Agenda Item 4.3	Priorities in the Implementation of the Triennium Work Plan (2010-2012) Review of New Information on Bycatch
Document 4-11	**ICES 2010: Report of the Study Group on Bycatch of Protected Species**
Action Requested	• Take note
Submitted by	United Kingdom

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ICES SGBYC REPORT 2010

ICES ADVISORY COMMITTEE

ICES CM 2010/ACOM:25

Report of the Study Group on Bycatch of Protected Species (SGBYC)

1–4 February 2010

Copenhagen, Denmark

ICES International Council for the Exploration of the Sea

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Contents

Executive summary

The Study Group for Bycatch of Protected Species met at the ICES building in Copenhagen from 1–4 February 2010. Simon Northridge (UK) chaired the meeting, which was attended by 21 participants from 12 countries. The Study Group examines the monitoring, assessment and mitigation of the incidental capture of protected species. It also coordinates and reviews activities conducted under EU Council Regulation 812/2004 on cetacean bycatch, including observer programmes and bycatch mitigation trials, and collates data provided in these and other reports with the aim of providing an overview of bycatch levels of protected species impacted in and around the ICES Area. The meeting addressed the Terms of Reference (Annex 2) in turn and much of the work was completed in subgroups with regular plenary updates and review of the draft report sections in plenary. All sections of the report were agreed before the end of the meeting except for that relating to ToR F which was subsequently agreed by e-mail.

In response to a request from the European Commission, the Study Group reviewed all national reports on Regulation 812/2004 for 2007 and 2008. The Study Group noted that documentation was now available from most member states for the most recent two reporting years. The Study Group compiled the national data to the extent possible, and provided an overview of how well member states had complied with the requirements of the regulation. The Study Group noted that information on the extent of cetacean bycatch in European waters had much improved during the past three or four years, but that monitoring and mitigation efforts could be better focused. A series of recommendations and draft advice for the Commission were prepared in relation to regulation 812/2004.

The Study Group reviewed recent estimates of bycatch of protected species in the ICES and wider European regions that are not covered by Regulation 812/2004. The Study Group had limited information from Canada, but new information on bycatch estimation schemes was presented from Iceland, as was some detailed information on bird bycatch from Germany. Bycatches of mammals, birds, turtles, sharks and sturgeons were considered in turn. Tabulated bycatch information is given at Annex 4.

The Study Group reviewed ongoing and recent work on protected species bycatch reduction in the ICES region and elsewhere to the extent that information could be located. Trials of acoustic deterrent devices to minimize cetacean bycatch in France, Ireland, the Netherlands, Poland, Turkey, the UK and the USA were described. Gear modification trials to minimize cetacean bycatch in the US and South America were also briefly reviewed, and an alternative gear trial in Germany - replacing gillnets with fish traps was also described. Several recent trials for reducing sea turtle mortality in longlines, poundnets, gillnets and trawls were summarized, largely drawing on the report of a workshop on turtle bycatch reduction that was held in the USA in 2009. Some recent trials involving seabirds and shark bycatch reduction in gillnet, trawl and longline fisheries were also described.

The Study Group recognized that a lot of work has been done on the use of acoustic deterrent devices and suggested that it would be an opportune time to review the results of all of these trials in an overview. The Study Group also pointed out a number of areas of research into bycatch reduction that appear to have received insufficient attention so far. These included improvements in technical aspects of pingers, mitigation work on sea-

bird/gillnet interactions, bycatch mitigation in general for elasmobranchs, and work to minimize turtle bycatch in trawl and gillnet fisheries in Europe.

The Study Group made progress in developing a database to hold the bycatch observation data reported under regulation 812. This was populated with all the data from three years of annual reports covering years from 2005 to 2008. The database was then used to generate tables (Annex 3). There was considerable discussion over the best way to take forward the development of this database, and a subgroup was established to try to make progress in the development of the database before any future meeting.

The Study Group re-iterated its view that collaboration with ongoing discard sampling schemes established under the Discard Framework Directive would be desirable to improve knowledge of the areas and gear types where protected species bycatch might be expected. Discussions with the Chair of PGCCDBS had led to the suggestion that SGBYC should appoint a contact person(s) to liaise with PGCCDBS. The group noted that while several EU member states were known to collect protected species records from discard samples, it is not always clear how rigorously such data are collated, and agreed that closer collaboration with PGCCDBS would be helpful. The group was also informed of recent changes in the ways that discard sampling and protected species bycatch sampling were being coordinated in France, essentially as a single programme, and noted some advantages and disadvantages of integrating the two objectives.

The Study Group noted that PGCCDBS had been active in promoting several workshops in sampling methodology, the results of which are useful for protected species bycatch monitoring. Advances in electronic monitoring were also reviewed with descriptions of recent trials in Denmark and Sweden. An integrated approach to bycatch assessment involving logbooks, questionnaires and research cruises in Iceland was also discussed.

ACOM had approved the proposed joint ICES / NAMMCO workshop on bycatch monitoring observer schemes, scheduled for late June 2010. The Study Group agreed an initial draft agenda, and a steering group established. ACOM had also approved a Co-operative research report to publicise the results of the workshop.

The Subgroup considered the request for advice from the Commission that had been submitted to ICES a few days before the meeting. It concluded that while some preliminary advice could be suggested dealing with a part of this request (dealt with under ToR A), a more detailed response to other questions would require the convening of a special workshop.

The Study Group made the suggestion to ACOM that after three years as a Study Group, the work of the Group should be continued as a standard ICES Working Group in 2011.

1 Opening of the meeting

The Study Group for Bycatch of Projected Species (SGBYC) met at ICES headquarters in Copenhagen 1–4 February 2010. Delegates were welcomed by Helle Gjeding Jørgensen. A complete list of participants is given at Annex 1. The Terms of Reference are given at Annex 2.

2 Adoption of the agenda

The Terms of Reference (Annex 2) were adopted as an agenda, noting the late addition of correspondence from the European Commission asking for preliminary advice on several further points, which is dealt with under ToR H.

3 ToR A: Review of national activities under Regulation 812

3.1 Introduction

The initial Term of Reference was to review annual national reports submitted to the Commission under Regulation 812/2004, to collate bycatch estimates from such reports and review mandatory and pilot projects and scientific studies carried out under this regulation. Additionally, the Commission asked ICES by letter dated 20th January 2010 to make an "assessment of the national reports from *2007 and* 2008" (emphasis added), as well as "specific scientific reports provided by Member States in the context of Reg. 812/2004".

The Study Group noted that it had reviewed reports on the calendar year 2007 in 2009 (ICES 2009a), but was informed that the Commission would nevertheless appreciate an overview of both years' reports.

The Study Group therefore examined all the National Reports provided and also considered other information available to provide an overview of cetacean bycatch monitoring in the EU, beginning with a presentation on monitoring in German fisheries, which the Group had previously known little about.

3.1.1 Overview of monitoring in German fisheries

Kock and von Dorrien (this meeting) provided an overview of the German fishing fleet. This consisted of more than 2000 fishing vessels in 2007. Those segments of the German fishing fleet which are likely to take small cetaceans as bycatch are:

- gillnet fisheries on gadoids, mostly cod and on sole conducted by fishing vessels up to 18 m in length in the North Sea. They operate in ICES Areas IVbc;
- gillnet fisheries on various other species (cod, flounder, plaice, herring) in the Baltic (Area IIIb: Divisions 22 and 24) conducted by professional and part-time fishermen; and
- pelagic trawl fisheries targeting herring, mackerel and horse mackerel in the North Sea (ICES Areas IVabc) and around the British Isles (ICES Areas VII and VI).

Germany has not yet established any dedicated observer system with respect to EU Regulation 812/2004. As an interim measure in the North Sea and other EU waters except the Baltic, Germany provided its scientific observers working within the EU Data Collection Regulation with the additional task of noting the bycatch of marine mammals, to investigate those on board and collect them if necessary. This approach appears to be feasible with respect to fishing vessels using set-nets where the hauling process can be surveyed by the scientific observer. It was not deemed feasible for scientific observers working on German large pelagic trawlers.

Monitoring under EU Regulation 812/2004 in the German Baltic is more difficult. The success of EU Regulation 812/2004 in reducing bycatch in fisheries in the Baltic is likely to be limited given that most fishing vessels are either too small to be covered by the regulation or the fisheries they are participating in are not included in the regulation. The authors made a number of suggestions which may help to illuminate bycatch rates of harbour porpoise in fisheries in the Baltic in future, including the use of Closed Circuit

Television (CCTV) and using patrol boats to monitor fishing activities of several boats during the same trip.

3.2 Review of National Reports-general overview

National Reports on the 812/2004 Regulation from 2009 and 2008 (reporting on the years 2008 and 2007 respectively) were received during the first day of the meeting. The Group again noted (ICES 2009a) that the late arrival of these reports did not facilitate detailed analysis of their contents.

The Group reviewed the national reports relating to the years 2007 and 2008. The Group recognized that there is no way to check that monitoring or mitigation (pinger) requirements have been fully met by member states, because it does not have access to individual national fleet effort data, nor fleet structure (size categories), so all assessments must be made on the basis of what is reported by member states in their annual reports.

The Group noted again that there was still no standard reporting format requirement in place. The Commission had issued a proposed format in July 2009, based on ICES and STECF recommendations, but this had not yet been adopted. The Group recommended that a standard reporting format should be in place for the next reporting round in June 2010. The group also repeated its recommendation of 2009 that data reported to the Commission should be supplied in spreadsheet format so that the database developed by SGBYC could be updated efficiently.

Reporting in 2009 had been much improved over reporting in 2008, possibly because the Commission had written to all member states reminding them that reports were due. Table 1 provides a summary of the reports received in 2009 by member state. Several member states had provided retrospective reports for 2007 during 2009 after having been reminded of this obligation by the Commission. All member states that are required to submit reports had done so.

Table 1: Summary of the availability of Reports submitted by Member States to the European Commission in 2009.

Nation	Report availability to SGBYC		Format[1] of report in 2009	Language of report in 2009
	Report available in 2009	Report(s) available in 2010 (Y/N)		
Belgium	N	Y	-	English
Bulgaria	N	N[2]	-	-
Cyprus	N	Y	National	English
Denmark	Y	Y	National	English
Estonia	Y	Y	National	English
Finland	Y	Y	National	English
France	Y	Y	National	National
Germany	N[3]	Y	National	English
Greece	N	Y	-	-
Ireland	Y	Y	ACOM	English
Italy	Y	Y	National	English
Latvia	N	Y	National	English
Lithuania	Y	Y	National	English
Malta	N	Y	National	English
Netherlands	Y	Y	ACOM	English
Poland	Y	Y	National	National
Portugal	N	Y	National	English
Romania	N	N[2]	-	-
Slovenia	N	Y	-	-
Spain	Y	Y	ACOM	English
Sweden	Y[4]	Y	ACOM	English
United Kingdom	Y	Y	ACOM	English

[1] 'National' refers to an independent reporting format; ACOM refers to the reporting format proposed by ICES in 2009.

[2] Bulgaria and Romania are not obliged to submit reports under Council regulation 812/2004, though both member states had done so in 2007.

[3] Germany provides reports on observations made under DCR to the Commission which include information on cetacean bycatch. Some of this information was made available at the meeting in 2009 but no national report was available.

[4] A Swedish report had been compiled but had not been received by the Commission in January 2009 and was therefore unavailable at the 2009 meeting; information from the report was made available at the meeting though the report itself was not reviewed.

The Study Group found that some member states had fulfilled the reporting requirements well, in which case data were tabulated and text summaries below are brief. Where some member states have not reported in any easily interpreted format, it has been necessary to describe in slightly more detail what sampling has been achieved.

Levels of fishing effort and observations by fishery, as well as bycatch estimates by fishery, where they have been given in national reports, are shown in Tables A1–A5.

3.3 Reviews of National Report by member State

Belgium

Belgium did not conduct an observer programme in 2007 or 2008 and reported that pingers are not in use and that "no fishing was carried out in areas or with gear subject to a special obligation". Four set-net vessels from the national fleet are reported to fish mainly in the southern North Sea but according to the Belgian report for 2008 these vessels do not require monitoring under EU regulation 812. The lengths of these vessels were not reported. No explicit mention was made as to whether the boats fishing in VIIdef are required to use pingers under Article 2 of 812/2004.

Bulgaria

There were no reports from Bulgaria for 2007 or 2008. Bulgaria is not obliged to submit reports under Council regulation 812/2004.

Cyprus

Cypriot authorities informed the Commission that Regulation (EC) 812/2004 does not apply to their fleets, as no pelagic trawlers (single or pair) were registered in their country in 2007 or 2008.

Denmark

In January and February 2008, Denmark had on-board observer coverage varying between 3–11% in the pelagic trawl fishery operating in ICES area IIIabcd on vessels larger than 15 m. No marine mammal bycatch was recorded.

There was no observer programme on gillnet vessels larger than 15 m.

Inspection vessels carried out regular spot checks in those areas where pinger use is mandatory and reported no violations from Danish vessels but a limited number of violations from vessels flying a foreign flag. No information was provided on how often pingers are inspected.

A pilot study on Catch Quota Management was carried out in 2008–2009. The study included a fully documented fishery in different types of fisheries using Closed Circuit TV. Videos from one participating gillnet vessel were analysed in relation to marine mammal bycatch. Data from September-December 2008 resulted in bycatch of one porpoise (*Phocoena phocoena*) and one seal (*Phoca vitulina*) with a video monitoring coverage of 100%. The pilot study demonstrated that the system can be used to monitor bycatch of marine mammals and suggested that a more widespread use of CCTV could function as a substitute to the observer schemes as these schemes are a much cheaper way of monitoring the fishery.

Estonia

Estonia had placed on-board observers on five >15 m pelagic midwater trawlers in ICES Subarea 3d (Baltic) covering 99 hours of fishing effort. In addition a small proportion of

fishing effort was covered by interviews in ports. Overall there were 14 727 hours of fishing effort by Estonian midwater trawlers in 2008 fishing in the times and areas defined in Annex III(e) of the regulation. This quite low coverage (0.67%) is reportedly due to the fact that vessels do not report to the organization (Estonian Marine Institute (EMI)) that provides the observers, whether the vessel intends to fish north or south of 59°N, and sampling is not required north of 59°N between November and May inclusive under Annex III(e) of regulation 812/2004. EMI only gets data from Fisheries Information System logbooks after the data have been logged. EMI then tries to contact the vessel that was fishing in the southern area but usually gets information that the next fishing trip is planned to take place in north, where most of fishing effort is located.

There are two vessels that fish in areas mentioned in Annex III (g) using gillnets, but in 2007 it was not possible to put any observer on board, as the fishing company was not cooperative or could not be contacted. However, in 2008 one trip was observed on one of these vessels.

In 2007 and 2008, two Estonian vessels conducted fisheries in areas and during time periods mentioned in Annex I Subsection E, where acoustic deterrent devices (ADD) should have been used. According to subsequent interviews with skippers and crew of these vessels the ADDs were used as requested.

Finland

According to the national report, in 2007 a fleet of 42 Finnish vessels was subject to monitoring under regulation 812/2004 Annex III. These included 39 trawlers and three net vessels. A two-year on-board observer project ran from the 1st of January 2006 to the 31st of December 2007. 16 pelagic trawlers under 15 m conducted 284 fishing trips in 2007 and as part of this pilot project observers were on board these vessels on five occasions. During this period coverage of 5% of fishing effort was reached on average although a small number of vessels in the southern Baltic Sea meant the fishing effort objective was not reached there. No marine mammal bycatch was observed therefore bycatch estimates could not be made. The near shore fishery in Finland comprises of approximately 2000 netting boats of four metres or more in length, but there was no observer coverage in this fishery due to a number of reasons including lack of space aboard. However, all registered professional fishermen and vessels are required to report bycatches to the Employment and Economic Development Centres and these data are available to the Finnish Game and Fisheries Research Institute. The report from Finland states that this system is comprehensive and functions as a pilot project referred to in Regulation No 812/2004 for small Finnish net vessels (under 15 m). No cetacean bycatch was reported during the pilot study between 2006–2007, so no further monitoring was deemed necessary under Regulation 812/2004.

Pinger use in the Baltic Sea ICES Subdivision 24 is mandatory and in 2007 authorization was granted to 14 net vessels (targeting cod) and seven driftnet vessels. Pinger compliance during this year was not reported.

In 2008, Finnish vessels did not fish in areas or with métiers referred to in Article 2 of Council Regulation (EC) No 812/2004. No Finnish fishing vessels have submitted reports on catches or observations of cetaceans in 2008.

France

The 2009 report from France on the year 2008 was in a similar format to that in previous years (in French, containing tables that differ from the SGBYC and proposed EU format). It contains a table with the sampling schemes for the targeted fleet segments (at métier level 4 according to the fleet descriptors defined in Council Decision 2008/949/EC) covered by regulation 812/2004. Bycatch estimates with CVs were calculated for pelagic pair trawling for some previous years. For vessels less than 15 m, some pilot monitoring also took place.

A total of 1028 days at sea was observed (with 3410 recorded hauls), fewer than the 1925 days required under the regulation. The difference between objective and achievement is mainly due to the single pelagic trawl fleet in the Atlantic which had not been adequately observed. Three of the largest vessels operating as single pelagic trawlers were not included in the sampling scheme as they operate from the Netherlands.

The observations were considered unbiased except for those on vessels less than 15 m in Area VIII, because it was not possible to put observers on vessels less than 8 m for safety reasons. A correction using a relationship between length of nets and length of vessels was used to provide a less biased estimate.

Within the observer schemes bycatches were reported for pair trawling (winter and summer), in single pelagic trawling in Mediterranean Sea, set-nets in Area VIII (for vessels of all lengths). For pelagic trawling some bycatch estimates are also provided by fishery (bass, tuna).

The raised bycatch totals by species were 350 porpoises (in set-nets in Area VIII), 400–500 common dolphins (in set-nets and pair pelagic trawling), 50 striped dolphins (in Area VIII /set-nets) and 90 pilot whales (pelagic trawling; raised from only one incident). In the Mediterranean area bycatch of bottlenose dolphin (raised estimate of 35 individuals) and striped dolphin (raised estimate of 70) are also reported. A pilot study to estimate bycatch rate in set-nets in the Iroise Sea (a protected marine area) and to compare three deterrent systems (pingers) during a whole year is in progress inside the project "PingIroise" under the authority of the ministry of environment.

Some results of trials with experimental acoustic deterrents in winter pelagic pair trawl are reported on that are not required under Regulation 812/2004.

Observations at sea on set-nets were carried out on vessels from ports around Paimpol in the Area VIIe. The total cetacean bycatch recorded during 1.5 years by one observer working full-time was one common dolphin. This result suggests a low bycatch rate in that part of the English Channel. As Pingers are not being used in Subarea VII, the fishing industry has started a two year project in Subarea VII in order to estimate the bycatch rate in set-net fisheries located at the two opposite ends of the English Channel. The project named FilManCet (Fileyeurs de Manche et Cétacés) uses observers at sea and all data collected since the end of 2008 have been entered into Ifremer's database. Further and more recent results of French studies into bycatch mitigation not included in the French 2009 report are included under ToR B.

Germany

Germany has not yet implemented a dedicated marine mammal observer programme to address its obligations under EU Regulation 812/2004. Other monitoring programmes, like that mandated under the DCF, cover some trips from those fleets that require monitoring under 812/2004. In 2007 inspection of vessels from other EU states resulted in the recording of six pinger infringements. Fishermen were requested to haul their nets and stop fishing and details were passed on to the Member States in question. No infringements were recorded in 2008. During 2008 pinger detectors (type PD1109) were fitted to fisheries protection vessels of the Federal Agency for Agriculture and Food, customs authorities and the Land fisheries authorities. These detectors are used to carry out inspection and control in accordance with Article 2 of Regulation 812/2004, under which 'the acoustic deterrent devices must be fully operational when setting the gear'.

Carrying out these controls is difficult, however, because there is only a very small 'window' in which an infringement can be proved. The only event clearly incurring a penalty is the moment when nets are cast without pingers or with non-operational pingers. Once nets have been shot without pingers or with non-operational pingers, it is difficult to prove that the deterrent device was not present or fully operational at the time the net was shot.

Greece

Greek authorities informed the Commission that Regulation (EC) 812/2004 does not apply to their fleets, as no pelagic trawlers (single or pair) were registered in their country in 2007 or 2008.

Ireland

The Irish report indicated that there was no funding in 2008 to execute the required monitoring under Regulation 812/2004. Instead some monitoring had been incorporated into other scientific and technical work. Pelagic trawl data had been combined for pair and single trawls as required under 812/2004. Observations had been carried out as part of scientific and technical trials so no target coverage was provided. A detailed breakdown of Fleet and Observer Effort data by season and ICES area was provided. An additional table provided a summary of total observer coverage achieved in each year. Coverage approaching 5% was achieved for gillnet vessels over 15 m in the Celtic Sea in 2005 and 2006 and among pelagic trawlers over 15 m in VI, VII and VIII in 2008. However it is not known whether or not this coverage is representative of the fleet. Coverage in other fleets has generally been poor.

No cetacean bycatch was observed in any of the observed pelagic trawlers over 15 m working in VI, VII and VIII in 2008.

There was no on-board observer monitoring of gillnet fisheries in 2008. However a relatively comprehensive observer programme was carried out between 2005 and 2007 permitting estimates of total bycatch for 2006 to be estimated in the Celtic Sea Effort in the gillnet fishery dropped considerably in 2008 with just 768 days of effort in 2008 compared with 1723 days in 2006 in the Celtic Sea.

A total estimate of porpoise bycatch in the Celtic Sea was provided based on Fleet effort and a bycatch rate estimate for 2006. Assuming constant bycatch rates year on year, an estimate of 160 harbour porpoises was provided for 2008.

No information was available on the number of vessel using pingers as required under 812/2004

Italy

The Italian Report contains the results of an *ad hoc* monitoring programme on the incidental bycatch of cetaceans in Italian pelagic pairtrawlers (midwater trawlers) in 2008 for the GFCM area GSA 17. In the Mediterranean region, Regulation 812/2004 requires observer coverage only on pelagic trawlers. Coverage by Italian observers varied between 3% and 5% depending on the strata. The observed bycatch rate was 0.007 bottlenose dolphins per day in 2008, compared with zero in 2006 and 2007. An annual bycatch estimate for this species is given, but considered unreliable, given the rarity of the events.

