phocoena phocoena*	North Atlantic	7e	Nets	156	5	
Cetacean	*Phocoena phocoena*	North Atlantic	7f	Nets	29	1	
Cetacean	*Phocoena phocoena*	North Sea and Eastern Arctic	27.IV	Nets	25	1	
Cetacean	*Phocoena phocoena*	North Sea and Eastern Arctic	4c	Nets	23	1	
Cetacean	*Phocoena phocoena*	North Sea and Eastern Arctic	4c	Nets	23	2	
Elasmobranch	*Cetorhinus maximus*	North Sea and Eastern Arctic	4a	Pelagic trawls	104	3	
Elasmobranch	*Mustelus asterias*	Mediterranean & Black Sea	GSA 17	Pelagic trawls	92	3	
Elasmobranch	*Pteroplatytrygon violacea*	Mediterranean & Black Sea	GSA 17	Pelagic trawls	92	4	
Elasmobranch	*Squalus acanthias*	Mediterranean & Black Sea	GSA 17	Pelagic trawls	92	16	
Seabird	*Aythya marila*	Baltic	3d	Nets	74	1	
Seabird	*Calonectris diomedea*	North Atlantic	9a	Polyvalent	50	1	

Taxa	Species	RCM Region	Fishing Area (ICES Division)	Gear Type (Metier Level 3)	Total Observed Effort (Days at sea)	Total No. Specimens	Reported Bycatch Estimate
Seabird	*Calonectris diomedea*	North Atlantic	9a	Seines	43	3	623
Seabird	*Clangula hyemalis*	Baltic	3d	Nets	74	7	
Seabird	*Fulmaris glacialis*	North Atlantic	6a	Longlines	*21	*113	
Seabird	*Fulmaris glacialis*	North Atlantic	4a	Longlines	*9	*6	
Seabird	*Larus fuscus*	North Atlantic	9a	Polyvalent	50	2	
Seabird	*Larus marinus*	North Atlantic	6a	Longlines	*21	*1	
Seabird	*Larus michaelis*	North Atlantic	9a	Longlines	4	5	9500
Seabird	*Larus michaelis*	North Atlantic	9a	Polyvalent	50	1	
Seabird	*Melanitta fusca*	Baltic	3d	Nets	74	1	
Seabird	*Melanitta nigra*	Baltic	3c	Nets	14	1	
Seabird	*Melanitta nigra*	Baltic	3d	Nets	74	1	
Seabird	*Morus bassanus*	North Atlantic	9a	Bottom trawls	71	4	690
Seabird	*Morus bassanus*	North Atlantic	9a	Longlines	4	2	3800
Seabird	*Morus bassanus*	North Atlantic	9a	Polyvalent	50	3	
Seabird	*Morus bassanus*	North Atlantic	9a	Seines	43	1	205
Seabird	*Phalacrocorax aristotelis*	North Atlantic	9a	Polyvalent	50	1	
Seabird	*Phalacrocorax carbo*	Baltic	3c	Nets	14	1	
Seabird	*Phalacrocorax carbo*	Baltic	3c	Traps	7	1	
Seabird	*Puffinus mauretanicus*	North Atlantic	9a	Polyvalent	50	3	
Seabird	*Puffinus mauretanicus*	North Atlantic	9a	Seines	43	1	205
Seabird	*Somateria mollissima*	Baltic	3c	Nets	14	1	
Seabird	*Uria aalge*	Baltic	3d	Nets	74	1	
Seal	*Halichoerus grypus*	Baltic	3d	Nets	74	1	
Seal	*Halichoerus grypus*	North Atlantic	6a	Pelagic trawls	93	1	9
Seal	*Halichoerus grypus*	North Atlantic	7b	Pelagic trawls	53	3	12
Seal	*Halichoerus grypus*	North Atlantic	7b	Pelagic trawls	53	7	