In addition, this report presents some results on bycatch rates of other taxa collected during this monitoring programme; specifically, estimates for loggerhead turtles (*Caretta caretta*) and several pelagic, bentho-pelagic and demersal elasmobranch species.

The Report also anticipates a number of initiatives (currently ongoing), such as the geographical improvement of observation coverage, an aerial survey in the entire Adriatic sea for estimating abundance of cetaceans and sea turtles, the testing of mitigation measures (excluder grids and pingers) and genetic stock assessment of bycaught species.

Latvia

Latvian vessels and fishing operations were monitored with an observer programme that worked from six fishing ports in 2007 and five fishing ports in 2008. The national report states that the proportion of observer coverage was sufficient; however there was no detailed breakdown of either fishing effort or observations. As no incidental catches of cetaceans were observed in the two years, the Latvian ministry states that there is no financial justification for continued on-board monitoring and suggests replacing the requested intensive observation programme by collecting the information from other available sources. The Report does not state what these sources might be.

Lithuania

The national Report indicated that since 2005 the number of Lithuanian vessels fishing with set gillnets has been drastically reduced. There were five vessels fishing in 2007 and only three in 2008 which were said to be too small to take observers on board. No information was provided on on-board observer programmes for pelagic trawls. Interviews of skippers and crews were conducted when vessels were inspected at sea or in port totalling 403 in 2007 and 576 in 2008. No cetacean bycatches were reported from these interviews or inspections in 2007 or 2008.

Malta

The Maltese authorities sent a letter to the Commission explaining that Regulation (EC) 812/2004 does not apply to their fleets, because no pelagic trawlers (single or pair) were registered in Malta in 2007 and 2008.

Netherlands

Regulation 812/2004 requires observer coverage in Dutch pelagic fisheries in ICES Areas VI, VII and VIII from the 1st of December to the 31st of March (at 10%) and from April 1st to November 30th (at 5%). Outside this area coverage is required all year round. Cetacean bycatch monitoring is integrated with the collection of discards data under the EC Data Collection Regulations 1543/2000 and 1639/2001. No dolphin bycatch has been reported in recent years.

A pilot observer study was conducted in the Dutch set-net fishery. This is not mandated under Regulation 812/2004. Approximately 90 vessels are known to land fish caught by set-nets. The main target species is sole which is fished with tanglenets. The pilot study focused primarily on trammelnets targeting cod/mixed species as they were believed to have a relatively high bycatch rate. As a result the fleet sampled is not representative of the total fleet.

The cod/mixed species fishery usually operates between October and March, but continued until June in 2008. Three vessels were sampled and a total of 48 day trips were observed. The fishing effort during these trips amounted to 210 km-days of trammelnets for cod/mixed species, 64 km-days of gillnets for cod and 12 km-days of tanglenets for sole. Bycatches of one harbour porpoise and one grey seal were observed; both occurred in trammelnets.

Poland

According to the National Report, in 2007 and 2008 Poland conducted a pilot observer programme in accordance with Regulation 812/2004. The vessels sampled were offshore trawlers and gillnetters >15 m. Less than 5% of the fleet was covered by the programme. No cetacean bycatch was recorded in either year. However, the SG noted that between 1990 and 1999 harbour porpoise bycatch had mainly been reported in the inshore (<15 m) coastal gillnet fishery (Skóra and Kuklik, 2003).

The majority of the Polish fishing fleet is composed of vessels which are smaller than those requiring observer coverage under Regulation 812/2004. In 2008, 76% of the fleet was less than 15 m in length (Kozubski and Marciniak, 2009). In general these vessels belong to the coastal gillnet fishery. It is unlikely that continuing the stipulated 5% observer coverage on vessels over 5 m will meet the goals of Regulation 812/2004.

Pingers purchased by the Ministry of Agriculture and Rural Development for boats >12 m using gillnets in the ICES 24 Area (Pomeranian Bay, S. Baltic, Poland) have been given to fishermen. No data on their usage or their mitigation effects were reported.

Portugal

The Portuguese Report indicates that Portugal did not run an observer monitoring programme in 2007 nor 2008 in relation to EC Regulation 812/2004. The Report states that there are no fisheries working in areas or using the métiers specified in Annex I of the regulation and therefore pingers are not in use. The Report indicates that Portugal had not operated a bycatch monitoring programme required under Articles IV and V for "administrative and financial" reasons.

A number of scientific studies relating to the impact of fishing gears on cetacean populations (in particular harbour porpoise) are ongoing. These include studies in the north and

central coastal regions where there is a recorded harbour porpoise population. In 2009 a research project focusing on the use of acoustic deterrent devices was scheduled to begin. In addition the Report provided some information relating to cetacean strandings.

Romania

There were no reports in 2009 from Romania. Romania is not obliged to submit reports under Council regulation 812/2004.

Spain

Spain reported preliminary results of a pilot observer programme, implemented in 2008, to monitor bottom-set gillnetting vessels of 15 metres or more in length in ICES Divisions VIa, VIIa,b and VIIIa,b,c. The at-sea sampling programme began in October 2008.

No specific sampling programmes to comply with (EC) Regulation 812 were in place either in gillnet fisheries in ICES Divisions VIIIc and IXa or in the high-vertical opening (HVO) trawl fishery working in the relevant ICES divisions. No information is provided concerning the use of acoustic deterrent devices by gillnets vessels in ICES Divisions VIIefghj.

Additional information is provided about observations made under Council Regulation (EC) No 199/2008 (Data Collection Framework) in the gillnet fleet in Division VIIIc. Data from the Marine and Food Technological Centre (AZTI) as regards the Basque Country's high-vertical opening (HVO) trawler fleet in Divisions VIIIa, b and d are also included in the Report.

Bycatch of one common dolphin was observed in 32 hauls in the gillnet fleet in Divisions VIIIa and b. One common dolphin was also caught by the Basque Country's HVO trawler fleet in Divisions VIIIa,b and d from a total of 92 monitored hauls. The observer programmes under Regulation (EC) No 199/2008 did not record any incidental catches of cetaceans in Division VIIIc.

Slovenia

Slovenian fishing authorities informed the Commission that only one pair of pelagic trawlers was operating in their country in 2007 and 2008. No bycatch of cetaceans was observed. However, complete reference to the observation coverage, for example, the number of observations and the total annual fishing effort (days at sea or total hauls) was missing.

Sweden

In 2008, 282 hours of pelagic trawling was monitored by observers under Regulation 812/2004. Observer coverage was mainly in Area III d but Area IIIa, IVa and IVb were also covered. The total pelagic fishing effort that year was 19 980 hours giving a total observer coverage of 1.4%.

A pilot study using Electronic Monitoring (CCTV) observed 12 607 km net hours in gillnet vessels smaller than 15 m. Total fleet effort for under 15 m gillnet vessels is not known, but this level of monitoring would correspond to 19% of the total fishing effort of gillnetters larger than 15 m that should be observed under the EU-regulation. The Electronic Monitoring system was tested over four months on two boats, including 71 days of

fishing operations, and proved to be reliable, with only a few days of data lost due to technical problems. During the study, no porpoises were bycaught, one seal and 19 seabirds were bycaught. Results from the monitoring system correlated very closely with the control data obtained from fishermen's logbooks.

No harbour porpoise bycatch was observed. This indicates a low bycatch rate in fishing gears and areas monitored under Regulation 812/2004.

During 2008, 13 gillnetters, larger than 12 m, fished in areas or with gear affected by the Regulation. The fishing effort was approximately less than six percent of the total fishing effort. Eight of those boats fished more than three days and all of these eight boats have acquired pingers. No monitoring of the use or reliability of pingers has been done.

UK

A dedicated cetacean bycatch monitoring scheme has been in existence since 2005. Sampling of pelagic trawlers and other over 15 m vessels mandated in Annex III of Regulation 812 has been aimed at the stipulated 5% and 10% levels. Not all targets have been met, largely due to logistical constraints, as it had proven difficult (a) to place observers on UK flagged foreign-owned boats and (b) because total fleet effort could not be reliably predicted from year to year.

No cetaceans had been observed among any of the over 15 m fleets sampled under 812/2004.

Pilot schemes had been implemented to cover under-15 m vessels mentioned in Annex III of Regulation 812/2004. The only observed cetacean bycatch had been in the pair trawl fishery for bass conducted in VIIe by under-15 m boats.

Further sampling of gillnet boats had been conducted in Subareas VII and IV, and outwith the requirements of 812/2004. Bycatch rates and estimated UK-based bycatch mortalities for common dolphins (ca 600) and harbour porpoises (ca 840) had been achieved for 2009 with CVs of less than 0.3 in both cases, though not all gillnet fleets in these subareas had been sampled.

The use of pingers had been poorly implemented. Industry had resisted these requirements of the regulation on the basis of cost, efficacy and health and safety. A new acoustic deterrent device was being tested under derogation in a sample of the fleet with trials beginning on 2008 and ongoing.

3.4 Conclusions or observations

SGBYC has carried out an extensive analysis of the National Reports produced by Member States. Overall the Study Group agreed that there have been benefits from the implementation of Regulation 812/2004. The data collected has provided a much more comprehensive picture of the extent of cetacean bycatch in European fisheries than there was in 2004. There are also assurances that in some fisheries which previously had allegedly high bycatch rates, in fact the opposite is the case. There are, however, obvious flaws with respect to the specific obligations it has imposed on Member States and these are discussed below. They include a number of specific examples which illustrate the observations made but these should not be considered as definitive.

The main points can be summarized as follows

- 812/2004 has provided a much more comprehensive picture of cetacean by-catch in European fisheries.
- There is not sufficient sampling in the right fisheries or areas to enable sound management decisions.
- The current acoustic deterrent devices available are not reliable and this acted as a dis-incentive for fishermen to use them.
- Monitoring of pinger use has been problematic although new technologies are being developed.
- The current mitigation measures are not well targeted.
- Adherence to the monitoring regime required has been inconsistent and some Member States have no dedicated observer programmes.
- The terminology used in the regulation is quite confusing, with a number of different types of "pilot project" allowed but poorly defined.
- A sampling strategy for vessels < 15 m needs to be established taking account the specific problems with monitoring such vessels.
- Research into new monitoring technologies should be encouraged and continued.
- The format of data remains inconsistent, making interpretation of the data difficult.
- A standard reporting format needs to be adopted as quickly as possible.

Further comments related to the specific articles of the Regulation are given below.

Articles 2 and 3-The use and monitoring of Acoustic Deterrent Devices

Overall SGBYC feels that there has not been sufficient sampling in the right fisheries or areas to enable sound management decisions to be made with respect to cetacean by-catch.

Currently there appears to be an over emphasis on mitigation measures by the EU where such reliable measures only partially exist. This has resulted in poor compliance among Member States with Article 2 and there is clearly a general reluctance by fishermen to use the devices currently available due to practical and economic reasons that have been well documented.

SGBYC also consider that the current mitigation measures are not well targeted in that the fisheries where there is a known bycatch are not required to use the devices e.g. the Danish hake gillnet fishery. In addition the measures currently do not necessarily take account of NATURA 2000 sites and the need for explicit management guidelines in such areas. There is a need to develop an adaptive and responsive management framework so that mitigation measures are applied in the appropriate fisheries as and when bycatch problems are identified.

Monitoring of pingers by control and enforcement agencies has been poor due to the lack of available tools. The development of pinger testing devices, notably in Denmark and Germany will improve this in future and SGBYC would encourage this research to be continued, with close collaboration between enforcement agencies.

Articles 4 and 5-Observation schemes

The Study Group noted that adherence to the monitoring regime specified in Article 4 of the Regulation has been inconsistent throughout Member States. Under this Article, Member States are obliged to set up dedicated observer programmes although it is apparent from the National Reports received that a number of Member States have not implemented such programmes. In most such cases these Member States have made attempts to monitor cetacean bycatch through other means such as the DCR.

The lack of observer programme in some member states appears to be mainly due to limited financial and manpower resources. In the current economic climate this is understandable but nonetheless has resulted in only limited coverage in the fisheries of these Member States. Whether this can be improved through better coordination and shared monitoring between Member States which participate in the same fishery should be explored.

The Study Group noted that much of the sampling of over-15 m vessels that is mandated under the Regulation has demonstrated zero bycatch rates, while this is helpful for delimiting areas of concern, there have also been substantial bycatches observed in other fisheries where monitoring is not mandated. For example the regulation is not responsive to evidence based on recent strandings nor results from population estimates (e.g. off the Dutch coast in the North Sea) where there are no monitoring or mitigation obligations for vessels operating in that area. Meanwhile, there is strong evidence of a geographical shift of harbour porpoise distribution from the Northern and Central North Sea (IVa and b) towards the southern North Sea (IVc).

The terminology used in the regulation is quite confusing, with a number of different types of "pilot project" allowed but quite poorly defined. SGBYC has identified a minimum of eleven types of "pilot projects" and this has resulted in different interpretations by each Member States as what constitutes a "pilot project". SGBYC recommends that the EU simplify the Regulation in this regard and merely define appropriate levels of observer coverage.

There is evidence that a relatively large proportion of cetacean bycatch appears to be associated with smaller vessels < 15 m, yet there are only limited and poorly defined obligations to monitor these fisheries with little guidance as to how any such observations might best be carried out. A sampling strategy for small boat fleets needs to be established, taking account the difficulties in monitoring such fleets due to the large numbers of vessels; space on board; and health and safety concerns of deploying observers on such vessels. SGBYC recommends that work to develop new monitoring technologies such as CCTV or remote platforms is continued. SGBYC recommends that this could be initially discussed at the joint NAMMCO/ICES Workshop to be held in June 2010.

In conclusion SGBYC recommends the EU adopts a more flexible approach to define monitoring needs. In time the Regulation should include a set of tools and guidelines for Member States to decide how best to target monitoring. Part of this framework needs to consider how to deal with the problem of monitoring small populations and where bycatch events are rare but nonetheless important e.g. harbour porpoise in the Baltic Sea. This will also be considered at the NAMMCO/ICES Workshop.

Article 6-Reporting

Despite the recommendations made by ICES and STECF, the format of data reported by Member States also remains inconsistent, making interpretation of the data difficult. Different metrics are used by different Member States and this needs to be consolidated. In particular Member States report fishing and observed effort in a number of different ways and a requirement for a standard effort unit of Days at Sea would assist in compiling data. Member States also take different approaches to reporting on single and pair pelagic trawls including high opening trawls with some combining fleets as referred to under 812/2004 and some separate fleets as required under the proposed standard reporting format. SGBYC recommends that the EU complete revision and issue a requirement to report using a standard format as quickly as possible. In particular Member States report fishing effort in a number of different ways e.g. hours as against days at sea. SGBYC recommends that the EU oblige Member States to report using the standard format proposed as quickly as possible.

4 ToR B: Review of other recent estimates of bycatch of relevant species in the ICES and EU areas

4.1 Introduction

Relevant species for the EU region that are not included in national reports on Regulation 812 may be either cetacean species from areas not under Regulation 812 (e.g. non EU neighbour states) or protected species under other European Directives or fishery legislation such as birds, sea turtles, sharks and sturgeons.

Given the migratory and trans-boundary nature of many protected species, the group had extended the term of reference from the EU region to the ICES area and the Mediterranean and Black Seas, considering that these Areas were relevant to the work of the SG and the monitoring of bycatch in the EU region (ICES 2009a).

The SG therefore compiled recent additional bycatch data that were available from areas fished by EU member states and other areas of the wider Northeast and Northwest Atlantic Ocean under three general areas: Northern Northeast Atlantic (Table B.1), Northwest Atlantic (Table B.2), and the Mediterranean Sea (Table B.3). The data were extracted from a variety of sources (journal articles, published and unpublished reports) noted in the tables or in the list of references, and the tables were structured according to the available data. The data presented do not pretend to be exhaustive, but represent what was available to the Group.

Data on observed bycatch and mortality estimates were primarily limited to 2008 and 2009. However, data discovered from earlier years that were not reported in the 2009 Study Group Report (ICES 2009a) are also noted here. Otherwise, all other relevant historical data can be found in the 2009 Study Group Report (ICES 2009a).

For the US Northwest Atlantic, the Marine Mammal Protection Act and the Endangered Species Act are vehicles which have established observer programmes to monitor and estimate bycatch of marine mammals, sea turtles and seabirds. In addition, Canada enacted the Species At Risk Act (SARA) in June 2003 [http://www.sararegistry.gc.ca/approach/strategy/default_e.cfm]. However, it is not known at this time if observer programmes will be established to meet the conservation objectives of SARA. The Group again recommends that Canada appoint a scientist with expertise in protected species bycatch in Canadian waters to the SGBYC.

The Study Group considered bycatch estimates among five categories of protected species: marine mammals, birds, turtles, elasmobranchs, and sturgeons.

4.2 Marine mammals

In **Iceland** information on fisheries of the Icelandic fishing fleet are reported to the Directorate of Fisheries. Information on marine mammals entangled in fishing gear should be included in the fishery reports; however there are limited means of verifying the reliability of these reports. In 2008 a system of electronic remote fishing reports via the Internet was launched and is today applied by most fishers. Complications in the new system resulted in a decline in reporting of marine mammals and a revised version is being developed for which reporting of marine mammals and birds is facilitated. Therefore the only preliminary bycatch data from fishery reports in 2009 are from the gillnet lump-

sucker fisheries (Olafsdóttir, Pers. Comm.). A total of 98 marine mammals were observed (Table B.2).

In April 2009 a programme of monitoring all marine mammal and bird bycatch in regular observations of the Fishery Directorate was implemented covering all types of fisheries. A total of eleven marine mammals and birds were observed in the period April to December, all in the lumpsucker fishery (Table B.2).

Research surveys in cod gillnet fishery operated by the Marine Research Institute annually in April have been used as a platform to collect data on the bycatch of marine mammals since 2003. Additional monitoring of bird entanglements was initiated in 2009; in total 43 mammals were observed caught in the gillnet survey in 2009 (Table B.2). The research area covers the main fishing area for cod in the coastal shelf waters and monitoring has been pre-stratified in proportion to the fishing effort by the entire fleet in the area. Bycatch data were then extrapolated in relation to relative fishing effort in the entire cod gillnet fishery in March and April within each of the Icelandic marine subareas (Taylor 2003). Confidence limits were calculated using a bootstrap resampling procedure. The most recently estimated number of harbour porpoises caught in March and April in 2009 was 374 animals (95% CI = 41–560). The results since 2003 demonstrate relatively stable rates of harbour porpoise entanglements in the gillnet fishery during spring between years. The estimated decline in bycaught harbour porpoises since the highest numbers were estimated in 2004 (958 animals 95% CL: 296–1472) follow a decrease in gillnet fishing effort over recent years.

In the **US Northwestern Atlantic**, to comply with the US Marine Mammal Protection Act (Section 118; 60 FR 45086, August 30, 1995) all US fisheries are categorized into three groups. These categories are defined by the level of serious injury and mortality incurred by a marine mammal stock attributable to a particular fishery. The categories are defined as: category I-annual mortality and serious injury of a stock in a fishery is greater than or equal to 50 percent of the stock's potential biological removal level (PBR; Barlow *et al*., 1995); category II-annual mortality and serious injury of a stock in a given fishery is greater than 1% and less than 50% of the stock's PBR; and category III- annual mortality and serious injury of a stock in a given fishery is less than or equal to 1% of the stock's PBR (NMFS 2008a). As a result, all fisheries with known interactions in the US are monitored at some level by observer programmes. In the US Northwest Atlantic region the Northeast Fisheries Observer Programme (NEFOP; NMFS 2008b) currently monitors these fisheries in addition to fisheries that interact with endangered or threatened sea turtles protected by the Endangered Species Act (Table B.3).

In **Canada** observations of harbour porpoise bycatch in the Bay of Fundy (BOF) sink gillnet fishery began in the early 1980s through casual observations and discussions with fishermen. An observer programme was implemented during summer in 1993 and harbour porpoise bycatch was estimated for the BOF region through 2001 (Waring *et al*., 2007). There has been no observer programme during summer in the Bay of Fundy region since 2002, although the fishery was active. Since the early 1990s marine mammal bycatch has been monitored in the Canadian herring weir fishery through cooperative efforts between commercial fishermen and biologists. A large proportion of the harbour porpoise interactions in Canadian herring weir fisheries result in live releases due to these cooperative efforts (Waring *et al*., 2007). In the 1990s (1991–1996) there was a Canadian observer programme that placed observers on board all foreign vessels operating in

Canadian waters and marine mammal bycatch was observed (Waring *et al*., 2007). The presence and/or extent of observer programmes to monitor marine mammal, sea turtle or seabird bycatch in Atlantic Canadian waters is unknown to the SG at this time.

In **France** the fishing industry has developed observations at sea to assess the bycatch rate in two areas of the English Channel (ICES VIIe,d) where pingers are mandatory but not really used. The project named FilManCet focused on two opposite fishing grounds of the English Channel. The project began at the end of 2008 and will continue for two years. Four observers are employed in the western Channel and two observers in the eastern Channel. A report (Morizur *et al*., 2009a) containing the results of the first year of the project was presented at the meeting. By the end of October 2009, 1800 km of nets had been hauled during 350 days observed at sea. The representativeness of observations allowed the calculation of a bycatch rate for the western Channel only, where 1400 km of nets (monkfish; spider crab; other nets) were observed. Three cetaceans were recorded in October; two harbour porpoises, and one pilot whale. The bycatch rate for Harbour porpoise was around one per 70 000 km. h, which is a hundred times less than that reported from the Celtic Sea and 700 times less than that reported for the North Sea (Cosgrove and Browne, 2007).

Ifremer reports that in 2009 the bycatch has increased in French pelagic trawling activities, especially in the Tuna fishery. Some difficulties in finding tunas during summer could have induced some skippers to modify their fishing operations which may have lead to increased risk of bycatch.

Within the Baltic porpoises are the only regularly occurring cetacean, though numbers are now very depleted. No reports of porpoise bycatch have emanated from monitoring under Regulation 812/2004, but a few records are available from voluntary reports from **Poland**. In Table 2 the number of voluntary reported bycatch and strandings of porpoises in the Polish EEZ collected since Polish EU accession have been collated. These data are also reported annually to ASCOBANS and HELCOM (data: Hel Marine Station, University of Gdańsk).

Table 2: Reports of porpoise bycatch and strandings in Polish waters

Year	2004	2005	2006	2007	2008	2009
Bycatch	1	1	0	0	0	2
Stranded	3	2	4	5	1	2

In the **Mediterranean** and Black Sea region, a joint workshop held under the aegis of ACCOBAMS and GFCM in Rome in October 2008 summarized current knowledge of cetacean bycatch issue in Mediterranean, Black sea and adjacent Atlantic waters. Quantitative estimates of cetacean bycatch are generally lacking, yet bycatches are widely reported anecdotally or through more or less systematic strandings surveys or interviews with fishermen. In many cases the frequency of such bycatch events still remains unclear. Monitoring programmes involving at sea observations of fishing activity were reported in Spain, France, Italy, Slovenia and the Ukraine. Such programmes have only recently been implemented and only a few preliminary estimates of total bycatch were available. In four cases out of five the catalyst for implementing these programmes has been Council Regulation (EC) 812/2004.

Evidence from strandings reveals that cetacean bycatch occurs in several other countries including Albania, Algeria, Bulgaria, Montenegro, Romania, and Turkey. However, experts were aware that similar data exist for other countries where cetacean stranding networks are operating with different levels of effort and organization. These include, for example, Croatia, France, Greece, Israel, Italy, Spain and Tunisia. Direct contacts with fishermen have also yielded observations and minimum estimates in several countries including Bulgaria, Romania, Turkey, Ukraine, Israel and Algeria. In the Black Sea the harbour porpoise was the most frequently recorded cetacean among incidentally caught animals; while in the Mediterranean Sea, common and striped dolphins, as well as some bottlenose dolphins were the most frequently reported. Table B.4 is a summary update of existing cetacean and other species bycatch data for the Mediterranean.

Karamanlidis and colleagues (2008) recently published their results on a study on historical and recent Mediterranean monk seal (*Monachus monachus*) bycatch events in Greece. Data were collected through questionnaires distributed in various locations in Greece and necropsies. Results indicate that accidental entanglement is still a major threat to the species in its main distribution area in the northeastern Mediterranean. Thirteen events were recorded, mainly with static nets, but also in longlines, affecting mostly subadults.

4.3 Birds

Bird mortality in fishing gear is a global conservation issue and it is recognized that bycatch in industrial longline and trawl fisheries threatens several seabird species. The issue has been addressed in some detail by the ICES WG on Seabird Ecology, especially pertaining to bycatch in longline fisheries, both in terms of bycatch data, issues and mitigation measures. Published documents providing data on seabird bycatch are collated in the report of the Working Group on Seabird Ecology (ICES 2008a).

Little is known about the effects of bycatch in small-scale gillnet fisheries on bird populations.

Zydelis *et al*. (2009) have reviewed 30 studies reporting bird bycatch in coastal gillnet fisheries in the Baltic Sea and the North Sea region in order to assess the magnitude of this problem and potential effects on bird populations. All species of diving birds that occur in the study region, including divers (loons), grebes, sea ducks, diving ducks, auks and cormorants, have been reported as dying in fishing nets. The cumulative bycatch estimate extracted from several localized studies providing such information, suggests that about 90 000 birds die in fishing nets annually, a number that is almost certainly a substantial underestimate. Therefore the authors conclude that it is likely that between 100 000 and 200 000 waterbirds are killed per year in the North Sea and Baltic Sea.

In **Germany** seabird bycatch was studied in a research project funded by the Federal Agency for Nature Conservation (Bfn). Bycatch was assessed in the gillnet and longline fisheries of Mecklenburg-Vorpommern (including catches in the adjacent German EEZ) during 2006–2009 using (i) voluntary reports of fishing effort and bird bycatch from 17 individual fishermen and (ii) on-board observations of 60 regular and 58 experimental hauls. The study aimed at collecting bycatch estimates as catch per unit of effort (cpue) expressed as "birds per 1000 meters of net length per day (birds/1000 NMD)" for gillnets and "birds per 1000 hooks per day" for longlines, respectively.

A total of 526 birds was recorded, including five birds released alive. Seaducks and diving duck feeding on benthic invertebrates accounted for more than 50% of bycaught birds in all types of gear and during catches of all target species. Diving ducks formed 65% of bycatches in coastal lagoons, while seaducks were most important in all catches between the outer coast and the EEZ (47%).

Mean bycatch rates in gillnets varied between 0.01 and 0.72 birds/1000 NMD. Rates depended on season with highest cpue recorded during December–April for bottom-set-nets and January–May for pelagic set-nets.

Based on this study the total bycatch in gillnets set by fishermen from Mecklenburg-Vorpommern was assessed at 15 880 to 18 165 birds per winter season (November–May). The bycatch in the spring Herring fishery in Greifswald lagoon (February–May) is estimated to be 904 to 2034 birds. All these estimates suffer from a lack of statistics on total fishing effort and were therefore based on conservative assumptions.

In the **Faroes** while there has been no formal investigation of seabird bycatch, it is not thought to be a major problem, except for fulmars (Olsen, pers. comm.). There is only a small set-net fishery and the nets are set so deep, that they catch very few birds. It has been estimated that the longline fishery takes between 5000 and 25 000 fulmars per year. The population of fulmars is estimated to 600 000 pairs, so the bycatch is not regarded as problematic. The fishermen however do use streamer lines in an attempt to scare birds away from the line.

In **Greenland**, reporting of bycatch of eiderducks in lumpsucker nets is mandatory and data can be accessed through the Greenlandic Ministry of Fisheries and Hunting.

In **Iceland** information on fisheries of the Icelandic fishing fleet are reported to the Directorate of Fisheries. Information on birds entangled in fishing gear should also be included in fishery reports; however there are limited means of verifying the reliability of the reports. Complications in the electronic fishing report system implemented in 2008 have resulted in further underreporting of bird and marine mammal bycatch. A revised version for reporting of marine mammals and birds has been implemented. Therefore, the only preliminary bycatch data from fishery reports in 2009 are from the gillnet lumpsucker fisheries (Olafsdóttir, pers. Comm.). There were 184 birds reported bycaught in this fishery (Table B.2).

In April 2009 a programme of monitoring all marine mammal and bird bycatch in regular observations of the Fishery Directorate was implemented covering all types of fisheries. A total of 52 birds was observed in the period April to December (Table B.2).

Research surveys in gillnet fishery operated by the Marine Research Institute annually in April has been used as a platform to collect bycatch data on marine mammal. Additional monitoring of birds entanglements was initiated in 2009 and a total of 195 birds were observed in the gillnet survey in 2009 (Olafsdóttir, pers. comm.; Table B.2).

Bjørge (pers. comm.) had informed the SG that **Norway** intended in 2009 to expand the monitoring programme for marine mammals to include birds, and it is likely that 2010 will be the first year of complete bird data.

In the **US Northwest Atlantic region** an analysis of seabird bycatch attributed to gillnet gear is currently underway. A final report with estimates is expected to be available for the 2011 Study Group Report.

4.4 Sea turtles

A recent report published by WWF Italy (Casale, 2008) contains extensive information on historical data on incidental catches of marine turtle species occurring in the Mediterranean Sea (*Caretta caretta*, *Chelonia mydas* and *Dermochelys coriacea*). Events concern the large majority of fishing gears used in the region; however, longlines seem to have the highest impact followed by trawlers and gillnets. This report also contains a review on potential mitigation measures in the regional context.

In addition, data on loggerhead sea turtle bycatch can be found in Table B.3 (USA) and in Table B.4 (Mediterranean). The SG believed that further records are likely to be available through national discard reporting schemes and bycatch monitoring coordinated by ICCAT. Such records should be included in future assessments.

The SG pointed out that further records are likely to be available through national discard reporting schemes and bycatch monitoring coordinated by ICCAT. As, for example, those presented by Peristeraki and colleagues (2008). Such records should be included in future assessments.

4.5 Elasmobranchs

The 2009 report of the ICES Working Group on Elasmobranch Fishes (WGEF) was reviewed in relation to the bycatch and discarding of these species in European waters (ICES 2009b). This Report is subdivided by species or species group, and therefore although there is no overall section relating to elasmobranch bycatch as a whole, information is provided for some species and is summarized in Table B.5.

One of the objectives under the **EU Action Plan for the Conservation and Management of Sharks (2009)** is to ensure that bycatches of sharks resulting from non-directed fisheries are properly regulated.

WGEF recommends that discard data should be brought to and then collated at the Group's annual meeting and there is a requirement for more detailed studies of discard datasets. In addition the Group reported that landings data are often incomplete or aggregated (nei) and that for those species which are rare or found occasionally but in large aggregations problems of species identification, both for discards and landings need to be overcome. In addition the Group believes that some species may be underreported to avoid highlighting that bycatch of these species may be a significant problem in some fisheries, and that landings from inshore vessels that may have large bycatches of certain species are not always included in official statistics.

In 2009 the ICES mixed fisheries advice for demersal fisheries in Division IIIa, in Subarea IV and in Division VIId stated that there should be no landings of angel shark and there should be a minimum bycatch of spurdog, porbeagle, and common skate and undulate ray. In the Celtic Seas there should be no catch or discard of spurdog, white skate and angel shark, and only a minimal catch of common skate and undulate ray.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) monitors and regulates international tuna fishing fleets in the north and south Atlantic and in the Mediterranean Sea. These fleets can have a large bycatch of pelagic shark species. In 2009 the Standing Committee of Research and Statistics (SCRS) of ICCAT recommended that for species of high concern (in terms of overfishing), which are expected to have high survivorship in fishing gears after release, particularly the bigeye thresher, that the Commission prohibit retention and landings of the species to avoid fishing mortality (SCRS 2009). For other species which can be easily misidentified, such prohibitions could complicate compliance monitoring and therefore, other measures such as minimum or maximum landing lengths or technical gear measures might be more appropriate.

In 2009 the SCRS held a joint porbeagle assessment with ICES (ICCAT 2009, ICES 2009b). This determined that in the NE Atlantic, the porbeagle stock is well below B_{MSY} and is fished at or above F_{MSY}. The SCRS recommends that countries initiate research projects to investigate means to minimize bycatch and discard mortality of sharks, with a particular view to recommending to the Commission complementary measures to minimize porbeagle bycatch in fisheries for tuna and tuna-like species.

A Working document to the Group (McCully and Ellis, 2009) presented bycatch information on porbeagle caught by UK vessels (excluding Scottish vessels) over the last ten years. The majority (42% total) of porbeagle landings have been reported by gillnetters and longliners (32% total), fishing in ICES Divisions VIIe–h. Information from the UK discard observer database demonstrated that the bycatch and retention of porbeagle was a factor of the gear type used, not the ICES Division where fishing took place. Within the gears examined, the majority (84%) of porbeagle caught by gillnets were retained, whereas all the porbeagles observed bycaught by pairtrawlers were discarded.

4.6 Protected fish species

European sturgeon (*Acipenser sturio*) and the Atlantic sturgeon (*Acipenser oxyrinchus*) in North- and Baltic Sea.

In general the knowledge of the bycatch of protected fish species is low. The EU Habitats Directive has listed a number of anadromous fish species on Annex II (e.g. sturgeon (*Acipenser sturio*), sea lamprey (*Petromyzon marina*), river lamprey (*Lampetra fluviatilis*), hounting (*Coregonus oxyrinchus*), twait shad (*Alosa fallax*), allis shad (*Alosa alosa*), with the aim of saving or restoring a "favourable conservation status". There are almost no data on the bycatch in marine waters available. Nevertheless as all these species undertake regular spawning migrations to their home rivers, the highest risk to be bycaught in commercial fisheries is in coastal waters close to river estuaries.

The European sturgeon is an anadromous fish species, which was once common in a number of European rivers. Today the European sturgeon is one of the most threatened fish species in Europe and is listed on the IUCN red list (Rochard *et al.*, 1990). The species is protected according to several international agreements (e.g. CITES, Bern and Bonner Convention, EU Habitats Directive.)

Sturgeons in European waters are a regularly bycaught in beam trawls, otter trawls bottom-set gillnet nets targeting demersal roundfish and flatfish. (Rochard *et al*., 1997a). In European waters 450 incidental bycatches of European sturgeon with a mortality rate of 57% have been reported (Rochard *et al*., 1997b). In the 1990s 100 to 400 bycaught indi-

viduals have been reported each year. In recent years there has been a decrease in bycatch numbers mainly reflecting the decreasing abundance of the European sturgeon population.

A German conservation project financed by the Federal Agency of Nature Conservation (http://www.bfn.de/habitatmare) aims to restore the population of European sturgeon in the North Sea and Atlantic sturgeon (*A. oxyrinchus*) in the Baltic Sea, both species being protected under the EU Habitat Directive. In May 2007 the first *A. oxyrichus* were released in Oder River and in 2008 a further 35 000 animals were released within the wider Oder region. In September 2008 European sturgeons were tracked in the Elbe River and in April 2009 in the Oste River, respectively.

In 2009 in total 73 sturgeons (*A. oxyrinchus*) have been reported by German, Danish, Swedish and Polish fisherman. Options to reduce bycatch of sturgeons included modified or alternative fishing gears.

5 TOR C: Review of ongoing bycatch mitigation trials with recommendations for further work

SGBYC reviewed ongoing bycatch mitigation trials in Europe and also from further afield in countries such as the US, South America, Asia and New Zealand. The review covered mitigation work for reduction of cetacean, sea turtle, seabird and elasmobranch bycatch. In most cases only studies carried out in the last 2–3 years are reported although older work on mitigation of sea turtle bycatch in coastal net fisheries reviewed at a Technical Workshop held in 2009 reported by Gilman (2009) are included as these were considered of interest to the Study Group.

5.1 Cetaceans-Acoustic Deterrent Devices (gillnets and pelagic trawls)

France

An experiment with acoustic deterrent devices was carried out on the French trammelnet fishery in a marine protected area located in the Iroise Sea off the west coast of Brittany. The objective was to compare different acoustic deterrent devices for reduction of harbour porpoise (*Phocoena phocoena)* bycatch (Morizur *et al*., 2009b). Three types of pinger devices (Aquamark 100, Marexi V2.2, DDD-02) were tested over an extended period. The DDD02 devices were attached at each end of the net near the anchor, while the Aquamark 100 and Marexi V2.2 devices were attached to the headline of the nets and spaced at 400 m and 200 m intervals respectively. Ten vessels from the ports of Le Conquet and Audierne were involved in the study over a 12 month period with 462 km of control nets without pingers and 150 km of nets with pingers deployed and monitored.

No statistical analysis could be completed due to the small numbers of bycatches observed but three harbour porpoises were caught in the control nets whereas two porpoises and two grey seals (*Halichoerus grypus)* were recorded in the nets equipped with Aquamark 100 pingers. No bycatch was recorded with the other pingers. None of the three pingers tested proved to be technically reliable, confirming earlier reports from studies completed in Ireland and the UK. An economic analysis of the costs for vessels to comply with 812/2004 was also carried out and demonstrated significant costs to vessels due to the high level of replacements required. The results highlighted the difficulties still being experienced in complying with the regulations and in particular the need for better quality control with respect to the commercially available pingers. The need for some sort of certification is suggested as a way forward to improve confidence in the devices.

Ireland

A trial was carried out by Bord Iascaigh Mhara (BIM) in Ireland in February 2009 to test if recordings of killer whale vocalisations could have a deterrent effect on common dolphins (*Delphinus delphis*), ultimately with a view to incorporating the sound into an interactive deterrent device developed by BIM for use in pelagic trawl fisheries (Cosgrove, 2009). Seven pairs of different recordings from killer whales were used during the trial on groups of common dolphins located off the south coast of Ireland. Each pair of control and test signals contained background noise to ensure that if significant differences in response occurred that it would be possible to conclude that the dolphins responded to killer whale calls rather than any other sound stimulus. The background noise in the

samples slowly increased in amplitude during the first 30 s, so as to avoid a startle response from the rapid onset of an unfamiliar sound. For the test sequence five killer whale calls from the same recording were spliced into the recording after 30 s. The control and test treatments were presented to the same group of dolphins in random order. During the first trial no evasive behaviour was observed during the test periods. As no reaction was observed a number of different killer whale sequences were tested subsequently but no changes in behaviour were recorded. A further study has just been completed in January 2010 on two further groups of dolphins off the south east coast of Ireland. Again no effect was observed from either group.

Netherlands

In the Netherlands a small pilot study has been initiated to test the effectiveness of SaveWave pingers. Six gillnet fishermen are participating and will report voluntarily on pinger effectiveness and record bycatch. The project is coordinated by the NGO Coastal and Marine Union and is expected to run from February 2010 to May 2012.

Poland

As reported in 2009 (ICES 2009a) a project being conducted by the Hel Marine Station, University of Gdańska, Poland to develop an "active protection" system for harbour porpoises is continuing in Puck Bay (ICES Subarea 24) in the Baltic Sea. The project is aimed at testing a new method of bycatch mitigation for the intensive traditional small boat gillnet fishery in the area. In 2009 the first part of the project monitored occurrence of harbour porpoises in the vicinity of fishing areas in Puck Bay using porpoise click detectors (PODs-Chelonia Ltd, UK). Only a few detections were recorded. Starting from April 2010 the fishing areas within the Bay will be protected by an acoustic barrier consisting of a row of AQUAmark pingers. On both sides of the barrier, POD's will continue to be deployed to register the presence of harbour porpoise. The assumption is that harbour porpoises will not cross the line of pingers and will avoid becoming entangled in fishing nets.

Also in Poland, a large number of pingers have been purchased by the Ministry of Agriculture and Rural Development for boats >12 m using gillnets in ICES Subarea 24 (Pomeranian Bay, S.Baltic, Poland) and given to fishermen. No data on their usage and the mitigation effects were available at present but these will be reported later in 2010.

Turkey

Gönener and Bilgin (2009) report on a study with pingers carried out in the Black Sea by Turkey. The aim of this study was to assess the effect of acoustic deterrent devices on the bycatch of harbour porpoise and catch rates of fish (turbot (*Schophthalmus maeoticus)* and thornback ray, (*Raja clavata*) in the turbot gillnet fishery in the Black Sea. Sea trials were carried out during the period March–April, 2006 off the Sinop Peninsula using nets fitted with Dukane NetMark™ 1000 pingers and control nets without pingers. The results demonstrated a reduction in *P. phocoena* bycatch without significantly affecting target and non-target fish size and catch. No data on levels of bycatch are reported.

UK

In 2008 the Sea Mammal Research Unit (SMRU) was contracted by the Department for Environment Food and Rural Affairs (DEFRA) to assess the efficacy, from both bycatch

reduction and operational perspectives, of a newly available more powerful pinger, the DDD-02 as reported in SGBYC report of 2009(ICES 2009a). According to SMRU (2009) to date a total of seven bycaught harbour porpoises (*Phocoena phocoena*) in 199 fleets without pingers and 0 bycatch in 155 fleets with pingers have been recorded in this study. No bycatch of any dolphin species has been observed during the trials. Results so far are promising with respect to porpoises and based on current data it is estimated bycatch rate of porpoises has been reduced by at least 45–50% in test fleets when using DDDs at a reasonable spacing. It is worth reiterating that no dolphins have been observed bycaught in either control or pingered fleets, although whether DDDs are having any effect on dolphin bycatch rates is still open to conjecture. It is clear that more sampling is needed to properly assess bycatch reduction levels associated with the use of DDD pingers.

From a practical perspective the feedback from skippers has generally been positive and there have been no complaints about the durability of the devices or any possible effects on fish catch. However, there remain some operational issues, mainly associated with shooting the pingers. At present, one of the crew has to throw the pingers and floats over the side/stern as the gear is being shot away. All the skippers involved in the trial feel this is an area that could be improved upon and have suggested some form of self-shooting system which would be safer and would mean that the crew could concentrate on their normal duties.

Also in the UK it is reported by Trengenza (*pers. comm.*), that a UK company, Fishtek, is developing a pinger designed to be very durable with an acoustically transparent elastomer carrier for the pinger body. This device has replaceable batteries and produces audible, randomized high frequency pings when first immersed or after manual stimulation. It can be adapted to different acoustic specifications and the designers are also planning to test whether mounting the pinger on the leadline rather than the headline as with traditional pingers, would be feasible. A prototype is due to be tested in 2010.

US

Harbour porpoise bycatch in the US Northeast gillnet fishery is managed under the Harbour Porpoise Take Reduction Plan (HPTRP), which was implemented on 1 January 1999. The HPTRP divides this fishery into management areas that are either completely closed to all gillnets or closed only to gillnets that do not use pingers. A recent analysis of 25 000 observed gillnet hauls reported by Palka *et al*., (2008) found that whereas in a 1994 controlled scientific experiment conducted in part of this fishery that used 15 cm mesh gillnets, the bycatch rate in pingered nets was 92% less than that in nets without pingers, these results had not transferred to the operational fishery. In contrast, in the operational fishery, the bycatch reduction in pingered nets was only 50–70%, depending on the time, area and mesh size. In particular, there was no observed bycatch in pingered nets that used the same mesh size as used in the experiment. Thus, it seems that the apparent decrease in pinger effectiveness in the operational fishery was partially due to the type of gillnet used and also a lack of compliance. Pinger usage started out high in 1999 (the first year required), dropped substantially during 2003–2005 and perhaps due to outreach activities increased beginning in 2006. During years of high pinger usage, 87% of the tested pingers were functional, while only 36% of the tested pingers were functional during years of low pinger usage. In general, as expected, observed bycatch rates in hauls without pingers were greater than bycatch rates in hauls with the required number of pingers. Unexpectedly, bycatch rates of observed hauls with an incomplete set of pingers

were higher than in observed hauls without pingers. Confounding factors that could partially explain this apparently contrary result include the following: strings with an incomplete set of pingers may also have non-functioning pingers; gaps between functioning/non-functioning pingers along the net are interpreted as a gap in the net and thus animals try to swim out; gillnets with missing pingers may be operating under different environmental characteristics and/or gear characteristics compared with those with none or all pingers. There was no evidence of temporal trends in the bycatch rates, suggesting that harbour porpoises had not habituated to the pingers.

In conclusion, in the US Northeast gillnet fishery, harbour porpoises do not appear to have habituated to pingers, and pingers appear to have reduced the bycatch rate, particularly when the required number of pingers were used and in nets using mesh sizes of 15 cm or less.