Taxa	Species	RCM Region	Fishing Area (ICES Division)	Gear Type (Metier Level 3)	Total Observed Effort (Days at sea)	Total No. Specimens	Reported Bycatch Estimate
Seal	*Halichoerus grypus*	North Atlantic	7g	Nets	36	3	
Seal	*Halichoerus grypus*	North Atlantic	7h	Nets	26	2	
† Seal	*Halichoerus grypus*	North Sea and Eastern Arctic & North Atlantic	4a–4c, 6b, 7a, 7d-j	Nets	*208	*6	*417
Seal	*Phoca vitulina*	North Atlantic	7h	Nets	26	1	
Seal	*Phoca vitulina*	North Sea and Eastern Arctic	4b	Pelagic trawls	2	1	
Teleost	*Alosa Fallax*	Baltic	25–32	Bottom trawls	46	5	
Teleost	*Alosa fallax*	Mediterranean & Black Sea	GSA 17	Pelagic trawls	92	459	
Teleost	*Alosa fallax*	North Sea and Eastern Arctic	4b	Bottom trawls	32	5	
Teleost	*Lampetra fluviatilis*	North Sea and Eastern Arctic	4b	Bottom trawls	32	4	
Teleost	*Thunnus thynnus*	North Atlantic	6a	Pelagic trawls	93	1	5
Turtle	*Caretta caretta*	Mediterranean & Black Sea	GSA 17	Pelagic trawls	92	7	

Table 9: Fleet effort totals (days at sea) for 2014 by division, reporting member state and major gear type. The records are not comprehensive but are focused on those gear types that have been subject to monitoring by member states. Most complete will be the data for static nets (though missing some smaller vessel data) and for pelagic trawlers, both of which require monitoring under Regulation 812//2004.

Division	Gear Type (Metier Level 4)	Denmark	France	Germany	Ireland	Netherlands	Spain	Portugal	UK	Totals
7	Driftnet								909	909
7	Midwater otter trawl	294	2181	228	432	780			383	4298
7	Midwater pair trawl		2181		1323				27	3531
7	Bottom otter trawl						36035			36035
7	Pots and traps			38						38
7	Set gillnet		12973	302	3653				29657	46585
7	Trammel nets		55061							55061
8	Midwater otter trawl	55	754	89		37			0	935
8	Midwater pair trawl		2523		45	2				2570
8	Bottom otter trawl						46810			46810
8	Bottom pair trawl						27625			27625
8	Pots and traps			8						8
8	Set gillnet		20408				89150		249	109807
8	Trammel nets		32380							32380
9	Midwater pair trawl				4					4
9	Bottom otter trawl						16680	12464		29144
9	Bottom pair trawl						8360			8360
9	Pots and traps			12						12
9	Purse seine							10680		10680
9	Set gillnet						46240	61560		107800
9	Set longlines							7800		7800

Table10. Combined observer monitoring effort totals (days at sea) from 2009–2013 for each major gear type and numbers of observed bycatch incidents and number of individuals for common dolphins (na=not applicable due to no effort). Bycatch rates (animals/days at sea) are provided simply as illustrative and should not be used for extrapolation as they are not necessarily representative of the fleet segments to which they are ascribed.

Division	Gear Type Metier Level 4	Monitored (days at sea)	Bycatch Events	No. Common Dolphin	Bycatch Rate
7	Driftnet	42	0	0	0.0000
7	Midwater otter trawl	880	3	6	0.0068
7	Midwater pair trawl	3990	331	929	0.2328
7	Bottom otter trawl	35	1	3	0.0857
7	Pots and traps	0	0	0	na
7	Set gillnet	3774	137	251	0.0665
7	Trammel nets	815	17	17	0.0208
8	Midwater otter trawl	94	9	9	0.0963
8	Midwater pair trawl	595	153	1137	1.9122
8	Bottom otter trawl	0	0	0	na
8	Bottom pair trawl	0	0	0	na
8	Pots and traps	0	0	0	na
8	Set gillnet	1192	44	50	0.0420
8	Trammel nets	710	0	0	0.0000
9	Midwater pair trawl	1	0	0	0.0000
9	Bottom otter trawl	734	2	2	0.0027
9	Bottom pair trawl	0	0	0	na
9	Pots and traps	0	0	0	na
9	Purse seine	537	44	102	0.1899
9	Set gillnet	347	3	3	0.0087
9	Set longlines	0	0	0	na
	Total	13746	744	2509	

Table 11. Questionnaire on sampling incidental bycatch was prepared for WGCATCH. Each member state is intended to fill out the questionnaire to inform WGCATCH and WGBYC on state of knowledge regarding how current sampling procedures are implemented by Members States. Indicate Y (yes)/N (no) or NA. NA if the question is not applicable for any fishery sampled under the national program.