5.2 Cetaceans-other modifications (trawls and gillnets)

US

Southeast Fisheries Service conducted a project to assess the underwater behaviour of dolphins around actively fishing shrimp trawls and to investigate the utility of stiffened lazylines on the trawl to reduce the risk of dolphin entanglement (NOAA, 2009). A number of lazylines were tested (polypropylene, polyethylene, polydacron, multi-poly and nylon, each having different degrees of stiffness. Eighteen experimental tows were conducted over four days on board a research vessel off Brunswick, Georgia. Dolphins were observed interacting with all lazyline types during all monitored tows and remained present in the vicinity of the vessel between tows and during hauling and setting of the net. Underwater stiffness of different lazylines was evaluated by scuba divers who physically manipulated the lines to make small loops or twists which could possible result in entanglement. Conclusions from the tests were that stiffer lazylines would be more difficult to be entangled in. Although the stiffer lines were slightly more difficult to handle by crew when deploying or retrieving the trawl the project concluded that it is operationally feasible to use these nets.

Historically speaking there have been high levels of harbour porpoise bycatch in New England waters attributed to gillnet gear. However, due to compliance and monitoring issues related to the use of pinger devices, other avenues of reducing bycatch are being researched. Evidence from observer records indicated that gillnets with netting hung at 0.33 had higher bycatch than gillnets with netting hung at 0.50 (i.e. tighter). As a result, there was interest in conducting research trials that evaluated the effect of different gillnet hanging ratios on the bycatch of harbour porpoise (Rossman. *pers. comm*.). From February through April 2009, an experiment was conducted in an offshore area to the southeast of the Cape Cod South Pinger Regulated Area. This is an area with documented high bycatch rates of harbour porpoise. The experiment was conducted in two phases. Phase 1 used a randomized design to assign net panels constructed with the two different hanging ratios to a string of gillnets. Phase 2 utilized gillnet strings where each panel in the string had the same hanging ratio. Phase 2 was implemented in the study due to unexpectedly high bycatch of marine mammals during Phase 1 of the study (randomly designed nets). The preliminary results are inconclusive. Over the duration of the study more animals were bycaught in nets where hanging ratio = 0.30 (n=7) compared with nets with a hanging ratio = 0.50 (n=5). However, more trials need to be conducted in

order to conduct a statistical analysis on the experimental data. A final report is expected to be available to the Study Group during the 2011 meeting.

South America

A study reported by Trippel *et al*. (2009) evaluated the efficacy of barium sulphate ($BaSO_4$) modified gillnets in reducing Franciscana dolphin bycatch in an area a few kilometers off the Argentine coast in the Bahia Samborombon, near to San Clemente del Tuyu. Field testing occurred from January to February, 2008 and November to March, 2009. Monofilament nylon gillnets containing $BaSO_4$ (6% by weight) were deployed with a stretched mesh size of 110 mm and twine thickness of 0.6 mm. Standard nylon nets from the same manufacturer using new mesh provided appropriate controls. Based on observer data, in the first year, a total of four and seven dolphins were caught in 55 sets of $BaSO_4$ and 57 sets of standard nylon gillnets, respectively and in the second year, 11 and 19 dolphins were caught in 198 sets of $BaSO_4$ and 211 sets of standard gillnets, respectively. Commercial fish catch rates were very similar among the two net types.

A new experiment conducted by Pablo Bordino has recently started at the same study site in Argentina. This trial is part of the international "Stiffnet" project led by Tim Werner (NEAq). Bycatch rates of Franciscana dolphins in two modified gillnets are being compared with standard nets used in the fishery. The first modified net type is impregnated with $BaSO_4$ and the second is a chemically stiffened net. The trial began in October 2009 and should be completed in February 2010 (Mackay *pers. comm*.) A second trial under the "Stiffnet" project using the same modified nets began in Brazil in January 2010. This trial is being conducted by Eduardo Secchi; Franciscana dolphin bycatch rates in the three nets will be compared in both a bottom-set and surface-set gillnet fishery.

5.2.1 Cetaceans-alternative gears

Germany

The need to develop alternative fishing gear in the gillnet fisheries in the Baltic has increased in recent years due to the high bycatch of birds and mammals and also growing seal and fisheries conflict. A potential alternative fishing gear for cod being considered to gillnets in the Baltic is the use of pots or traps. Studies in a number of countries including Sweden, Norway, Canada, Faroe Islands and Iceland are reported by the ICES Study Group on the Development of Fish Pots for Commercial Fisheries and Survey Purposes (SGPOT, ICES, 2009c). In Germany a series of small-scale feasibility studies were conducted by the Federal Agency for Nature Conservation to find out whether cod pots could fully or partly replace gillnets and this was reported by Pusch at the meeting. During the studies no-bycatch of seabirds and marine mammals has been recorded. Regarding the catch efficiency of traps the results have been variable and reached an average of 10.5 kg cod/10 pots/day and have been significantly lower than in gillnet, which have been applied as a reference. Another disadvantage of codpods was the large proportion (up to 42.5 %) of cod below minimum landing size of 38 cm. In summary, codpots can therefore be at this stage assessed as an ecological but not economical sustainable alternative to gillnets. In future projects the size selectivity and catch efficiency of codpots should be optimized and further fishing gears (e.g. longlines) will be evaluated as a possible ecological alternative to gillnets.

Two cruises on a research vessel in August and October 2008 were carried out by the von Thünen Institute to compare catches of cod with (Norwegian Type) pots set pelagic and on the bottom with catches of gillnets fished nearby. The results for the trials were very disappointing because only one cod was caught in 11 pots. The 50 gillnets revealed a mean catch of 12 kg/day of cod and 74 kg/day of flounder. In subsequent trials by the Federal Agency for Nature Conservation, commercial fishermen have also been equipped with a limited number of codpots. Catch rates have been more encouraging and closer to catch rates in gillnets although further work is require before it is felt likely fishermen will adopt this method of fishing.

5.3 Sea turtles-longlines

Spain

In July and August 2009 Alnitak, with support from NOAA, the Secretaria General del Mar (Spain), Marine Reserves of Spain, SUBMON and the Agriculture and Water Agency of the Region of Murcia, conducted a field trial to mitigate loggerhead turtle bycatch rates in the Spanish surface longline fishery (Rueda, 2010). This trial was conducted aboard a longline research vessel and the experimental longline sets composed of 1600 hooks in total. J hooks (Mustad J7) and circular hooks (16/0) were placed alternatively along the length of the set, resulting in 800 of each hook type being deployed. Five sets were conducted around the Cape of Palos (Southeast Spain), and 23 loggerhead turtles were observed bycaught, 15 by J hooks, five by circle hooks. Hook type for the remaining three turtles could not be determined as the hook had been swallowed. Results indicate that the ratio of catch rates between the two gear types was lower than expected for the circle hooks. Also, the observed catch ratio of fish between the two hook types was not significantly different. However, the sample size for this study is small. In addition the way in which loggerheads were captured by the two hook types and ease of removal of the gear was investigated and ten turtles were tagged with SPOT4 tags (Wildlife computers), to investigate post-release survival rates. Data from these tags revealed there was no direct mortality of any of the turtles within a few days or weeks of being released after capture.

5.4 Sea turtles-poundnets

US

In the Chesapeake Bay, fishermen use poundnets to harvest a wide variety of fish. Turtle bycatch has been recorded in many of these fisheries with most turtles caught in the leader section of such nets. This led in 2003 to NMFS prohibited offshore poundnet leaders in a section of the lower Chesapeake Bay from May 8 through June 30 of each year. Following the gear restriction, NMFS worked with the fishing industry to develop a modified leader design to reduce sea turtle takes. The modified leader was similar in height to the traditional leader, but mesh was hung only in the lower one-third of the submerged portion. The remainder of the leader height was hung with vertical lines spaced two feet apart. After two years of testing up to 2007, only one turtle was taken in the modified net, while 22 turtles were taken in the traditional net. Fish catches were not significantly different between the modified and traditional designs. As a result, the NMFS enacted legislation allowing use of the modified leader during the time when the traditional leaders were prohibited and this legislation remains in place.

Japan

Modified poundnets were also tested in a shallow coral lagoon in the southern part of Japan in 2008/2009 to reduce incidental capture of sea turtles. The first design incorporated a square hole with a flap (40 x 50 cm) at the upper part of the cone-shaped bag of the poundnet. When a turtle caught inside the bag pushed on the flap, it opened to allow the animal to be released. Using this flap releasing device during tests, 81% of green turtles (*Chelonia mydas)* escaped from the bag. Similar results were obtained for loggerhead turtle, (*Caretta caretta)*, and hawksbill turtle, (*Eretmochelys imbricata)*. There was only a small reduction ~4% in the commercial catch rates of the target species. While such a flap releasing device was effective in releasing turtles from the small cone shaped bag, it was felt that further modification would be required for larger poundnets with a closed box-shaped pocket net and a much mesh bigger size. Thus a second modification incorporating a sloping roof to induce the turtle to move to the highest places in the net where a releasing device was fitted was tested. A release device for the box-shaped pocket net of large-scale poundnets has also been developed. The design concept of this releasing device is the same as that for the small cone-shaped bag. The releasing device unit consists of 200 cm squared flexible plastic net with a centrally located turtle escape hole (100 cm x 100 cm) and a flap covering the escape hole. Initial tank tests with captive animals suggested that the sloped roof had the required effect in leading the turtles to the modified release device although no commercial trials have been carried out subsequently.

5.5 Sea turtles-gillnets

Mexico

In 2004, controlled experiments to compare bycatch and target capture rates between low profile (1 m height) experimental gillnets and control nets of traditional 2 m height were carried out off Baja, Mexico (Maldonado *et al*., 2006). In 117 controlled sets observed in 2004, there was no significant difference in turtle bycatch between the experimental (low) and control nets, but significantly more fish were caught in the control nets. In 2005, further experiments to compare half tie down experimental nets (tie down length 0.9 m) tested against control nets with tie downs of 1.8 m length were conducted (Maldonado *et al*., 2006). In 129 controlled sets observed in 2005, there was no significant difference in turtle bycatch between the experimental (half tie down length) and control nets. However, many more target fish by number and weight were caught in the experimental nets. In 2007 and 2008, experiments comparing bycatch rates and landings between traditional (control) nets and nets without floats on the headline were carried out. Due to the difference in the soaking characteristics of the nets without floats, experimental nets were set adjacent to control nets as opposed to tied together. In 35 controlled sets in depths greater than 32 m, 47% fewer turtles were caught in the experimental nets without floats (9 turtles) than in the control nets (19 turtles). Catch of target fish was very similar in species composition and quantity between the two designs, with 649 and 653 kg of fish landed in the experimental and control nets, respectively. While encouraging, the researchers concluded that further trials are required to determine whether nets without floats catch significantly fewer turtles (Peckham *et al*., 2009).

Experiments conducted in 2006/2007 also in Baja off Mexico indicated that changing the visual cues associated with gillnets can help in reducing sea turtle bycatch (Wang *et al*., 2009). Illuminating nets with battery-powered LED lightsticks reduced the catch rates of

green sea turtles in gillnet fisheries for elasmobranchs and halibut by 40% with no change in target fish catch rates.

Additional studies examining the effects of placing shark shapes were also conducted. Sharks are a primary predator of sea turtles and observations with captive reared loggerhead turtles suggest that shark shapes trigger an escape response, indicating that the shark shapes could be useful as a sea turtle deterrent (Higgins, 2006). Trials carried out gave a reduction in sea turtle catch rates of 54% when shark shapes were incorporated in gillnets used in a commercial bottom fishery, but the targeted fish catch rates also decreased by 55%. Possible reasons for this decline in target fish catch include flight responses of the target species to the shark shapes or the shapes interfering with the net's ability to catch fish. Nonetheless, these results are intriguing in that they provide evidence that sea turtles initiate escape behaviours in response to shark shapes and confirm a potential utility of a shark shape "scarecrow" technique to reduce turtle bycatch in other settings that have sea turtle interactions.

US

The North Carolina Division of Marine Fisheries (NCDMF) conducted two studies, in 2001 and 2004, to identify a potential gillnet gear that can reduce sea turtle interactions, while maintaining catches of southern flounder (*Paralicthys lethostigma)* in this fishery in the Pamlico Sound, North Carolina. A modified, low-profile gillnet performed well in these studies where flounder catches were maintained and no sea turtle interactions occurred. A follow-up designed to further test and evaluate the low-profile gillnet (test) configuration compared with the standard gillnet (control) historically used in this region was tested in 2006. The 2006 results were combined with the two previous studies to reveal that the modified gillnet configuration effectively reduced sea turtle interactions, maintained acceptable levels of target catches (to the industry) and reduced overall bycatch. In addition to the applicability of this modified gear in the deep-water region of Pamlico Sound during the fall southern flounder fishery, the low-profile gillnet merits further examination in other fisheries where similar sea turtle bycatch issues exist.

West Indies

There is a high bycatch of critically endangered leatherback turtle (*Dermochelys coriacea*) in the coastal gillnet fisheries for king mackerel (*Scomberomorus cavalla*) and Spanish mackerel (*Scomberomorus brasiliensis*) off Trindad (Gearhart *et al*., 2009). Extensive trials conducted in 2007 from the ports of Matelot and Toco tested low profile gillnets of 50 meshes deep (i.e. 5 metres) against standard 100 mesh deep nets (10 metres). All trips were conducted on traditional fishing grounds along the northern and eastern Coasts of Trinidad. Nets were set at dusk and soaked up to 8 hours. For all experiments, a matched-pair experimental design was used with alternating control and experimental nets. A total of 121 leatherback turtles were captured with only two mortalities. The experimental net retained 29 turtles, while the control net-captured 92. Target catch was also reduced with the experimental net, catching 35% less king mackerel and 55% less Spanish mackerel. This work has demonstrated that the use of nets that have a lower profile and that are set to target the depth of the preferred species provide good economic return, while at the same time reducing turtle bycatch. Results differed between ports with the experimental net reducing turtle bycatch by 11% in Matelot and 74% in Toco. This difference was attributed to lights used to mark nets in Matelot, which may have

attracted turtles to a specific portion of the gear. In 2008, 50 mesh nets configured with experimental red monochromatic lights were tested against control nets rigged with white lights. No statistically significant difference in turtle catch rate between nets with white light and those using red lights but fish catch rates were far higher in nets equipped with red lights.

Work has also been carried out to develop trolling as a viable alternative method to gillnetting, and while it exhibits a slightly lowered economic return, its complete elimination of turtle bycatch means that this method could replace gillnets during times of high turtle abundance. For 2009, it is intended to continue tests on gillnets as well as introduce incentives to fishers to replace traditional drift gillnets with trolling during part of the year.

5.6 Sea turtles-trawl fisheries

US

A Data Logger to assess tow times from bottom-trawlnets was recently designed and approved by the National Marine Fisheries Service (NMFS). The objective of the data logger is to record and monitor tow durations (all with other parameters) for enforcement purposes. Tow duration restrictions are being considered as a mitigation measure to reduce incidental bycatch of sea turtles in US Northwest Atlantic bottom-trawl fisheries. The data logger is designed to mount onto the trawl doors. The data loggers: 1) can measure the amount of time gear is in the water at depth; 2) can operate to depths <=300 meters; 3) are tamper resistant; 4) are robust to withstand harsh environmental and working conditions; 5) have a long battery and battery life indicator; 6) can download data transfer; 7) are affordable; 8) have instructions on installation and operation of the unit; 9) have unique serial number; 10) and have manual for operating the unit. Enforcement options include dockside enforcement to see if logger alarms have been triggered if specified tow times have been exceeded or by downloading data onto a shuttle. At-sea enforcement possibilities include checking for logger installation and LED signals for alarm warnings. The data logger is currently being field tested. A final report should be available in 2011.

5.7 Seabirds

US

In 2009, a pilot study on seabird interactions with paravanes was carried out in the North Pacific off Alaska as reported by Benaka (2009). A paravane is a device that trawl operators use to obtain signals from net monitoring equipment. The paravane receives acoustic signals as it is deployed at five or more fathoms deep via a boom alongside the vessel. This study concentrated on investigating the level and type of interaction with paravanes, as well as testing a variety of mitigation measures. To provide insight into levels of seabird interaction, seabird abundance data were collected at various periods daily during one trip on board a commercial vessel. Interaction rates varied from 0–138 per 15 minute observation session and all were by Northern Fulmars (*Fulmaris glacialis*). Interactions involved the paravane cable itself rather than the various lines supporting or controlling the paravane boom. Six different types of mitigation measures to reduce the level of interaction with the paravane were then tested although there is little information on the actual measures tried during this study.

New Zealand

A new device has been developed in New Zealand to reduce seabird bycatch in longline fisheries. This underwater baited hook system recently won first prize in the WWF Smartgear competition (WWF, 2009). It is a stern-mounted, hydraulically driven device setting baited hooks underwater, below vessel propeller turbulence, in a method much different from setting baits on the water's surface. It was tested in March 2009, when researchers set 300 underwater baited hooks from a longline vessel. Results demonstrated that bait quality and bait retention on hooks were not affected by the new method of deployment, so that use of the device is unlikely to affect the catch rates of target and non-target fish species. On the basis of this short trial the researchers concluded that this was potentially a workable alternative to baited hooks on the water's surface, and has the potential to eliminate the mortality of surface-seizing species such as albatrosses, and to reduce or eliminate the mortality of deep-diving species such as white-chinned petrels, shearwaters and grey petrels. It may also enable fishing at any time of the day or night cycle, and in all seasons; including in seabird breeding seasons, when interactions are most intense. Further testing will be carried out in 2010.

5.8 Elasmobranchs-gillnets and longlines

US

The potential for modifying gillnets to reduce shark bycatch was investigated in the North Carolina Spanish mackerel and spot gillnet fisheries as reported by Thorpe and Frierson, 2009. The modified net had larger floats on the headrope and increased weight on the lead-line to increase the tension of the net. Results demonstrated that the catch rate of some shark species including blacknose (*Carcharhinus acronotus*), blacktip (*Carcharhinus limbatus*) and bonnethead (*Sphyrna tiburo*) were significantly reduced in the modified gillnets. Target catch rates of Spanish mackerel did not differ significantly between control and modified nets of the same mesh size. These results demonstrated that modified gillnets may have the potential to reduce shark bycatch, particularly for those species for which wrapping was the primary entanglement mode.

A field trial to investigate the utility of using cerium ("mischmetal" a rare-earth metal cerium/lanthanide alloy) to reduce the bycatch of spiny dogfish was conducted in the setline fishery for Pacific halibut in Alaska, during September 2007 (Kaimmer and Stoner, 2008). Three hook types were interspersed on 36 longline sets; standard circle hooks, hooks with cerium mischmetal attached above the hook, and hooks with a similar but inert piece of mild steel attached above the hook. Fewer dogfish were observed caught on hooks with cerium mischmetal than on the other two hook types. In addition these hooks reduced the catch of longnose skate. There was no difference in halibut catch between the three hook types. However, the authors note a number of limitations in the use of mischmetal in commercial fisheries. These include expense, safety and the relatively rapid hydrolysis in seawater.

Similar field studies testing triangular slices of the "mischmetal" incorporated into longlines and rod-and-reel gear to assess its effectiveness in reducing catches of spiny dogfish (*Squalus acanthias*) in the Gulf of Maine are reported by Tallack and Mandelman (2009). Treatment catches (mischmetal present) were compared with control (no mischmetal) catches. Laboratory studies provided video-taped, behavioural observations on the effects of alloys under variable levels of food deprivation and dogfish density. No signifi-

cant reductions in dogfish catch were recorded for either rod and reel or longline, and *in situ* video footage verified persistent dogfish feeding behaviour, regardless of mischmetal presence. The laboratory trials found some evidence of avoidance behaviour in dogfish approaching treatment baits, but only with dogfish fed to satiation; no aversion to the material was observed after two and four days of food deprivation. Dogfish density had no effect on feeding behaviour in the laboratory. Overall, there is little evidence to suggest that mischmetal can significantly reduce catches of dogfish in hook gears in the Gulf of Maine.

5.9 Conclusions

- Over the last twenty years there has been a large amount of testing of acoustic deterrent devices in a wide variety of fisheries. Taking cognisance of the review carried out in the US reported by Palka *et al*. (2008), SGBYC would see this as an opportune time to review all pinger data and try to establish the following:
  1) How effective are the devices and for which species;
  2) What are the appropriate acoustic specifications that should be used;
  3) What is the appropriate spacing;
  4) How they should be deployed;
  5) Appropriate testing equipment both in and out of water;
  6) Level of compliance;
  7) Costs;
  8) Evidence of habituation.

In this respect SGBYC notes that the Consortium for Wildlife Bycatch Reduction plans to hold a workshop in Boston in 2011 to consider mitigation measures for protected species. SGBYC would fully endorse this initiative and would encourage one of the outputs from this Workshop be a collation and analysis of pinger data.

- SGBYC notes the encouraging results from the trials with treated and stiff gillnets in South America but would caution that these results are only preliminary and from an artisanal fishery which would not be representative of most European gillnet fisheries. SGBYC therefore feels that at the moment this should be considered as "work in progress" and the results should be closely monitored.
- SGBYC notes the development of pots for cod as an alternative to gillnets in the Baltic and other areas as a way to reduce bycatch of marine mammals and seabirds. SGBYC believes that these gears should be tested further but based on current research are seen only as a viable alternative economically in only a few fisheries that specifically target cod.
- SGBYC notes there seems to be a large amount of research into mitigation of sea turtle bycatch in trawl, longline and gillnet fisheries outside Europe. However, SGBYC has found that, other than work in the Mediterranean being conducted by Spain, there seems to be little research on mitigation of turtle bycatch in other European countries, yet there is evidence of high bycatch levels in some fisheries e.g. trawl fisheries in the Central Adriatic, Tunisia and the

North-east Mediterranean and gillnet fisheries in the Adriatic and Mediterranean. SGBYC therefore is of the opinion that more emphasis be put on the development and testing of mitigation devices in such fisheries.

- SGBYC has identified a large amount of work being conducted on the monitoring and mitigation of seabird bycatch in longline fisheries globally. However, SGBYC has found little evidence of development and testing of mitigation measures in gillnets, although there is evidence of high bycatch rates in some of these fisheries e.g. in the Baltic and North Sea. SGBYC therefore would encourage mitigation measures in these fisheries be prioritized and in this regard would highlight the recommendation made at the 27th Session of the FAO Committee on Fisheries (COFI) in 2007, that technical guidelines developed as part of NPOA's for seabirds should be extended to other relevant fishing gears (e.g. gillnet and trawl fisheries) (ICES, 2009d).
- SGBYC has identified only limited work into the mitigation of elasmobranch bycatch. In many cases this is due to the fact that the species in question have a commercial value. SGBYC would, however, encourage the development and testing of mitigation measures in particular for the larger elasmobranch species. SGBYC notes there is a theme session at the ICES ASC in 2010 which specifically deals with mitigation of elasmobranch bycatch, which should help to identify ongoing work in this area.