	Enter Member State:	**Does the on board sampling protocol ask to record this information?**	**Is the National database designed to enter this information?**
1	Does the protocol contain instruction to record catch of other vertebrate species than fish (i.e. turtles, birds, dolphins, seals)?		
2	In gill nets - and hook-and-line fisheries: does the protocol instruct to indicate how much of the hauling process has been observed for (large) incidental bycatches which never came on board (because they fall out of the net)?		
3	Does the protocol contain a check for rare specimens in the catch at opening of the codend or immediate removal during hauling in gill nets or hook-and-line?		
4	If Yes: is the observer instructed to indicate if the codend was not checked in a haul or at how much of the hauling process has been checked for immediate removal?		
5	Does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)?		
6	If Yes: is the observer instructed to indicate how much of the sorting process has been checked on "haul level" (i.e. percentage)?		
7	Does the protocol instruct to report specific handling or devices on board which may hide incidental bycatch?*		
8	If Yes: is the observer instructed to report what effect this has on the sampling at "haul level"?		
9	Does the protocol instruct to report of mitigation (i.e. Acoustic Deterrent Devices or "pingers")?		
10	If yes for ADD's: is there a check for proper working (i.e. Battery check)?		
11	In case of an incidental catch: is the observer instructed to indicate its state (dead and discarded, released alive, discarded in unknown state, collected for further research?		

Table12. Work plan for by-catch of PETS for the different stages on future regional sampling programs.

	Description	PETS by-catch
Decision making	1. Identify and classify main end users and their role in the decision making process. *Link to WP1	1. End user table.
Regional objectives & Estimates needed	2. Consultation 3. Justification of the data collection 4. Define the target population 5. Define the objectives and estimates required at a regional level. Indicate minimum precision needed. 6. Prioritizing. Identification of core and additional variables. *Link to WP1	2. List of PETS. Definition of different PEST groups 3. Different needs. Define estimates needed and precision.
Type of data needed	7. Define the type of data which needs to be collected to get the estimates required	4. Table of data needs by each of the different PETS groups (marine mammals, sea birds, sharks…) 5. Need for high spatial and temporal resolution data
Data collection methods & design	8. Review of data collection methodologies and data sources. 9. Calibration studies and harmonization of techniques 10. Coverage of the current sampling 11. Sampling design: Apply the principles of probability based sampling (link to WP2)	6. Methodologies: a. Surveys and at sea sampling programs b. CCTV cameras c. Combination of discard and by-catch sampling programs 7. Current at sea sampling coverage (discard and by-catch monitoring). Map spatial coverage 8. Data availability (WGBYC and others) 9. General data gaps 10. Templates describing fisheries (only for selected scenarios) 11. MS involved 12. Lessons learned 13. Sampling design:
Sampling intensity; optimization	12. Sampling effort allocation 13. Feasibility study. Cost vs precision. Cost effective sampling design	14. Cost of by-catch data collection: a. Combined with current on board discard sampling b. Dedicated by-catch sampling c. Other methodologies as CCTV 15. Examples of cost effective sampling
Data collection	14. Review and define data collection protocols	16. Review existing data collection protocols (different by-catch monitoring programs) 17. Practical implementation of combined discard and by-catch sampling
Data archiving: DB	15. Data handling 16. Use of harmonized formats 17. Need for a common Data Base *Link to WP2	18. Thinking the characteristics of a common DB. Different exam Formats 19. Historical data: quality needs to be assured
Quality evaluation.	*Link to WP4	20. examples
Assessment/ Analysis/ estimation	18. This point is part of the process but we don't have the resources to develop it during this project	
Scientific advise/ report/ Statistics	19. This point is part of the process but we don't have the resources to develop it during this project	