Given the identified weaknesses in 812/2004 SGBYC considers that a properly funded research programme to improve the provisions of the regulations, including the development of more reliable and efficient pingers is required.

6 ToR D: Compilation of bycatch data and the development of a protected species bycatch database

One of the recommendations from SGBYC 2009 was to work between meetings to input data from existing National Reports on Regulation 812/2004 into an Access database. Work on this task commenced in October 2009 prior to a final standard reporting format being agreed and published by the European Commission. The database structure is therefore based on the proposed European Parliament (EP) format issued in September 2009 and on previous development of a database at SGBYC 2009 (ICES 2009a). The scope of the database includes not only the mandatory monitoring required under Regulation 812/2004 and to scientific studies and pilot projects mentioned in the same regulation, but also to observations not required under 812/2004, for example observations on bycatch in areas where monitoring is not required, or even for species that are not covered under 812/2004. Cosgrove (2010, this meeting) provided an overview of the data structure and some of the issues involved in implementing a data schema.

Data collated at SGBYC meetings in 2008, 2009 and 2010 data have now been used to populate the SGBYC database. A set of standard spreadsheets has been developed based on the database tables to permit data collected in future to be pasted directly into the database tables: The database was used to generate the tables referred to in the present report under ToR A (Annex 3: Tables A3.1–A3.4). This was a significant step forward in trying to collate observer data relating to the 812/2004 Regulation at a European level. It is intended the spreadsheets will be used by SGBYC to compile data collected in Member State Reports in 2010 as well, though continued refinement is likely to be necessary in the light of experiences gained during collation and report production and after an agreed reporting format has finally been laid down at a European level.

A number of issues were raised and discussed during the meeting. One of the most problematic concerns the level of detail to which fisheries or métiers should be described in any such database. The Study Group recognized that there are two distinct purposes in the development of a protected species bycatch database; one is to be able to store, query and tabulate results of monitoring conducted under Regulation 812/2004 in such a way as to be able to assess the extent to which national obligations have been met. A second purpose may be, ultimately, to enable bycatch estimates to be generated at a regional level by combining observations from different nations employing the same fishing techniques in the same areas. A necessary aspect of this work might involve assessing the extent to which any existing sampling is biased.

For the former task, aggregated data will suffice, as the regulation requires monitoring based on strata that are not very detailed (for example on pelagic trawlers in the North Sea). The SG agreed that a more detailed description of fishing effort (for example by target species, by season, by vessel size and by ICES division) would potentially be much more useful in the longer term.

There was considerable discussion about how fishery strata might be defined and redefined from year to year. No consensus on the correct way to do this was achieved but it was agreed that there would inevitably be a period of time during which such issues would be debated and the resulting data tried and tested before consensus on the best approach would be achieved. The Study Group agreed to continue to try to collate observer and effort data intersessionally and consider the consequences of the current pro-

posed data structure once again at the next meeting once an agreed reporting format had been agreed at the EU level. It also agreed to continue to review and develop the database intersessionally, and specifically to find ways to facilitate more detailed analyses. A subgroup was agreed to take forward discussion on how to refine the database in concert with improving the quality of data, for example by incorporating finer scale data. Couperus, Cosgrove, Fortuna, Lens, Lunneryd, Morizur, Northridge and von Dorrien agreed to form this subgroup to report back to the Group at its next meeting; Cosgrove agreed to coordinate this subgroup.

A description of the current database structure is proved in Annex 5 taken from the paper presented by Cosgrove at the meeting.

7 ToR E: Assess the scale of relevant discard survey data available at a national level and update the discard survey table

The Study Group reiterated its view that data that are being and have been collected under the Data Collection Regulations (DCR) and more recently the Data Collection Framework (DCF) that could provide some very useful insights into the nature, occurrence and extent of bycatch of protected species in a range of European fisheries that would otherwise not be prime candidates for protected species bycatch monitoring.

The Study Group was fully aware that protected species monitoring is not mandated by the DCF, but nevertheless several member states do collect records of protected species bycatch on a voluntary basis. The Group again emphasized how important it is to know whether protected species bycatch records are being collected or not, as observations of 'no-bycatch' are as important as observation of bycatch, and an absence of records could indicate either that no bycatch was observed or that no bycatch monitoring occurred. Only limited information on which member states collect records of bycatch under the DCF programme was available, summarized in Table 3 below.

Table 3: Bird and mammal data collected under DCR/DCF by country.

Member state	Voluntary collection of bird mammal turtle data?	Year that such data collection was started
Belgium		
Cyprus		
Denmark		
Estonia		
Finland		
France	Yes (birds in comment field)	2009
Germany	Yes	2006
Greece		
Ireland	Yes (not birds)	
Italy	Yes (In theory)	2008
Latvia		
Lithuania		
Malta		
Netherlands	Yes	2003
Poland		
Portugal		
Spain	Yes	2000 (but inconsistent)
Slovenia		
Sweden	Yes (birds unclear)	2004
UK	Yes	2003

Some concerns were expressed that although there may be a commitment or wish on the part of national discard survey co-ordinators to collect protected species bycatch, individual observers may not always fulfil this commitment. There are therefore concerns regarding data consistency and validation.

Monitoring for protected species bycatch under Regulation 812/2004 is targeted at fisheries that were expected to have the highest bycatch rates of cetaceans at the time the Regulation was drafted. With hindsight it is evident that this targeting was based on was flawed, and as a result some sampling effort has not been deployed optimally. An analysis of 'background information' from discard sampling could help to focus protected species sampling in a more effective way.

Any protected species with a low bycatch per day at sea in a particular fishery could nevertheless experience a significant level of bycatch at a population level if the fishery concerned is large enough, so a large number of observations from large-scale fisheries could help determine the likely maximum bycatch rates of protected species in that fishery. For example, there have been numerous anecdotal accounts of porpoise bycatch in demersal trawl fisheries. Observations under the DCR/DCF where any porpoise bycatch would have been recorded can enable us to determine the likely maximum rate in any given demersal trawl fishery even if there are zero bycatch records, as long as it is clear that observers had been tasked to take such records while collecting commercial fish discard or biological data, and have been able to do so.

The Study Group suggested at last year's meeting that better coordination with PGCCDBS would be a useful way to ensure a better flow of information from the DCF to SGBYC. The Chair had been in contact with one of the co-chairs of the PGCCDBS; he suggested that it would be useful to identify a 'data contact person' within SGBYC who could attend the PGCCDBS meeting and channel requests for information through PGCCDBS. During discussion of this point, two opinions were expressed within the Group. One was that relevant data from the discard monitoring schemes should be sought from national discard co-ordinators without addressing PGCCDBS. This is because SGBYC does not need to influence the planning of discard sampling schemes and has no role under the DCF, while the data required should be readily accessible nationally. The other view was that obtaining such data would be easier if PGCCDBS were to endorse a general request for data on protected species bycatch and some quantification of relevant levels of monitoring by métier. Discard data programme managers are usually busy, and a task endorsed through PGCCDBS would be more likely taken seriously. It was also suggested that engaging with PGCCDBS would enable the issue of bycatch of protected species to be included in future ecosystem approaches to management. It was agreed that both approaches had merit and neither need preclude the other. The Study Group agreed that it would be useful for a member of SGBYC to attend future meetings of PGCCDBS.

Couperus and Northridge agreed to take the matter forward, and although neither was able to attend the PGCCDBS meeting in 2010 (in March). Instead they prepared a short PowerPoint presentation on the work of SGBYC that was delivered to the meeting. The PGCCDBS expressed its thanks and welcomed SGBYC participation and exchange of data.

The SG was unable to update last year's database on national discard survey data, but recommended that continued working with PGCCDBS would be one way to progress this aim.

The Group also learned that France has revised its strategy for on-board sampling, and has now integrated cetacean sampling within an overall sampling scheme.

Morizur presented an overview of discard and bycatch sampling in France. In July 2009 the Ministry of Fishing had decided to merge all the EU observer requirements (EC regulations relating to, inter alia, deep-sea species, yellow fin tuna and deep set-nets, as well as those mandated under the DCF and Reg 812/2004) and national at-sea monitoring projects. The objective of the changes was to improve economic efficiency in the collection of data and to avoid too many observers interacting with the same vessels.

Ifremer has prepared a sampling scheme for the Ministry who contract directly with observer companies. The scheme is targeted at level five fleet details as requested by the DCF (although Reg 812/2004 requires observations only at level three). The scheme is now stratified by quarter and not by month as the previous scheme dedicated to the Reg 812/2004 had been. The trip has been chosen as the sampling unit instead of the day at sea, because the variability of fish catch was considered higher between trips than between days.

For each métier, all the requests are listed by quarter and the sampling intensities are decided in order to satisfy all requirements.

A standard protocol has been prepared for the observations of the total catch on board and all the new forms and manuals were made available to the observer companies through Ifremer's extranet. When fish catch is sampled only in a part of each fishing operation, cetacean as well as rare elasmobranch species have to be observed in all the fishing operations.

The scheme established for the year 2010 comprises the North Sea, the Atlantic area and the Mediterranean Sea. It requires around 1000 trips to be monitored representing more than 3000 days at sea. For cetacean bycatch it presents the advantage of providing information on segments of fleets other than those requested by the 812/2004 (e.g. set-nets in Mediterranean area).

The Group also discussed the merits and problems associated with integrating cetacean or other protected species bycatch monitoring with the discard and biological sampling programmes. Ensuring that all observers are able to carry out all on-board sampling tasks, whether they relate to discards, biological sampling or bycatch monitoring-as is the case in the USA-has clear advantages in terms of efficiency. Where such observers are working for the same organization, it can also ease relations with skippers who may otherwise be confronted by more than one agency attempting to sample their boats at the same time. The SG discussed whether or not it was truly possible to monitor protected species bycatch and conduct discard sampling at the same time. Examples were given where discard sampling officers had ignored protected species bycatch. However, it was noted that an integrated programme exists within the USA where observers are trained to be able to undertake a number of different tasks, and a protocol is established whereby different tasks can be given different priorities, if necessary on a trip by trip basis. It was suggested that to some extent the success of integrated schemes depends on the culture within the organization conducting the monitoring, and that clear guidance and protocols can help overcome some of these issues.

Less easy to address are problems arising from very different stratifications needed to address protected species bycatch and discard or biological sampling. Protected species bycatch monitoring is usually accorded less importance in Europe than discard and biological sampling, and integrating the two schemes runs the risk of obscuring objectives

for the former. One concern raised over the integration of monitoring in France was that detailed data collection on fish catches and discards could make skippers less likely to agree to take an observer. Furthermore, other problems may arise where fleet stratifications devised to monitor discards are used to monitor protected species bycatch rates, making the raising procedure much more difficult.

The Study Group recognized that this is a difficult issue to address, but agreed that better integration between protected species bycatch monitoring and monitoring under the DCF could be achieved, with a long-term aspiration that European observers could be trained to an agreed and uniform standard, able to undertake either task with equal effectiveness. This discussion was picked up again later and extended under ToR G.

8 ToR F: Technical aspects of bycatch monitoring and assessment

8.1 Introduction

Under this ToR, the Study Group examines tools and mechanisms for improving protected species bycatch monitoring and assessment. The ToR is deliberately vague, and does not address a specific request for Advice. Rather, it addresses some of the scientific justifications of the Group, specifically to "examine methodologies of bycatch estimation" and to "coordinate activities conducted under EU Regulation 812/2004".

For the 2010 meeting the Group had agreed to focus on how representative monitoring data are with respect to the fleet data. There were several useful papers that were brought to the Group's attention under this topic. In addition, presentations from Ólafsdóttir, from Kindt-Larsen and from Lunneryd, updated the Group on recent bycatch monitoring work in Iceland (on sampling methods used), and in Denmark and Sweden (on electronic monitoring) respectively.

8.2 Sampling methodology: representativeness of bycatch monitoring data

The SG noted that the issues of bias and precision in monitoring and raising of samples to fleet levels had recently been the subject of three ICES workshops under the aegis of PGCCDBS. WKDRP (ICES 2007) had established a set of common best practices to be used to raise discard survey data to fleet level. The Workshop had demonstrated that particular raising methods can underestimate or overestimate discard sampling estimates in a systematic manner. A raising procedure key was elaborated to assist in managing discard survey schemes.

WKACCU (ICES 2008b) had examined the issue of bias in discard and assessment sampling, and had developed a practical framework for detecting potential sources of bias in fishery data collection programmes. A list of key parameters that might contribute to bias in estimating stock parameters or discard levels was drawn up, including species identity, landings weight, fishing effort and various biological parameters measured in the sampled fish. A simple score card was then developed where each indicator was rated green, yellow or red according to the perceived risk of bias.

WKPRECISE (ICES 2010) considered aspects of precision and focused on survey design requirements and best practices in data collection programmes to facilitate the quantification of precision of estimates. In particular, clustering effects caused by multistage sampling were considered; estimators or key parameters must take appropriate account of the hierarchical structure of the data. The Workshop was only able to give general guidelines for the estimation of precision as the detailed specifications of estimators are highly dependent on specific programme design.

The SG also noted that similar steps to address bias and precision in estimating discards as well as bycatch estimation had already been taken in the USA. A workshop in 2006 had addressed the issue of vessel selection bias (Volstad and Fogarty, 2006). The Workshop had identified procedures used by US observer programmes to select vessels for observation, identified factors that could cause bias in estimates of catch or bycatch, and had provided recommendations on how to improve designs and procedures for reducing bias. Based on results from a questionnaire and workshop discussions the causes for bias were classified into three broad categories.

a) Errors in the sampling frame;

b) bias caused by how vessels within the sampling frame are selected for observation;

c) bias caused by changes in fishing behaviour in the presence of observers.

Failure to identify and include all 'active' vessels within a fleet or fishery results in a biased sampling frame. The list of vessels should be as complete and current as possible and reflect active fishing vessels. A 'call-in' system is a means of ensuring that a sampling frame is current. When vessels call-in to report a planned trip it provides an active list of vessels that is adaptable in season changes of vessel activity.

Six methods of selecting vessels from the sampling frame were identified by the Workshop. These were:

1) census-100% coverage (eliminates bias but prohibitively expensive);

2) random sampling with replacement (most cost-effective means of reducing bias in general-caveats are safety concerns and vessel size that impede observer placement);

3) stratified random sampling with replacement (same as #2);

4) stratified random sampling without replacement (same as #2);

5) systematic random sampling (same as #2);

6) *ad-hoc* selection of vessels (most likely to produce bias; however *ad hoc* selection of vessels, with full compliance may not cause any more systematic bias than a random selection with poor compliance).

Other factors in addition to sampling frame errors and the selection of vessels could contribute to potential bias.

1) Refusals;

2) Safety concerns for the observer;

3) Lack of accommodations (vessel size limitations).

The Workshop concluded that these types of systematic errors cannot be resolved simply by increasing observer coverage of the observable fleet. However, this source of bias is expected to be small if the sampled fleet is characteristic of the fleet in general as a whole. Using video technology to monitor a portion of the fleet that is unobservable is a promising approach for evaluating some types of bias. In addition, vessels owned or leased by the government may be used for a roving survey to observe nearshore vessels that cannot accommodate an observer.

The presence of an observer may cause a change in fishing behaviour (i.e. trip duration, length of tow times/soak durations, or other aspects of fishing operations). This is most likely to occur where quotas are in place, and is the most difficult source of bias to address. Better outreach to improve skipper cooperation may be one way to address this source of bias.

Moving from general considerations of methods to improve bycatch monitoring, the Study Group was informed of recent bycatch monitoring developments in Iceland, and in

particular attempts that have been made to integrate bycatch date from official records, interviews and fishery research cruises.

8.3 Bycatch sampling methods used in Iceland

Fisheries data from the Icelandic fishing fleet are reported to the Directorate of Fisheries. Information on marine mammal and bird entanglements in fishing gear should also be included in these reports. Between 2002 and 2008 a total of 1676 marine mammals were reported from the Icelandic gillnet fishery. Instances of zero bycatch are not reported so the usefulness of these data has therefore been questioned as it seems impossible to differentiate between "no bycatch" and "non-reporting bycatch". A questionnaire was sent to all vessels operating in the gillnet fishery in 2004 and followed up by telephone interviews questioning if bycatch had occurred in their fishing in 2002–2004 and whether it was reported in fishery logbooks. They were also asked to estimate total number of harbour porpoises entangled during the previous fishing year.

Information on the ratio of "no-bycatch" to "not-reporting bycatch" was used to analyse the bycatch data on harbour porpoises from the fishery logbook data. Data were stratified by area, two seasons (January–June, July–December) and by year and confidence intervals were calculated using a bootstrap procedure. The assumption was made that every vessel reporting bycatch at least once did so consistently and all their fishing effort was categorized as "reporting" effort in the analyses. The total estimated number of harbour porpoises caught in gillnets was 839 (95% CL = 488–1216), 1049 (95% CL = 505–1599) and 989 (95% CL = 673–1310) in 2002, 2003 and January–June 2004 respectively. The total sum of harbour porpoises from the questionnaire survey as estimated by 136 fishermen themselves (responsible for 37.4% of total fishing effort) as an annual bycatch in the fishing year 2003/2004 was 974 porpoises resulting in a rough estimate of about 2600 porpoises for the whole fleet. Extrapolation of the fishery reported bycatch data to the whole gillnet fishery gave therefore considerably lower estimates of harbour porpoises than self estimates by the fishermen (approx. 1000 against 2600).

A third source of information on harbour porpoise bycatch in the Icelandic gillnet fishery is observer data from fishery research surveys conducted annually in April by the Marine Research Institute. Extrapolation of the bycatch data gave total estimates of harbour porpoises in March and April of 929 animals (95% CL = 291–1418) in 2003 and 958 animals (95% CL = 296–1472) in 2004. These results support the findings discussed above that the fishery logbook data result in underestimated bycatch rates. Underestimations using fishery logbook data may indicate that fishermen who report bycatch may not always do so and the assumption of regarding all their fishing effort as "reporting" effort therefore probably wrong.

In conclusion, self reporting of entanglements of non-commercial species were not considered reliable source of information for estimation of total numbers of bycatches using simple correction factors for non-reporting vessels. The fishery reports may however be useful in identifying potential high risk fisheries and most frequent bycatch species. Fishery report data may also give indications of changes or trends in bycatch rates over longer periods.

8.4 Recent developments in electronic monitoring: Denmark and Sweden

In Denmark and Sweden attempts are being made to improve bycatch monitoring, especially in the small vessel fleet, through the use of electronic monitoring or CCTV systems. In January and February 2008 DTU Aqua carried out a feasibility study that evaluated the use of Electronic Monitoring (EM) technology, developed by Archipelago Marine Research in Canada, for Danish vessels (Dalskov and Kindt-Larsen, 2009) The feasibility study concluded that the combination of proprietary software and extremely durable hardware allows EM systems to collect pertinent at-sea commercial fishery data. EM systems are capable of continuously logging data on vessel position, hydraulic pressure, and winch or drum rotations as well as capturing high quality digital imagery of the catch Based on the results of the feasibility study, DTU Aqua ran a pilot project for the period September 2008 to July 2009, in which six Danish commercial fishing vessels (four trawlers, one seiner, and one gillnetter) had an Electronic Monitoring System installed on board. The aim was to test a fisheries management paradigm shift where vessels, which carried out a fully documented fishery, got additional landing opportunities based on the fact that there was complete catch documentation of retained and discarded cod. The total catch record was audited by use of a sensor system and four video cameras, each filming different angles of the catch handling as well as the discard shute. Since the system is recording all catch events it was noted that the Electronic Monitoring System could also be used for bycatch monitoring of marine mammals. The 14 m gillnet vessel involved in the study, targeting cod, plaice and hake, was equipped with an EM system for 11 months from September 2008 to July 2009, and was monitored for all 119 fishing days over this time period. During 732 hours of video recording a total of three harbour porpoises (*Phocoena phocoena*), one harbour seal (*Phoca vitulina*), two cormorants (*Phalacrocorax carbo*) and one seagull (*Laridae*) were recorded as bycatch on the video system. Kindt-Larsen and Dalskov (2010) concluded that the EM system can be used as a very efficient monitoring method to register marine mammal bycatch and coverage percentages up to 100% can be obtained.

Lunneryd tabled a paper (Tilander and Lunneryd, 2010) summarizing a similar trial in Sweden, with trials involving two gillnetters in the central Baltic Sea during summer 2008 also using a system from Archipelago Marine Research. Video and sensor data recordings, including GPS coordinates, were stored on a removable hard drive, which could hold many weeks' worth of data and was removed later in order to check for bycatches. The time needed for analysing the recordings on dry land was somewhat less than the actual time spent hauling nets, and considerably less than an at-sea observer would have had to spend on board. The system was tested for four months, including 71 days of fishing operations, and proved to be reliable, with only a few days of data lost due to technical problems. The same set-up lends itself to recording bycatches of seabirds and seals; to the documenting of seal-induced damage to catches; and even to monitoring bycatches of non-target fish species. During the study, no porpoises were bycaught, one seal was reported as bycaught but it fell out of the net before it could be filmed and 19 seabirds were bycaught. Results from the monitoring system correlated very closely with the control data obtained from fishermen's logbooks.

The Study was carried out in active cooperation with commercial fishermen A rough projection based on this pilot study suggests that the cost of implementing a full-scale EM monitoring programme should approach as little as one third of the cost of maintaining

an on-board observer programme, and possibly even less. The authors concluded that the EM system should be an effective and relatively cheap way of monitoring bycatches.

The Study Group also agreed that EM systems could be a very useful way of implementing bycatch monitoring at a greater scale and at less cost than using on-board observers, though ground-truthing with on-board observers would still be necessary for a sample of the fleet.

8.5 Topic for 2011

The Study Group agreed that at its next meeting it would focus on national fleet descriptors under this agenda item, which will help in deciding on fleet/métier aggregation criteria. A one page description of the fleet characteristics of each country would be provided by members of the Group, and the Chair agreed to remind members of the Group a month or so before the meeting to do this.