Annex 5: Figures

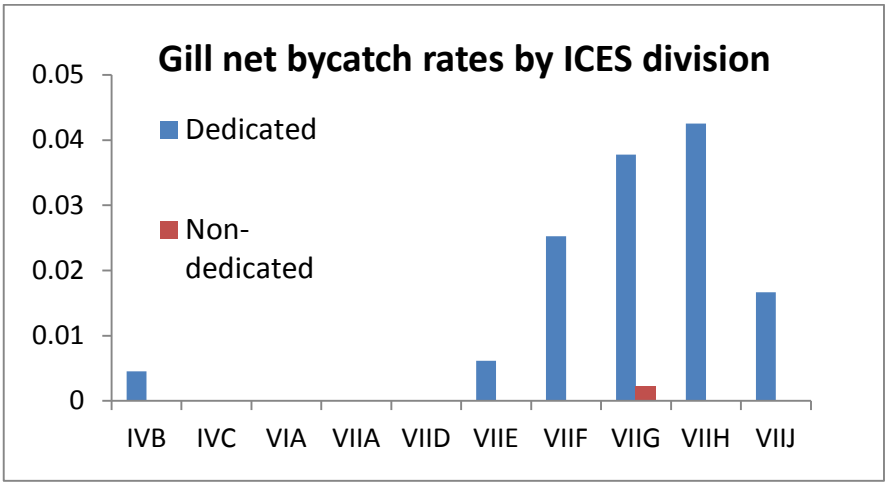

Figure 1: A comparison of UK gillnet bycatch rates (no. animals per haul) for marine mammal species (cetaceans and seals) by ICES division calculated from dedicated (blue) and non-dedicated (red) monitoring programs based on data collected from 2005–2014.

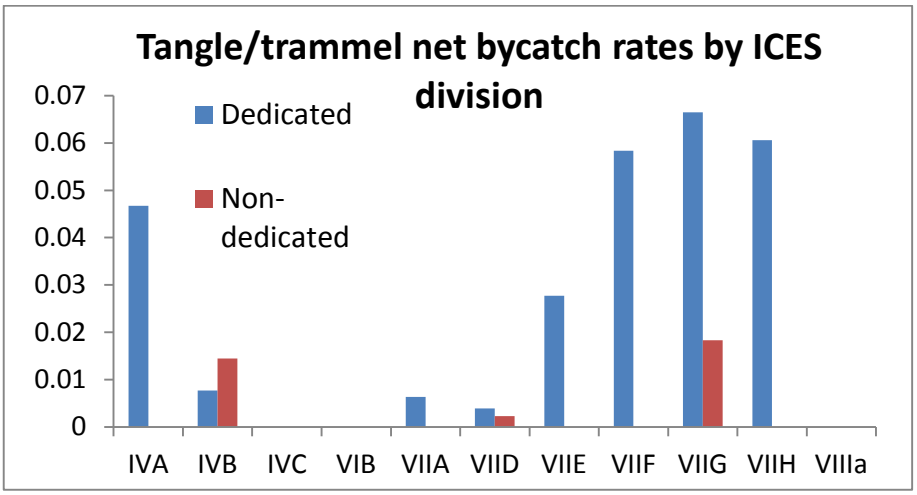

Figure 2: A comparison of UK tangle/trammel net bycatch rates (no. animals per haul) for marine mammal species (cetaceans and seals) by ICES division calculated from dedicated (blue) and non-dedicated (red) monitoring based on data collected from 2005–2014.

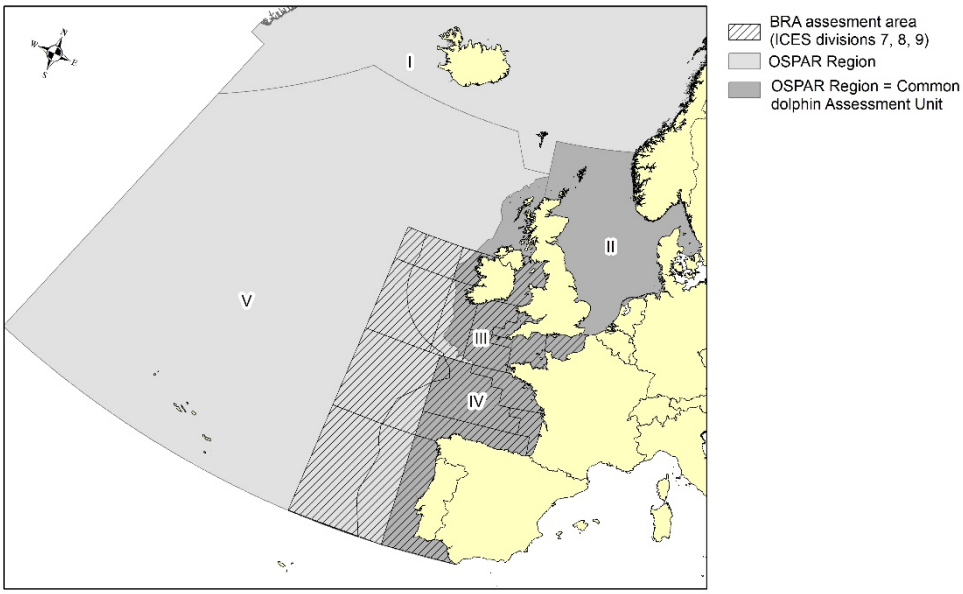

Figure 3. Area used for the common dolphin Bycatch Risk Assessment (BRA). The area defined as the Assessment Unit for common dolphin (ICES, 2014b) is also shown.