9 ToR G: Review and further develop the proposals for the ICES-NAMMCO Workshop on Observation Schemes for Bycatch of Mammal and Bird Observation Schemes

A proposal from NAMMCO (North Atlantic Marine Mammal Commission) to organize a joint NAMMCO/ICES Workshop on observer schemes to monitor bycatch had been received at the 2009 meeting of SGBYC (ICES 2009a). This suggestion had been approved by the SG and a proposal had been developed intersessionally and submitted to ACOM. ACOM had agreed to this proposal at its November meeting in 2009, and it had been agreed that a joint workshop would be convened in late June 2010. The Terms of Reference as agreed by ACOM are given in Annex 6.

The Study Group agreed to the scheduling of the meeting and a draft agenda was drawn up and agreed at the meeting (Annex 7). A steering group was agreed. Members are Ólafsdóttir, Tasker, Northridge, Rossman and Kindt-Larsen; it was agreed that a sixth member would be recruited from the NAMMCO secretariat, and Christian Lockyer (General Secretary of NAMMCO) subsequently agreed to join the steering committee.

The Study Group agreed that the Workshop might provide a first step in developing a training manual for protected species bycatch observers in Europe, and the Steering Committee agreed to try to find a way of incorporating this into the agenda of the Workshop.

10 ToR H. Respond to European Commission's letter concerning possible advice

The Study Group was informed that just before the meeting, ICES had received a letter from the European Commission asking for an evaluation regarding possible advice on the several topics, listed below:

1) To provide an assessment of the national reports from 2007 and 2008, and specific scientific reports provided by Member States in the context of Reg. 812/2004;

2) Based on the best available knowledge of the cetacean species concerned by Regulation 812/2004 provide an assessment of the population status and map their yearly distribution and density in European waters since 2004;

3) Identify areas outside the scope of Reg. 812/2004 where measures would be necessary to be applied to reduce the incidental catches of cetaceans;

4) Provide an evaluation of mitigation measures currently in place and an assessment on the most recent developments of mitigation measures used to reduce the incidental catches of cetaceans, including information on cost;

5) Following the assessment made in point 4) identify the most efficient mitigation measure for each species concerned by Reg.812/2004 and according to the fishing gear in use."

ICES had replied that SGBYC would attempt to address numbers 1 and 3 to the best of its ability during the present meeting, and that Item 2 would be addressed by WGMME. A fuller response to Items 3–5 could not be answered at such short notice but could be addressed by a further meeting of the Group. Given other commitments and logistic constraints, this would be best convened in autumn of 2010, should this be desirable to the Commission.

Under ToR A, the Study Group made a thorough review of submitted national reports for 2007 and 2008 and some preliminary comments relating to Item 3 above are also addressed in the recommendations derived from ToR A.

11 Any other business

11.1 Future of SGBYC

The Study Group members agreed that the Group serves a very useful purpose and recommended to ACOM that the Study Group should be converted to a Working Group before its next meeting. Draft Terms of Reference would be based on the existing SGBYC Terms of Reference. Northridge agreed to continue as interim Chair for the first meeting of the Working Group, if ACOM agrees to its establishment.

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Annex 2: Agenda and Terms of Reference

2009/2/ACOM25 The **Study Group for Bycatch of Protected Species [SGBYC].** (Chaired by: Simon Northridge, UK) will meet at ICES headquarters in Copenhagen, Denmark, from 1–4 February 2010.

Agenda follows the Terms of Reference. ToR H and I are added.

a) Review annual national reports submitted to the Commission under Regulation 812/2004: collate bycatch estimates and review mandatory and pilot projects and scientific studies carried out under thus regulation;

b) Collate other recent estimates of bycatch of protected species (birds, mammals, reptiles, fish) in the ICES and EU regions;

c) Review ongoing bycatch mitigation trials, compile recent results, upload relevant study details to "the database" and make recommendations for further work;

d) Compile bycatch data intersessionally as described in our 2009 Report, and assess the development and utility "the database";

e) Assess the scale of relevant discard survey data available at a national level and update the discard survey table;

f) Continue to develop technical aspects of bycatch monitoring and assessment to improve and coordinate bycatch monitoring and assessment schemes: specifically in 2010 focusing on the how representative the monitoring data are with respect to the fleet data;

g) Review and further develop the proposals for the ICES-NAMMCO Workshop on Observation Schemes for Bycatch of Mammal and Bird Observation Schemes (WKOSBOMB);

h) Respond to European Commission's letter concerning possible advice;

i) Any Other Business; future of SGBYC.

Annex 3: Tables from ToR A

Table A-1. Fleet descriptions taken from National Reports.

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Belgium	46					Nets	Set gillnet		IV c				
Belgium	47					Nets	Set gillnet		VII d				
Belgium	48					Bottom Trawls	Bottom otter trawl		IV b				
Belgium	49					Bottom Trawls	Bottom otter trawl		IV c				
Belgium	50					Bottom Trawls	Bottom otter trawl		VII a				
Belgium	51					Bottom Trawls	Bottom otter trawl		VII d				
Belgium	52					Bottom Trawls	Bottom otter trawl		VII e				
Belgium	53					Bottom Trawls	Bottom otter trawl		VII f				
Belgium	54					Bottom Trawls	Bottom otter trawl		VII g				
Belgium	55					Bottom Trawls	Bottom otter trawl		VII h				

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Belgium	113	2005		4		Nets	Set gillnet		Ivc, 57, VIId, VIIe, VIIf		No	0	
Denmark	1				>15	Nets	Set gillnet		IIIbcd	All year	Yes	5	
Denmark	2				>15	Pelagic Trawls		mackerel, herring, sprat	IIIbcd	All year	Yes	5	
Denmark	3				>15	Pelagic Trawls		mackerel, herring, sprat	IIIa	All year	Yes	5	
Denmark	4				>15	Pelagic Trawls		mackerel, herring, sprat	IVb	All year	Yes	5	
Denmark	56				>15	Nets	Set gillnet		IIIb,c,d			5	
Denmark	57				<15	Nets	Set gillnet				No	5	
Denmark	58				<15	Pelagic Trawls	Midwater Otter trawl			apr–nov	No	5	
Denmark	59				<15	Pelagic Trawls	Midwater Otter trawl			dec–march	No		
Denmark	60				>15	Pelagic Trawls	Midwater Otter trawl		IIIa,b,c,d,IV,IX			5	
Denmark	61				>15	Pelagic Trawls	Midwater Otter trawl		VI,VII,VIII		No	10	
Denmark	62				>15	Pelagic Trawls	Midwater Otter trawl		VI,VII,VIII		No	5	
Denmark	63				<15	Pelagic Trawls	Midwater Otter trawl				No	5	

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Denmark	116				<15	Nets	Set gillnet	Cod, plaice, Hake	IIIa	All year			pilot
Estonia	5					Pelagic Trawls	Midwater Otter trawl	herring, sprat	IIIabcd	June–September		5	
Estonia	6					Pelagic Trawls	Midwater Otter trawl	herring, sprat	IV & IX	All year		5	
Estonia	64			67	>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	1–12		5	
Estonia	161	2008		2		Nets	Set gillnet	cod, flounder, whiting	IIIb,c,d	1–12	yes		
Finland	7					Nets	Set gillnet		IIId	All year		5	Pilot
Finland	8					Pelagic Trawls		Sprat	IIId south	All year		5	Pilot
Finland	9					Pelagic Trawls		Baltic herring, Sprat	IIId north	From 1 June to 30 September		5	Pilot
Finland	65				>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	7–12		5	
France	10					Pelagic Trawls	Midwater pair trawl	Sea bass	VI, VII & VIII	January to March& December		10	
France	11					Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	January to March& December		10	

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
France	12					Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	January		5	Pilot
France	13					Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		5	
France	14					Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	April to november		5	
France	15					Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	April to november		5	Pilot
France	16					Nets	Set gillnet	Sole	VIa, VIIa,b, VIII abc, IXa	All year		5	
France	17					Nets	Set gillnet	Sole, monkfish, pollack, red mullet	VIa, VIIa,b, VIII-a, b, c, IXa	All year		1	Pilot
France	18					Nets	Set gillnet		VII, IVc	All year		100	Pingers
France	66			532	>15	Nets	Set gillnet	sole, bass, hake	IVc, VII bdehgj, VIIIabce	1–12			
France	67			622	<15	Nets	Set gillnet	sole, bass, hake	IVc, VII bdehgj, VIIIabce	1–12			
France	68			125	>15	Pelagic Trawls	Midwater Otter trawl	Bass, Scad, mackerel, herring, sardine	IVc, VII bdehgj, VIIIabce	1–12			

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
France	114	2007	2009			Pelagic Trawls	Midwater Otter trawl	anchovy, sardine	Mediterranean	1–12	Yes	5	
Germany	69			6	<15	Pelagic Trawls	Midwater Otter trawl		IIIa,b,c , IV, IX			5	
Germany	70			4	>15	Pelagic Trawls	Midwater Otter trawl		VI,VII,VIII			10	
Germany	71			33	>15	Pelagic Trawls	Midwater Otter trawl		IIIa, b, c, d	1–12		5	
Germany	72								VI			2	
Germany	73								VII				
Germany	74								VII				
Germany	162				<15	Nets	Set gillnet	Cod, flounder, herring	IIIa,b,c,	1–12			
Germany	163				>15	Nets	Set gillnet	Cod, flounder, herring	IIIa,b,c,	1–12			
Ireland	75			11	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIa, VIIb, VIa	1–12	Yes	5	
Ireland	76			27	<15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIa, VIIb, VIa	1–12	Yes	5	
Ireland	77			13	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1–12	No	0	
Ireland	78			28	<15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1–12	No	0	
Ireland	79			58	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1–12	Yes	10	

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Ireland	80			6	<15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1–12	Yes	10	
Italy	25			78	>15	Pelagic Trawls	Midwater pair trawl	Anchovy (about 70%) sardines (20%)	GSA 17	1–7, 9–12	Yes	CV <30%	GCFM codes should be entered
Italy	115			9	>15	Pelagic Trawls	Midwater Otter trawl	Anchovy (about 70%), sardines (about 20%)	GSA 16	1–8, 10–12	Yes	CV <30%	
Latvia	85				>15	Nets	Set gillnet	cod	III d	1–12		5	
Latvia	86				>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	1–12		5	
Lituania	26					Pelagic Trawls	Midwater Otter trawl		IIId	All year			
Lituania	27					Nets	Set gillnet		IIId	All year			
Netherlands	28				>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		10	
Netherlands	29					Pelagic Trawls			II, IV, V, VI, VII, VIII	April to November		5	
Netherlands	108	2008		12	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1–3,12	Yes	10	from 2008 onwards pelagic trawl split in single and pair

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Netherlands	109	2008		12	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4–11	Yes	5	from 2008 onwards pelagic trawl split in single and pair
Netherlands	110	2008		2	>15	Pelagic Trawls	Midwater pair trawl	hor, mac, her	VI, VII, VIII	1–3, 12	Yes	10	from 2008 onwards pelagic trawl split in single and pair
Netherlands	111	2008		2	>15	Pelagic Trawls	Midwater pair trawl	hor, mac, her	all exept VI, VII, VIII	4–11	Yes	5	from 2008 onwards pelagic trawl split in single and pair
Netherlands	112	2008		90	<15	Nets	Set gillnet	cod/turbot/flatfish	Ivc	2–6	No	0	Pilot
Poland	30				>15	Pelagic Trawls		Herring, sprat	IIId	Jan–Jun	yes	5	Pilot
Poland	31				>15	Nets	Set gillnet	Cod, flatfish	IIId	Jan–Jun	yes	5	Pilot
Portugal	89				<15	Nets	Set gillnet	several species	VIa, VIIa, b, VIIIa, b and c, Ixa	1–12			
Portugal	90				>15	Nets	Set gillnet	several species	VIa, VIIa, b, VIIIa, b and c, Ixa	1–12			
Spain	32					Nets	Set gillnet	Hake	VIa, VIIb, VIIIabc, IXa	All year		5	Pilot

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
Spain	33					Pelagic Trawls	Midwater Otter trawl	Blue whiting, Horse mackerel, mackerel, Hake, Monk	VI, VII ,VIII & IX	All year		5	Pilot
Spain	93				<15	Nets	Set gillnet	several species	VIa, VIIa, b, VIIIa, b and c, Ixa	1–12			
Spain	94				>15	Nets	Set gillnet	several species	VIa, VIIa, b, VIIIa, b and c, Ixa	1–12			
Spain	95				>15	Pelagic Trawls	Midwater Otter trawl	Blue whitting, Horse mackerel	VI, VII, VIII and IX	1–12			HVO net
Spain	96				>15	Pelagic Trawls	Midwater Otter trawl	Hake	VI, VII, VIII and IX	1–12			HVO net
Spain	117				>15	Nets	Set gillnet	several species	VIIefghj	1–12	yes		pingers in vessels >12m
Sweden	41					Pelagic Trawls		Herring, sprat	IIIa	All year		5	
Sweden	42					Pelagic Trawls		Herring, sprat	IIId	All year		5	
Sweden	43					Pelagic Trawls		Herring, sprat	IVa	All year		5	
Sweden	44					Pelagic Trawls		Herring, sprat	IVb	All year		5	
Sweden	45				>15	Nets	Set gillnet	cod, flatfish	IIId	All year		5	
United Kingdom	34	2007			>15	Pelagic Trawls		Mack,her, b whit, hr mack, sard, sprat, bass, anch	VI,VII & VIII	Dec, Jan–March		10	

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
United Kingdom	35	2007			>15	Pelagic Trawls		her, blue whit, hr mack, mack, sard, sprat, anchov	VI,VII & VIII	April to November		5	
United Kingdom	36	2007			>15	Nets	Set gillnet	Monkfish, hake, pollack	VIa, VIIab, VIII	All year		5	
United Kingdom	37	2007			>15	Nets	Driftnet	bass	VIIef	Dec, Jan–March		5	
United Kingdom	38	2007			>15	Pelagic Trawls		Mackerel	IV	All year		5	
United Kingdom	39	2007			>12	Nets	Set gillnet	Monkfish cod	IV	All year			Pilot
United Kingdom	40	2007			>12	Nets	Set gillnet	Turbot, cod, Pollack, ling, hake, monk	VIIdefghj	All year			Pilot
United Kingdom	98	2005	2006			Nets	Purse seine		VIIe	1–12			ringnet
United Kingdom	99	2005	2006			Nets	Set gillnet		VII	1–12			
United Kingdom	100	2005	2006			Nets	Set gillnet		VII	1–12			Tanglenets
United Kingdom	101	2005	2006			Bottom Trawls	Bottom otter trawl		VIIe	1–12			
United Kingdom	102	2005	2006		>15	Pelagic Trawls	Midwater Otter trawl		III, IV, IX	1–12		0	
United Kingdom	103	2005	2006		<15	Pelagic Trawls	Midwater Otter trawl	herring, sprats	IV	1–12		5	
United Kingdom	104	2005	2006		>15	Pelagic Trawls	Midwater Otter trawl	Mackerel, blue whiting	VI, VII, VIII	1–3, 12		10	

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
United Kingdom	105	2005	2006		>15	Pelagic Trawls	Midwater Otter trawl	Herring and mackerel	VI, VII, VIII	4–11		5	
United Kingdom	106	2005	2006	2	<15	Pelagic Trawls	Midwater Otter trawl	Bass, sprats	VI, VII, VIII	1–3, 12			
United Kingdom	107	2005	2006		<15	Pelagic Trawls	Midwater Otter trawl	Sprats, bass	VI, VII, VIII	4–11			
United Kingdom	118	2008	2008		<15	Nets	Drift net	Dover sole	IVc				
United Kingdom	119	2008	2008		<15	Nets	Drift net	Thornback Ray	IVc				
United Kingdom	120	2008	2008		<15	Nets	Drift net	Bass	VIIa				
United Kingdom	121	2008	2008		<15	Nets	Drift net	Bass	VIId				
United Kingdom	122	2008	2008		<15	Nets	Set gillnet	Cod	IVb				
United Kingdom	123	2008	2008			Nets	Set gillnet	Bass	IVc				
United Kingdom	124	2008	2008			Nets	Set gillnet	Dover sole	IVc				
United Kingdom	125	2008	2008			Nets	Set gillnet	Ray	VIIa				
United Kingdom	126	2008	2008			Nets	Set gillnet	Bass	VIIa				
United Kingdom	127	2008	2008			Nets	Set gillnet	Flounder	VIIa				
United Kingdom	128	2008	2008			Nets	Set gillnet	Plaice	VIIa				

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
United Kingdom	129	2008	2008			Nets	Set gillnet	Ray	VIIa				
United Kingdom	130	2008	2008			Nets	Set gillnet	Dover sole	VIId				
United Kingdom	131	2008	2008			Nets	Set gillnet	Ray	VIId				
United Kingdom	132	2008	2008			Nets	Set gillnet	Bass	VIIe				
United Kingdom	133	2008	2008			Nets	Set gillnet	Brill	VIIe				
United Kingdom	134	2008	2008			Nets	Set gillnet	Cod	VIIe				
United Kingdom	135	2008	2008			Nets	Set gillnet	Dover sole	VIIe				
United Kingdom	136	2008	2008			Nets	Set gillnet	Hake	VIIe				
United Kingdom	137	2008	2008			Nets	Set gillnet	Lobster	VIIe				
United Kingdom	138	2008	2008			Nets	Set gillnet	Monkfish	VIIe				
United Kingdom	139	2008	2008			Nets	Set gillnet	Plaice	VIIe				
United Kingdom	140	2008	2008			Nets	Set gillnet	Pollack	VIIe				
United Kingdom	141	2008	2008			Nets	Set gillnet	Ray	VIIe				
United Kingdom	142	2008	2008			Nets	Set gillnet	Red Mullet	VIIe				
United Kingdom	143	2008	2008			Nets	Set gillnet	Spider Crab	VIIe				
United Kingdom	144	2008	2008			Nets	Set gillnet	Turbot	VIIe				

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
United Kingdom	145	2008	2008			Nets	Set gillnet	Whitefish	VIIe				
United Kingdom	146	2008	2008			Nets	Set gillnet	Hake	VIIf				
United Kingdom	147	2008	2008			Nets	Set gillnet	Lobster	VIIf				
United Kingdom	148	2008	2008			Nets	Set gillnet	Monkfish	VIIf				
United Kingdom	149	2008	2008			Nets	Set gillnet	Pollack	VIIf				
United Kingdom	150	2008	2008			Nets	Set gillnet	Ray	VIIf				
United Kingdom	151	2008	2008			Nets	Set gillnet	Red Mullet	VIIf				
United Kingdom	152	2008	2008			Nets	Set gillnet	Spider Crab	VIIf				
United Kingdom	153	2008	2008			Nets	Set gillnet	Turbot	VIIf				
United Kingdom	154	2008	2008			Nets	Set gillnet	Hake	VIIg				
United Kingdom	155	2008	2008			Nets	Set gillnet	Monkfish	VIIg				
United Kingdom	156	2008	2008			Nets	Set gillnet	Pollack	VIIg				
United Kingdom	157	2008	2008			Nets	Set gillnet	Turbot	VIIg				
United Kingdom	158	2008	2008			Nets	Set gillnet	Hake	VIIh				
United Kingdom	159	2008	2008			Nets	Set gillnet	Pollack	VIIj				

Country	Fleet ID	Fleet Start Year	Fleet End Year	No of Vessels	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Target Coverage	Comments
United Kingdom	160	2008	2008			Pelagic trawls	Midwater Pair trawl	Bass	VIIe				

Table A-2(i). National fleet effort and observed effort for set-nets.

						Fleet Effort						Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Type of Pilot study	Coverage (%)
	Denmark	1	477	1–2	IIIbcd									0					0
	Estonia	161	597	1–12	IIIb,c,d	2						1	1	13	130 000				
	France	17	523	1–12				13 120					265	265			1531	2	2
	France	16	522	1–12				10 668					46	210			492	1	2
	Lituania	27	605	1–12	III d	3		323				0	0	0	0	0	0		0
	United Kingdom	129	562		VIID								3	5			10	11	
	United Kingdom	138	571		VIIE								35	55			124	11	
	United Kingdom	137	570		VIIE								1	8			1	11	
	United Kingdom	136	569		VIIE								2	15			23	11	
	United Kingdom	135	568		VIIE								16	19			92	11	
	United Kingdom	134	567		VIIE								2	2			12	11	
	United Kingdom	133	566		VIIE								2	7			7	11	
	United Kingdom	132	565		VIIE								1	1			1	11	
	United Kingdom	139	572		VIIE								1	2			15	11	
	United Kingdom	130	563		VIID								14	15			53	11	
	United Kingdom	125	558		VIIA								1	2			4	11	

						Fleet Effort						Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Type of Pilot study	Coverage (%)
	United Kingdom	128	561		VIIA							6	6				21	11	
	United Kingdom	127	560		VIIA							2	2				6	11	
	United Kingdom	126	559		VIIA							1	2				5	11	
	United Kingdom	124	557		VIIA							22	24				110	11	
	United Kingdom	159	592		VIIE							1	9				38	11	
	United Kingdom	158	591		VIIJ							2	16				13	11	
	United Kingdom	131	564		VIIE							4	4				23	11	
	United Kingdom	149	582		VIIF							1	8				50	11	
	United Kingdom	155	588		VIIG							1	5				10	11	
	United Kingdom	140	573		VIIE							14	14				138	11	
	United Kingdom	154	587		VIIG							5	38				38	11	
	United Kingdom	123	556		IVC							2	2				14	11	
	United Kingdom	153	586		VIIG							4	14				31	11	
	United Kingdom	152	585		VIIF							3	5				9	11	
	United Kingdom	157	590		VIIH							2	6				12	11	

						Fleet Effort						Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Type of Pilot study	Coverage (%)
	United Kingdom	150	583		VIIF								2	4			14	11	
	United Kingdom	156	589		VIIG								1	8			50	11	
	United Kingdom	148	581		VIIF								4	4			6	11	
	United Kingdom	147	580		VIIF								4	21			15	11	
	United Kingdom	146	579		VIIF								7	52			71	11	
	United Kingdom	145	578		VIIF								2	5			3	11	
	United Kingdom	144	577		VIIE								12	21			78	11	
	United Kingdom	143	576		VIIE								4	4			24	11	
	United Kingdom	142	575		VIIE								1	1			4	11	
	United Kingdom	141	574		VIIE								3	7			25	11	
	United Kingdom	151	584		VIIF								2	7			6	11	
<15	Denmark	116	527	9–12	IIIa	1	37	37	12		37	1	37	37	12		37	camera	100
<15	Germany	162	619		IIIa,b,c	97						2							0.03
<15	Ireland	78	338	7–9	VIIg			134											
<15	Ireland	76	252	7–9	VIa			56											
<15	Ireland	76	251	4–6	VIa			62											
<15	Ireland	76	250	1–3	VIa			14											
<15	Ireland	76	254	1–3	VIIa			140											

						Fleet Effort						Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Type of Pilot study	Coverage (%)
<15	Ireland	76	255	4–6	VIIa			34											
<15	Ireland	76	260	7–9	VIIb			80											
<15	Ireland	76	259	4–6	VIIb			114											
<15	Ireland	78	335	10–12	VIIg			124											
<15	Ireland	76	257	10–12	VIIb			13											
<15	Ireland	78	337	4–6	VIIg			178											
<15	Ireland	78	339	10–12	VIIj			90											
<15	Ireland	78	340	1–3	VIIj			75											
<15	Ireland	78	341	4–6	VIIj			75											
<15	Ireland	78	342	7–9	VIIj			117											
<15	Ireland	76	258	1–3	VIIb			25											
<15	Ireland	76	256	7–9	VIIa			15											
<15	Ireland	76	253	10–12	VIIa			8											
<15	Ireland	78	336	1–3	VIIg			169											
<15	NLD	112	515	1–6	IVc	90	1359	1781				3	48	48				2,7	0.03
<15	United Kingdom	122	555		IVC								2	2			2	11	
>15	Germany	163	620		IIIa,b,c	7						0							0
>15	Ireland	75	216	1–3	VIIc			15											
>15	Ireland	75	215	7–9	VIIb			105											
>15	Ireland	75	214	4–6	VIIb			78											
>15	Ireland	75	213	1–3	VIIb			21											
>15	Ireland	75	211	4–6	VIIa			23											
>15	Ireland	75	210	1–3	VIIa			237											
>15	Ireland	75	212	10–12	VIIb			55											
>15	Ireland	77	299	7–9	VIIf			7											
>15	Ireland	77	300	10–12	VIIg			80											

						Fleet Effort						Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Vessels	Trips	Days	Total length of nets (km)	Total km hours	No of hauls	Type of Pilot study	Coverage (%)
>15	Ireland	77	301	1–3	VIIg			35											
>15	Ireland	77	302	4–6	VIIg			307							e				
>15	Ireland	77	303	7–9	VIIg			247											
>15	Ireland	77	304	10–12	VIIj			64											
>15	Ireland	77	305	1–3	VIIj			109											
>15	Ireland	77	306	4–6	VIIj			87											
>15	Ireland	77	307	7–9	VIIj			75											
>15	Ireland	77	308	7–9	VIIk			6											
>15	Ireland	75	208	4–6	VIa			7											
>15	Ireland	75	209	10–12	VIIa			3											
>15	Latvia	85	600	1–12	III d														
>15	Poland	31	595	1–6	IIId			540						32			156		5.83
>15	Spain	94	528	10–12	VIa	1	5	60				0	0	0			0		
>15	Spain	94	530	1–12	VIIIc							8	21	21			40		
>15	Spain	94	529	10–12	VIIIa,b	21	48	581				2	2	25			32	pilot	6
>15	Sweden	45	615	1–12	IIId	3		239		66352		2		71				7	
>15	United Kingdom	36	549	1–12	VIII	5	21	273				0	0	0			0	1	0
>15	United Kingdom	36	548	1–12	VIIb	1	1	22				0	0	0			0	1	0

Table A-2(ii). National fleet and observed effort for pelagic trawls.

						Fleet Effort					Observed Effort						
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total towing time	No of hauls	Vessels	Trips	Days	Total towing time	No of hauls	Type of Pilot study	Coverage (%)
	Denmark	2	479	1–2	IIIbcd			649					73				11
	Denmark	3	478	1–2	IIIa			358					9				3
	Denmark	4	480	1–2	IVb			179					0				0
	France	13	519	4–11				7079				62	238		296	1	3.4
	France	10	516	1–3, 12				3017				40	196		281	1	9.3
	France	12	518	1–12				280				0	0		0	2	0
	France	14	520	4–11				1480				4	5		7	1	0.5
	France	15	521	4–11				740				0	0		0	2	0
	France	114	524	1–12				6000				196	194		623	1	3
	France	11	517	1–3, 12				760				0	0		0	1	0
	Lithuania	26	604	1–12	III d	16		370			0	0	0	0	0		0
	Sweden	44	614	1–12	IVb	7		8	26	14	0		0				
	Sweden	43	613	1–12	IVa	15		32	97	36	0		3	0	0		
	Sweden	42	612	1–12	IIId	44		2579	19 338	2861	9		30	278	44		
	Sweden	41	611	1–12	IIIa	28		196	519	217	1		1	4	1		
	United Kingdom	160	593		VIIE							3	10		16	9	
<15	Germany	69	617		IIIa,b,c	1			818		0						0
<15	Ireland	80	473	1–3	VIa			2									
<15	Ireland	80	476	7–9	VIIa			3									
<15	Ireland	80	470	10–12	VIa			4									
<15	Ireland	80	472	10–12	VIIg			9									
<15	Ireland	80	474	1–3	VIIa			2									
<15	Ireland	80	475	4–6	VIIg			6									
<15	Ireland	80	471	10–12	VIIa			54									
>15	Estonia	64	596	1–12	IIId	42			42 165		4			99			0.67

						Fleet Effort					Observed Effort						
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total towing time	No of hauls	Vessels	Trips	Days	Total towing time	No of hauls	Type of Pilot study	Coverage (%)
>15	Germany	70	616		VI, VII, VIII	4			3758		3			164			4.38
>15	Germany	71	618		IIIa,b,c	33			30 794		2			146			0.47
>15	Ireland	79	453	4–6	VIIb			58									
>15	Ireland	79	445	1–3	VIIa			3					1				
>15	Ireland	79	446	1–3	VIIb			297					2				
>15	Ireland	79	448	1–3	VIIg			51									
>15	Ireland	79	450	1–3	VIIj			240									
>15	Ireland	79	444	1–3	VIb			16									
>15	Ireland	79	452	4–6	VIa			67					8				
>15	Ireland	79	441	10–12	VIIj			85									
>15	Ireland	79	454	4–6	VIIj			5									
>15	Ireland	79	455	7–9	VIa			22					4				
>15	Ireland	79	456	7–9	VIIb			10					10				
>15	Ireland	79	451	1–3	VIIk			0									
>15	Ireland	79	457	7–9	VIIj			172					3				
>15	Ireland	79	442	10–12	VIIk			0									
>15	Ireland	79	449	1–3	VIIh			13									
>15	Ireland	79	440	10–12	VIId			6									
>15	Ireland	79	439	10–12	VIIb			9									
>15	Ireland	79	438	10–12	VIIg			144					12				
>15	Ireland	79	437	10–12	VIId			0									
>15	Ireland	79	436	10–12	VIIc			9									
>15	Ireland	79	435	10–12	VIIb			397									
>15	Ireland	79	434	10–12	VIIa			39									
>15	Ireland	79	433	10–12	VIa			579					13				
>15	Ireland	79	458	7–9	VIIk			222									

						Fleet Effort				Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total towing time	No of hauls	Vessels	Trips	Days	Total towing time	No of hauls	Type of Pilot study	Coverage (%)
>15	Ireland	79	443	1–3	VIa			372					2				
>15	Ireland	79	447	1–3	VIIc			115					4				
>15	Italy	25	526	1–7, 9–12	GSA 17	69	10 861	10 861		48 984	23	409	409		1650		3
>15	Latvia	86	601	1–12	III d												
>15	NLD	109	491	4–11	IIa	13	14	140			3	3	54		103		0.39
>15	NLD	109	492	4–11	IIb	3	3	27			0	0	0		0		0
>15	NLD	109	493	4–11	IVA	7	16	91			1	1	12		22		0.13
>15	NLD	109	494	4–11	IVB	7	11	17			0	0	0		0		0
>15	NLD	109	495	4–11	IVC	10	20	32			1	1	4		4		0.13
>15	NLD	109	497	4–11	VIA	10	23	241			1	1	21		49		0.09
>15	NLD	108	490	1–3, 12	VIIK	8	10	27			0	0	0		0		0
>15	NLD	109	500	4–11	VIID	6	10	110			2	2	9		21		0.08
>15	NLD	109	496	4–11	VB	1	1	2			1	1	1		1		0.5
>15	NLD	109	501	4–11	VIIE	7	10	79			1	1	1		1		0.01
>15	NLD	111	510	4–11	IVA	2	11	56			0	0	0		0		0
>15	NLD	109	502	4–11	VIIIA	3	8	59			1	1	12		34		0.2
>15	NLD	111	511	4–11	IVC	2	23	36			0	0	0		0		0
>15	NLD	111	512	4–11	VIID	2	9	36			0	0	0		0		0
>15	NLD	111	513	4–11	VIIE	2	10	40			0	0	0		0		0
>15	NLD	111	514	4–11	VIIJ	2	2	14			0	0	0		0		0
>15	NLD	109	499	4–11	VIIC	2	2	9			0	0	0		0		0
>15	NLD	110	508	1–3, 12	VIIIA	2	2	7			0	0	0		0		0
>15	NLD	109	498	4–11	VIIB	4	5	25			0	0	0		0		0
>15	NLD	110	507	1–3, 12	VIIE	2	8	10			0	0	0		0		0
>15	NLD	108	489	1–3, 12	VIIJ	11	30	115			1	1	4		5		0.03
>15	NLD	110	509	1–3, 12	VIIJ	1	1	2			0	0	0		0		0

						Fleet Effort				Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total towing time	No of hauls	Vessels	Trips	Days	Total towing time	No of hauls	Type of Pilot study	Coverage (%)
>15	NLD	110	506	1–3, 12	VIID	2	12	67			0	0	0		0		0
>15	NLD	109	505	4–11	VIIJ	3	6	104			1	1	18		32		0.17
>15	NLD	109	504	4–11	VIIID	1	1	2			2	2	7		9		3.5
>15	NLD	108	481	1–3, 12	VIA	9	15	98			1	1	3		6		0.03
>15	NLD	108	487	1–3, 12	VIIIA	1	2	5			0	0	0		0		0
>15	NLD	108	482	1–3, 12	VIIB	9	15	99			2	2	24		50		0.24
>15	NLD	108	488	1–3, 12	VIIID	1	1	2			0	0	0		0		0
>15	NLD	108	486	1–3, 12	VIIH	4	6	17			0	0	0		0		0
>15	NLD	108	485	1–3, 12	VIIE	5	7	8			1	2	1		2		0.13
>15	NLD	108	484	1–3, 12	VIID	7	12	90			2	2	19		40		0.21
>15	NLD	108	483	1–3, 12	VIIC	10	25	200			3	4	30		56		0.15
>15	NLD	109	503	4–11	VIIIB	1	2	3			0	0	0		0		0
>15	Poland	30	594	1–6	IIId			1289					76		386		5.93
>15	Spain	95	531	1–6,9–12	VIIIc	4											
>15	Spain	96	532	1–7,9–12	VIIIa,b,d	6						7	36		92		
>15	United Kingdom	35	544	4–11	VIIe	2	22	84		99	1	8	25		31	1	15.32
>15	United Kingdom	34	538	12,1–3	VIIh	2	1	6		5	0	0	0		0	1	0
>15	United Kingdom	34	533	12,1–3	VIa	29	101	348		268	8	27	78		60	1	22.4
>15	United Kingdom	34	534	12,1–3	VIIb	14	22	109		84	0	0	0		0	1	0
>15	United Kingdom	34	535	12,1–3	VIIc	9	39	177		136	0	0	0		0	1	0
>15	United Kingdom	34	536	12,1–3	VIId	4	4	14		11	0	0	0		0	1	0

						Fleet Effort				Observed Effort							
Vessel size range (m)	Country	Fleet ID	Bycatch ID	Season	Fishing Area	Vessels	Trips	Days	Total towing time	No of hauls	Vessels	Trips	Days	Total towing time	No of hauls	Type of Pilot study	Coverage (%)
>15	United Kingdom	34	537	12,1–3	VIIe	6	68	75		58	0	0	0		0	1	0
>15	United Kingdom	34	539	12,1–3	VIII	4	9	36		28	0	0	0		0	1	0
>15	United Kingdom	34	540	12,1–3	VIIj	7	14	58		45	0	0	0		0	1	0
>15	United Kingdom	35	541	4–11	VIa	22	44	143		169	2	3	8		8	1	9.54
>15	United Kingdom	38	547	1–12	IVc	2	7	23		13	0	0	0		0	1	0
>15	United Kingdom	35	543	4–11	VIId	2	3	14		17	0	0	0		0	1	7.58
>15	United Kingdom	38	545	1–12	IVa	34	145	376		218	20	31	79		49	1	9.72
>15	United Kingdom	38	546	1–12	IVb	4	10	18		10	0	0	0		0	1	0
>15	United Kingdom	35	542	4–11	VIIa	2	16	38		45	0	0	0		0	1	0

Table A-3. Protected species bycatch records from National Reports.

Country	Fleet ID	Bycatch ID	Pingers used Yes/No	Species	No of incidents without pingers	No of specimens without pingers	CV(%)	Provided Bycatch Estimate
Denmark	2	479	No		0	0		
Denmark	3	478	No		0	0		
Denmark	116	527	No	*Phoca vitulina*		1		
Denmark	116	527	No	*Phocoena phocoena*		1		
Estonia	161	597	No		0	0		
France	10	516	Yes	*Delphinus delphis*		19		300
France	13	519	No	*Globicephala melas*	1	4		90
France	13	519	Yes	*Delphinus delphis*	3	5		120
France	16	522	No	*Phocoena phocoena*	5	5		250
France	17	523	No	*Delphinus delphis*	2	2		100
France	17	523	No	*Stenella coerulealba*	1	1		50
France	17	523	No	*Phocoena phocoena*	2	2		100
France	114	524	No	*Stenella coerulealba*	2	2		70
France	114	524	No	*Tursiops truncatus*	1	1		35
Ireland	79	433	No		0	0		
Ireland	79	456	No		0	0		
Ireland	79	455	No		0	0		
Ireland	79	452	No		0	0		
Ireland	79	447	No		0	0		
Ireland	79	446	No		0	0		
Ireland	79	445	No		0	0		
Ireland	79	443	No		0	0		
Ireland	79	438	No		0	0		
Ireland	79	457	No		0	0		
Italy	25	526	No	*Caretta caretta*		39	21	427
Italy	25	526	No	*Bottlenose dolphins*		3	68	24
NLD	108	484	No		0	0		
NLD	108	483	No		0	0		
NLD	108	489	No		0	0		

Country	Fleet ID	Bycatch ID	Pingers used Yes/No	Species	No of incidents without pingers	No of specimens without pingers	CV(%)	Provided Bycatch Estimate
NLD	108	482	No		0	0		
NLD	108	481	No	*Phocoena phocoena*	1	1		
NLD	108	485	No		0	0		
NLD	109	497	No		0	0		
NLD	109	505	No		0	0		
NLD	109	491	No		0	0		
NLD	109	493	No		0	0		
NLD	109	495	No		0	0		
NLD	109	496	No		0	0		
NLD	109	501	No		0	0		
NLD	109	502	No		0	0		
NLD	109	504	No		0	0		
NLD	109	500	No		0	0		
NLD	112	515	No		0	0		
Poland	30	594				0		
Poland	31	595				0		
Spain	94	529	No	*Delphinus delphis*	1	1		23
Spain	96	532	No	*Delphinus delphis*	1	1		
Sweden	41	611	No			0		
Sweden	42	612	No			0		
Sweden	43	613	No			0		
Sweden	45	615	No			0		
United Kingdom	130	563	No	Porpoise	1	1		
United Kingdom	138	571	No	Porpoise	1	1		
United Kingdom	138	571	No	Common dolphin	1	1		
United Kingdom	140	573	No	Porpoise	1	1		
United Kingdom	140	573	No	Bottlenose dolphin	1	1		
United Kingdom	146	579	No	Porpoise	2	1		
United Kingdom	146	579	No	Common dolphin	1	1		
United Kingdom	153	586	No	Porpoise	1	1		

Country	Fleet ID	Bycatch ID	Pingers used Yes/No	Species	No of incidents without pingers	No of specimens without pingers	CV(%)	Provided Bycatch Estimate
United Kingdom	154	587	No	Common dolphin	1	1		
United Kingdom	158	591	No	Porpoise	1	1		
United Kingdom	160	593	Yes	Common dolphin	5	22		
United Kingdom	130–158		No	Porpoise			0.27	838
United Kingdo	136,138, 140, 144–49, 153–59		No	Common dolphins			0.27	594

Table A-4. Summary table of all SGBYC bycatch data 2005–2008 (observed effort where days observed >0).

Fleet									Fleet and Observed Effort								Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
3	Denmark	>15	Pelagic Trawls		mackerel, herring, sprat	IIIa	All year	Yes	2007	1196	44	IIIa	1-12	5	4		0		0
4	Denmark	>15	Pelagic Trawls		mackerel, herring, sprat	IVb	All year	Yes	2007	2105	142	IVb	1-12	5	7		0		0
2	Denmark	>15	Pelagic Trawls		mackerel, herring, sprat	IIIbcd	All year	Yes	2007	1277	87		1-12	5	7		0		0
116	Denmark	<15	Nets	Set gillnet	Cod, plaice, Hake	IIIa	All year		2008	37	37	IIIa	9-12			*Phoca vitulina*	1	camera	
116	Denmark	<15	Nets	Set gillnet	Cod, plaice, Hake	IIIa	All year		2008	37	37	IIIa	9-12			*Phocoena phocoena*	1	camera	
2	Denmark	>15	Pelagic Trawls		mackerel, herring, sprat	IIIbcd	All year	Yes	2008	649	73	IIIbcd	1-2	5	11		0		
3	Denmark	>15	Pelagic Trawls		mackerel, herring, sprat	IIIa	All year	Yes	2008	358	9	IIIa	1-2	5	3		0		
64	Estonia	>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	1-12		2006	1009	8	III d	1-12	5		*0*		pilot	
161	Estonia		Nets	Set gillnet	cod, flounder, whiting	IIIb,c,d	1-12	yes	2008		13	IIIb,c,d	1-12				0		
65	Finland	>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	7-12		2006	275	25	III d	7-12	5		*0*		pilot	
8	Finland		Pelagic Trawls		Sprat	IIId south	All year		2007	560	1	III d south	1-12	5	5		0		0
9	Finland		Pelagic Trawls		Baltic herring, Sprat	IIId north	From 1 June to 30 September		2007	810	42	III d North	6-9	5	5		0		0
67	France	<15	Nets	Set gillnet	sole, bass, hake	IVc, VII bdehgj, VIIIabce	1-12		2006	28800	30		1-12			*0*	0	pilot	0
66	France	>15	Nets	Set gillnet	sole, bass, hake	IVc, VII bdehgj, VIIIabce	1-12		2006	10640	61		1-12			*0*	0	pilot	0
68	France	>15	Pelagic Trawls	Midwater Otter trawl	Bass, Scad, mackerel, herring, sardine	IVc, VII bdehgj, VIIIabce	1-12		2006	8390	276		1-12			Common dolphin	4	pilot	57
16	France		Nets	Set gillnet	Sole	VIa, VIIa,b, VIII abc, IXa	All year		2007	10668	154		1-12	5	1	*Phocoena phocena*	1		100
17	France		Nets	Set gillnet	Sole, monkfish, pollack, red mullet	VIa, VIIa,b, VIII-a, b, c, IXa	All year		2007	27552	213		1-12	1	1	*Phocoena phocoena*	8	pilot	500

Fleet									Fleet and Observed Effort							Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
12	France		Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	January		2007	280	2		1-12	5	0		0	pilot	0
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2007	4605	341		4-11	5	7	*Globicephala melas*	1		13
10	France		Pelagic Trawls	Midwater pair trawl	Sea bass	VI, VII & VIII	January to March& December		2007	1745	170		1-3, 12	10	10	*Delphinus delphis*	13		226
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2007	4605	341		4-11	5	7	*Delphinus delphis*	1		13
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2007	4605	341		4-11	5	7	*Tursiops truncatus*	4		54
15	France		Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	April to november		2007	740	30		4-11	5	4		0	pilot	0
14	France		Pelagic Trawls	Midwater Otter trawl	Mackerel, Horse Mackerel, sardine, sprat, herring	VI, VII & VIII	April to november		2007	1480	34		4-11	5	5		0		0
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2007	4605	341		4-11	5	7	*Stenella coerulealba*	3		40
17	France		Nets	Set gillnet	Sole, monkfish, pollack, red mullet	VIa, VIIa,b, VIII-a, b, c, IXa	All year		2008	13120	265		1-12	1	2	*Phocoena phocoena*	2	2	100
17	France		Nets	Set gillnet	Sole, monkfish, pollack, red mullet	VIa, VIIa,b, VIII-a, b, c, IXa	All year		2008	13120	265		1-12	1	2	*Stenella coerulealba*	1	2	50
17	France		Nets	Set gillnet	Sole, monkfish, pollack, red mullet	VIa, VIIa,b, VIII-a, b, c, IXa	All year		2008	13120	265		1-12	1	2	*Delphinus delphis*	2	2	100
16	France		Nets	Set gillnet	Sole	VIa, VIIa,b, VIII abc, IXa	All year		2008	10668	210		1-12	5	2	*Phocoena phocoena*	5	1	250
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2008	7079	238		4-11	5	3.4	*Delphinus delphis*	5	1	120
10	France		Pelagic Trawls	Midwater pair trawl	Sea bass	VI, VII & VIII	January to March& December		2008	3017	196		1-3, 12	10	9.3	*Delphinus delphis*	19	1	300
114	France		Pelagic Trawls	Midwater Otter trawl	anchovy, sardine	Mediterranean	1-12	Yes	2008	6000	194		1-12	5	3	*Stenella coerulealba*	2	1	70
114	France		Pelagic Trawls	Midwater Otter trawl	anchovy, sardine	Mediterranean	1-12	Yes	2008	6000	194		1-12	5	3	*Tursiops truncatus*	1	1	35
13	France		Pelagic Trawls	Midwater pair trawl	Tuna, mackerel, black bream, horse mackerel, bass	VI, VII &VIII	April to november		2008	7079	238		4-11	5	3.4	*Globicephala melas*	4	1	90