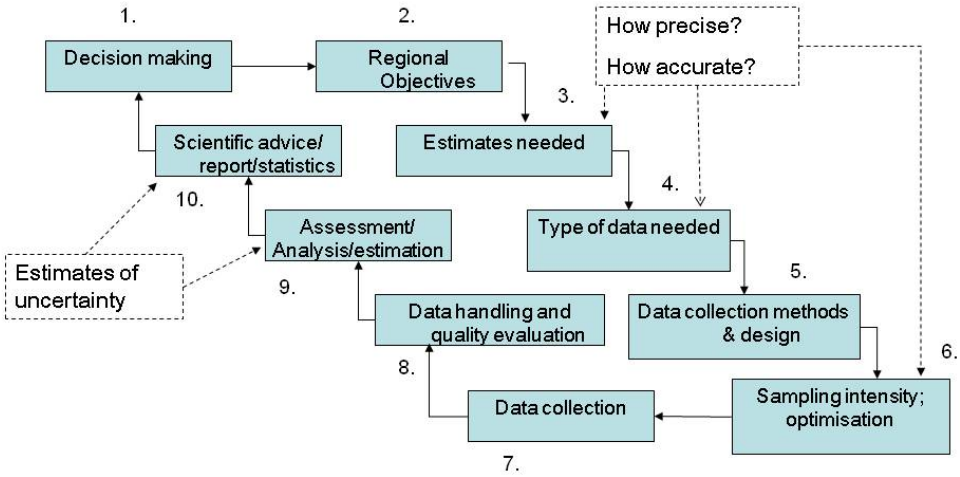

Figure 4. Stages in design and implementation of a regional data collection scheme providing data supporting assessments and management advice.

Annex 6: Recommendations

RECOMMENDATION	ADRESSED TO
1. Recommendation to RCM's: Sampling under the current DCF can contribute to the assessment of by-catch of protected or other species at risk, but is largely insufficient on its own as currently implemented by Member States. An assessment carried out by WKBYC (2013b) showed that bottom trawling is generally relatively oversampled with respect to monitoring of protected species bycatch, while in some specific fishing areas set nets, longlines, and purse-seines are under sampled. For seabirds priority should be given to monitoring in trammel nets and set gillnets in the Baltic, North Sea, and North Atlantic, and in set long-line fisheries in the Atlantic and Mediterranean/Black Sea.	RCM's
2. Recommendation for ICES Data Center and WGSFD: WGBYC is requesting for all passive gears total commercial effort data in units of days at sea from vessel logbooks during years 2009-2015, and stratified by year, metier level 4, RCM and ICES rectangle. Maps of this data request and meta-data to support proper interpretation (e.g. data gaps in reporting, field definitions and collection procedures) are also requested. WGBYC intends to summarize logbook effort over broad temporal and spatial scales (i.e. calendar year and assessment units) to support protected species bycatch risk assessments and 2017 ICES advice.	ICES Data Centre and WGSFD
3. Recommendation for WGCATCH: WGBYC recommends that WGCATCH implement the collection of data on incidental by-catch of protected and other species at risk (i.e. rare bycatch events) in the sampling protocols of national catch- and discards sampling schemes, including incorporation of appropriate fields in National databases, data processing, data validation and synchronization with the regional database.	WGCATCH
4. Recommendation for JWGBIRD: WGBYC recommends that JWGBIRD coordinate with WGBYC on matters related to bycatch risk assessment (as it relates to OSPAR indicator B.1) and mitigation of seabird bycatch.	JWGBIRD

RECOMMENDATION	ADRESSED TO
5. Recommendation for WGBYC: Collate, review and evaluate relevant information on bycatch monitoring, assessment, and mitigation around the European and Northwest Atlantic waters. In particular, the current state of knowledge on pinger effectiveness for small cetaceans (intersessional).	WGBYC