Fleet									Fleet and Observed Effort								Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
78	Ireland	<15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2005	83	15	VIIg	7-9	0		*Phocoena phocena*	1		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2005	160	15	VIIg	1-3	0		*Phocoena phocena*	2		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2005	260	48	VIIg	4-6	0		*Phocoena phocena*	2		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2005	399	1	VIa	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2005	7	7	VIIk	7-9	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2005	48	14	VIIj	7-9	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2005	518	12	VIIb	1-3	10			0		
78	Ireland	<15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	172	3	VIIg	1-3	0			0		
78	Ireland	<15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	216	3	VIIg	4-6	0			0		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	76	14	VIIg	10-12	0		*Delphinus delphis*	2		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	87	31	VIIg	7-9	0		*Delphinus delphis*	1		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	87	31	VIIg	7-9	0		*Phocoena phocena*	1		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	76	14	VIIg	10-12	0		*Phocoena phocena*	2		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2006	76	14	VIIg	10-12	0		*Stenella coerulealba*	1		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2006	58	16	VIIa	10 -12	10		*Delphinus delphis*	4		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2006	560	24	VIa	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2006	11	11	VIIj	7-9	10			0		
77	Ireland	>15	Nets	Set gillnet	Cod,hake, turbot, crawfish	VIIg,VIIj, VIIk	1-12	No	2007	163	10	VIIg	4-6	0			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	14	11	VIa	4-6	10			0		

Fleet									Fleet and Observed Effort								Bycatch		
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pinge rs	Type of Pilot study	Provided Bycatch Estimate
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	321	11	VIIj	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	270	10	VIIb	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	117	2	VIIj	10 -12	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	39	1	VIIa	10 -12	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	587	3	VIa	10 -12	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2007	4	7	VIIg	4-6	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	372	2	VIa	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	10	10	VIIb	7-9	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	22	4	VIa	7-9	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	172	3	VIIj	7-9	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	115	4	VIIc	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	3	1	VIIa	1-3	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	144	12	VIIg	10 -12	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	579	13	VIa	10 -12	10			0		
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	297	2	VIIb	1-3	10			0		

Fleet									Fleet and Observed Effort								Bycatch		
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
79	Ireland	>15	Pelagic Trawls		mackerel, herring, blue whiting, horse mackerel, albacore tuna	VI, VII, VIII	1-12	Yes	2008	67	8	VIa	4-6	10			0		
25	Italy	>15	Pelagic Trawls	Midwater pair trawl	Anchovy (about 70%) sardines (20%)	GSA 17	1-7, 9-12	Yes	2006	22636	243	GSA 17	1-7, 9-12	CV <30%		*Caretta caretta*	26		
25	Italy	>15	Pelagic Trawls	Midwater pair trawl	Anchovy (about 70%) sardines (20%)	GSA 17	1-7, 9-12	Yes	2007	7961	199	GSA 17	1-7, 9-12	CV <30%	2	*cetaceans*	0		0
25	Italy	>15	Pelagic Trawls	Midwater pair trawl	Anchovy (about 70%) sardines (20%)	GSA 17	1-7, 9-12	Yes	2008	10861	409	GSA 17	1-7, 9-12	CV <30%	3	*Caretta caretta*	39		427
25	Italy	>15	Pelagic Trawls	Midwater pair trawl	Anchovy (about 70%) sardines (20%)	GSA 17	1-7, 9-12	Yes	2008	10861	409	GSA 17	1-7, 9-12	CV <30%	3	Bottlenose dolphins	3		24
85	Latvia	>15	Nets	Set gillnet	cod	III d	1-12		2006		222	III d	1-12	5		*0*		pilot	
86	Latvia	>15	Pelagic Trawls	Midwater Otter trawl	herring/sprat	III d	1-12		2006		641	III d	1-12	5		*0*		pilot	
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2004/ 2005	834	98		1-3, 12	10		Common dolphin	3	pilot	
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2006	685	87		1-3, 12	10		Whitesided dolphin	1	pilot	
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	89	10	IVb	4-11	5	11		0		0
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	146	41	IIa	4-11	5	28		0		0
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	383	67	IVa	5-11	5	17		0		0
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	0	1	VIb	4-11	5	0		0		0
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	270	34	VIa	4-11	5	13		0		0
29	Netherlands		Pelagic Trawls			II, IV, V, VI, VII, VIII	April to november		2007	99	5	VIIb	4-11	5	5		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	13	5	VIIe	1-3, 12	10	38		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	3	2	VIIh	1-3, 12	10	67		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	29	3	VIb	1-3, 12	10	10		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	81	11	VIId	1-3, 12	10	14		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	46	8	VIIb	1-3, 12	10	17		0		0

Fleet									Fleet and Observed Effort								Bycatch		
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	153	13	VIa	1-3, 12	10	9		0		0
28	Netherlands	>15	Pelagic Trawls		Horse mackerel, blue whiting	VI, VII & VIII	January to March& December		2007	78	4	VIIj	1-3, 12	10	5		0		0
112	NLD	<15	Nets	Set gillnet	cod/turbot/flatfish	IVc	2-6	No	2008	1781	48	IVc	1-6	0	0.03		0	2,7	
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	241	21	VIA	4-11	5	0.09		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	2	1	VB	4-11	5	0.5		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	104	18	VIIJ	4-11	5	0.17		0		
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	8	1	VIIE	1-3, 12	10	0.13		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	110	9	VIID	4-11	5	0.08		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	140	54	IIa	4-11	5	0.39		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	32	4	IVC	4-11	5	0.13		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	79	1	VIIE	4-11	5	0.01		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	2	7	VIIID	4-11	5	3.5		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	59	12	VIIIA	4-11	5	0.2		0		
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	115	4	VIIJ	1-3, 12	10	0.03		0		
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	98	3	VIA	1-3, 12	10	0.03	*Phocoena phocoena*	1		
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	99	24	VIIB	1-3, 12	10	0.24		0		
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	200	30	VIIC	1-3, 12	10	0.15		0		

Fleet									Fleet and Observed Effort							Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pinge rs	Type of Pilot study	Provided Bycatch Estimate
108	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her	VI, VII, VIII	1-3,12	Yes	2008	90	19	VIID	1-3, 12	10	0.21		0		
109	NLD	>15	Pelagic Trawls	Midwater Otter trawl	hor, mac, bw, her,arg	all exept VI, VII, VIII	4-11	Yes	2008	91	12	IVA	4-11	5	0.13		0		
31	Poland	>15	Nets	Set gillnet	Cod, flatfish	IIId	Jan-Jun	yes	2006	2857	6	IIId	9-12	5		*0*		pilot	0
30	Poland	>15	Pelagic Trawls		Herring, sprat	IIId	Jan-Jun	yes	2006	4130	19	IIId	9-12	5		*0*		pilot	
31	Poland	>15	Nets	Set gillnet	Cod, flatfish	IIId	Jan-Jun	yes	2007	2288	7	IIId	1-12	5	0				0
30	Poland	>15	Pelagic Trawls		Herring, sprat	IIId	Jan-Jun	yes	2007	6165	140	IIId	1-12	5	2		0		0
31	Poland	>15	Nets	Set gillnet	Cod, flatfish	IIId	Jan-Jun	yes	2008	540	32	IIId	1-6	5	5.83		0		
30	Poland	>15	Pelagic Trawls		Herring, sprat	IIId	Jan-Jun	yes	2008	1289	76	IIId	1-6	5	5.93		0		
94	Spain	>15	Nets	Set gillnet	several species	VIa, VIIa, b, VIIIa, b and c, Ixa	1-12		2008	581	25	VIIIa,b	10-12		6	*Delphinus delphis*	1	pilot	23
96	Spain	>15	Pelagic Trawls	Midwater Otter trawl	Hake	VI, VII, VIII and IX	1-12		2008		36	VIIIa,b, d	1-7,9-12			*Delphinus delphis*	1		
41	Sweden		Pelagic Trawls		Herring, sprat	IIIa	All year		2006	188	13	IIIa	9-12	5			0		
42	Sweden		Pelagic Trawls		Herring, sprat	IIId	All year		2006	826	20	IIId	9-12	5			0		
43	Sweden		Pelagic Trawls		Herring, sprat	IVa	All year		2006	33	3	IVa	9-12	5			0		
45	Sweden	>15	Nets	Set gillnet	cod, flatfish	IIId	All year		2007	141	24	IIId	1-12	5	9			11	0
42	Sweden		Pelagic Trawls		Herring, sprat	IIId	All year		2007	2761	140	IIId	1-12	5	5		0		0
41	Sweden		Pelagic Trawls		Herring, sprat	IIIa	All year		2007	399	18	IIIa	1-12	5	8		0		0
43	Sweden		Pelagic Trawls		Herring, sprat	IVa	All year		2007	68	2	IVa	1-12	5	4		0		0
45	Sweden	>15	Nets	Set gillnet	cod, flatfish	IIId	All year		2008	239	71	IIId	1-12	5			0	7	
43	Sweden		Pelagic Trawls		Herring, sprat	IVa	All year		2008	32	3	IVa	1-12	5			0		
42	Sweden		Pelagic Trawls		Herring, sprat	IIId	All year		2008	2579	30	IIId	1-12	5			0		
41	Sweden		Pelagic Trawls		Herring, sprat	IIIa	All year		2008	196	1	IIIa	1-12	5			0		
38	United Kingdom	>15	Pelagic Trawls		Mackerel	IV	All year		2007	777	76	IVa	1-12	5	10		0	1	0
34	United Kingdom	>15	Pelagic Trawls		Mack,her, b whit, hr mack, sard, sprat, bass, anch	VI,VII & VIII	Dec, Jan - March		2007	449	84	VIa	12,1-3	10	16		0	1	0
35	United Kingdom	>15	Pelagic Trawls		her, blue whit, hr mack, mack, sard, sprat, anchov	VI,VII & VIII	April to November		2007	40	3	VIId	4-11	5	8		0	1	

Fleet									Fleet and Observed Effort								Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
35	United Kingdom	>15	Pelagic Trawls		her, blue whit, hr mack, mack, sard, sprat, anchov	VI,VII & VIII	April to November		2007	124	19	VIIe	4-11	5	15		0	1	
35	United Kingdom	>15	Pelagic Trawls		her, blue whit, hr mack, mack, sard, sprat, anchov	VI,VII & VIII	April to November		2007	269	26	VIa	4-11	5	10		0	1	
34	United Kingdom	>15	Pelagic Trawls		Mack,her, b whit, hr mack, sard, sprat, bass, anch	VI,VII & VIII	Dec, Jan - March		2007	184	7	VIIc	12,1-3	10	4		0	1	0
153	United Kingdom		Nets	Set gillnet	Turbot	VIIF			2008		14	VIIG				Porpoise	1	11	
152	United Kingdom		Nets	Set gillnet	Spider Crab	VIIF			2008		5	VIIF						11	
144	United Kingdom		Nets	Set gillnet	Turbot	VIIE			2008		21	VIIE						11	
154	United Kingdom		Nets	Set gillnet	Hake	VIIG			2008		38	VIIG				Common dolphin	1	11	
155	United Kingdom		Nets	Set gillnet	Monkfish	VIIG			2008		5	VIIG						11	
156	United Kingdom		Nets	Set gillnet	Pollack	VIIG			2008		8	VIIG						11	
157	United Kingdom		Nets	Set gillnet	Turbot	VIIG			2008		6	VIIH						11	
158	United Kingdom		Nets	Set gillnet	Hake	VIIH			2008		16	VIIJ				Porpoise	1	11	
159	United Kingdom		Nets	Set gillnet	Pollack	VIIJ			2008		9	VIIE						11	
151	United Kingdom		Nets	Set gillnet	Red Mullet	VIIF			2008		7	VIIF						11	
134	United Kingdom		Nets	Set gillnet	Cod	VIIE			2008		2	VIIE						11	
123	United Kingdom		Nets	Set gillnet	Bass	IVC			2008		2	IVC						11	
124	United Kingdom		Nets	Set gillnet	Dover sole	IVC			2008		24	VIIA						11	
125	United Kingdom		Nets	Set gillnet	Ray	VIIA			2008		2	VIIA						11	
126	United Kingdom		Nets	Set gillnet	Bass	VIIA			2008		2	VIIA						11	
127	United Kingdom		Nets	Set gillnet	Flounder	VIIA			2008		2	VIIA						11	
128	United Kingdom		Nets	Set gillnet	Plaice	VIIA			2008		6	VIIA						11	
129	United Kingdom		Nets	Set gillnet	Ray	VIIA			2008		5	VIID						11	
130	United Kingdom		Nets	Set gillnet	Dover sole	VIID			2008		15	VIID				Porpoise	1	11	
131	United Kingdom		Nets	Set gillnet	Ray	VIID			2008		4	VIIE						11	
146	United Kingdom		Nets	Set gillnet	Hake	VIIF			2008		52	VIIF				Porpoise	1	11	
133	United Kingdom		Nets	Set gillnet	Brill	VIIE			2008		7	VIIE						11	
150	United Kingdom		Nets	Set gillnet	Ray	VIIF			2008		4	VIIF						11	
135	United Kingdom		Nets	Set gillnet	Dover sole	VIIE			2008		19	VIIE						11	
136	United Kingdom		Nets	Set gillnet	Hake	VIIE			2008		15	VIIE						11	
145	United Kingdom		Nets	Set gillnet	Whitefish	VIIE			2008		5	VIIF						11	
149	United Kingdom		Nets	Set gillnet	Pollack	VIIF			2008		8	VIIF						11	
148	United Kingdom		Nets	Set gillnet	Monkfish	VIIF			2008		4	VIIF						11	
132	United Kingdom		Nets	Set gillnet	Bass	VIIE			2008		1	VIIE						11	
146	United Kingdom		Nets	Set gillnet	Hake	VIIF			2008		52	VIIF				Common dolphin	1	11	
137	United Kingdom		Nets	Set gillnet	Lobster	VIIE			2008		8	VIIE						11	
143	United Kingdom		Nets	Set gillnet	Spider Crab	VIIE			2008		4	VIIE						11	
142	United Kingdom		Nets	Set gillnet	Red Mullet	VIIE			2008		1	VIIE						11	
141	United Kingdom		Nets	Set gillnet	Ray	VIIE			2008		7	VIIE						11	
140	United Kingdom		Nets	Set gillnet	Pollack	VIIE			2008		14	VIIE				Bottlenose dolphin	1	11	

Fleet									Fleet and Observed Effort							Bycatch			
Fleet ID	Country	Vessel size range (m)	Gear Type Level 3	Gear Type Level 4	Target Species	Fishing Areas	Season(s)	Required under 812/ 2004	Year	Fleet Effort Days	Observed Effort Days	Fishing Area	Season	Target Coverage	Coverage (%)	Species	No of specimens without pingers	Type of Pilot study	Provided Bycatch Estimate
140	United Kingdom		Nets	Set gillnet	Pollack	VIIE			2008		14	VIIE				Porpoise	1	11	
139	United Kingdom		Nets	Set gillnet	Plaice	VIIE			2008		2	VIIE						11	
138	United Kingdom		Nets	Set gillnet	Monkfish	VIIE			2008		55	VIIE				Common dolphin	1	11	
138	United Kingdom		Nets	Set gillnet	Monkfish	VIIE			2008		55	VIIE				Porpoise	1	11	
147	United Kingdom		Nets	Set gillnet	Lobster	VIIF			2008		21	VIIF						11	
122	United Kingdom	<15	Nets	Set gillnet	Cod	IVB			2008		2	IVC						11	
121	United Kingdom	<15	Nets	Drift net	Bass	VIID			2008		2	IVB						11	
120	United Kingdom	<15	Nets	Drift net	Bass	VIIA			2008		5	VIID						11	
119	United Kingdom	<15	Nets	Drift net	Thornback Ray	IVC			2008		1	VIIA						11	
118	United Kingdom	<15	Nets	Drift net	Dover sole	IVC			2008		4	IVC						11	
160	United Kingdom		Pelagic trawls	Midwater Pair trawl	Bass	VIIE			2008		10	VIIE				Common dolphin	22	9	

Annex 4: Tables from ToR B

Table B-1. Northern Northeast Atlantic: recently observed bycatch in the Faroes, Greenland, and Iceland.

The 2008 data are extracted from NAMMCO (2009 in press). Preliminary 2009 data from Iceland were provided by Droplaug Ólafsdóttir. Ole Heinrich provided the data for Greenland and were extracted from 'incidental reports'.

COUNTRY	REGION	FISHERY	YEAR		OBSERVED
Faroes			2008	No Reported Bycatch	0
Greenland		Bundgarn	2008	Humpback whale	1
		Codgarn		Humpback whale	1
		Salmon net		Minke whale	1
		Sealnet		Narwhal	1
		Sinknet		Narwhal	1
Iceland		Gillnet	2008 Jan–Jun	Harbour seal	44
		Gillnet		Unid. dolphin	84
		Gillnet		Harbour porpoise	3
		Unknown	2008	Minke Whale	1
		Lumps. gillnet	2009	Harbour seal	31
		Lumps. gillnet	2009	Grey seal	7
		Lumps. gillnet	2009	Harp seal	2
		Lumps. gillnet	2009	Unidentified seal	35
		Lumps. gillnet	2009	Harbour porpoise	34
		Lumps. gillnet	2009	Unidentified bird	27
		Lumps. gillnet	2009	Common guillemot	44
		Lumps. gillnet	2009	Fulmar	1
		Lumps. gillnet	2009	Black guillemot	102
		Lumps. gillnet	2009	Great northern diver	2
		Lumps. gillnet	2009	Eider	21
		Lumps. gillnet	2009	Common or black guillemot	11
		Lumps. gillnet	2009	Razorbill	2
		Lumps. gillnet	2009	European shag	1
		Lumps. gillnet	2009	Red thoated diver	5
		Codtrap	2009	European shag	1
		Longline	2009	Fulmar	14
		Longline	2009	Black backe gull	2
		Gillnet	2009	Brünich's guillemot	3
		Gillnet	2009	Harbour porpoise	16
		Gillnet	2009	Harbour seal	3
		Gillnet	2009	Harp seal	23
		Gillnet	2009	Bearded seal	1
		Gillnet	2009	Fulmar	21
		Gillnet	2009	Common guillemot	173
		Gillnet	2009	Eider	1

Table B.2. Northwest Atlantic Region-US and Canada.

US Northwest Atlantic bycatch estimates for cetaceans and pinnipeds in Table 2 are preliminary estimates currently being reviewed by the Atlantic Scientific Review Group (ASRG) and will subsequently be made available for public comment. The final published estimates will be available in late 2010 or early 2011. All estimates were reported for the most recent year available. For estimates from previous years refer to the SGBYC 2009 Report (ICES, 2009a).

COUNTRY	REGION	GEAR/FISHERY	YEAR	COVERAGE %	SPECIES	OBSERVED	ESTIMATE (CV)
USA	Atlantic	Northeast Gillnet	2008	5.00	Harbour Porpoise	30	720 (0.48)
					Short-beaked Common Dolphin	2	35 (0.77)
					White-sided Dolphin	4	82 (0.56)
					Harbour Seal	9	278 (0.41)
					Gray Seal	32	643 (0.23)
					Harp Seal	14	250 (0.37)
USA	Atlantic	Mid-Atlantic Gillnet	2008	3.00	Harbour Porpoise	9	353 (0.76)
					Harbour Seal	2	88 (0.74)
					Harp Seal	4	176 (0.74)
			1995–2006	2.20	Loggerhead Sea Turtle	41	350 (0.20)a
USA	Atlantic	Northeast Mid-water Trawl	2008	19.00	White-sided Dolphin	0b	6 (0.52)
					Pilot Whale spp.	3	7 (0.56)
USA	Atlantic	Mid-Atlantic Mid-water Trawl	2008	13.00	White-sided Dolphin	2	4 (0.43)
USA	Atlantic	Northeast Bottom Trawl	2008	8.00	Harbour Porpoise	1	Unkc
					Pilot Whale spp.	5	10 (0.34)
					Short-beaked Common Dolphin	1	17 (0.29)
					White-sided Dolphin	3	147 (0.32)
					Gray Seal	4	Unkc
USA	Atlantic	Mid-Atlantic Bottom Trawl	2008	3.00	Pilot Whale spp.	0b	24 (0.36)
					Short-beaked Common Dolphin	1	108 (0.28)
					White-sided Dolphin	0b	16 (0.18)
					Loggerhead Sea Turtle	10	Unkd
USA	Atlantic	Sea Scallop Dredge	2008	6.00	Loggerhead Sea Turtle	2	Unkd
USA	Atlantic	Sea Scallop Bottom Trawl	2008	7.00	Loggerhead Sea Turtle	0	0
Canada	Atlantic	Herring Weir	2008	Unke	Harbour Porpoise	0	0

[a] The mortality estimate is an average over the 1995–2006 time period (Murray 2009).

[b] The method used to estimate bycatch mortality of cetaceans in bottom and midwater trawl gear includes data pooled over years and a bycatch rate is predicted using a generalized linear model. The pooled data are treated as one dataset and assumed to represent average fishing practices during the pooled time period Therefore, if there was no observed bycatch reported for any subsequent years (e.g. 2008), this does not imply that there was no bycatch during that year (Rossman, 2009).

[c] Estimation of total bycatch mortality for harbour porpoise and pinniped species attributed to the Northeast bottom-trawl fishery have not been generated; bycatch of these species in bottom trawls is extremely rare.

[d] Loggerhead sea-turtle bycatch estimates attributed to bottom trawl and scallop dredge gear in recent years are currently being generated by the Northeast Fisheries Science Center in Woods Hole. They are expected to be available for the 2011 Study Group Report.

[e] Canada has not reported coverage level for the Herring Weir Fishery; Unk=unknown.

Table B.3. Mediterranean Sea: Summary of recent or relatively recent species of conservation concern bycatch data and estimates of totals.

The data presented here are extracted from Álvarez de Quevedo *et al*. *in press,* Fortuna *et al*., *in press*, Öztürk *et al*., 2001 and Tonay and Öztürk, 2003.

Country	Region	Gear/Fishery	Year	Coverage %	Species	Observed	Estimate (CV)
Italy	Mediterranean GSA 17	Pair midwater/pelagic trawl	Jul 2006–Dec 2008	2.1	Bottlenose dolphin	2 dead, 1 released	34 (66%)
					Loggerhead turtle	80 (1 dead, 6 comatose)	1510 (15%)
					Bull ray *(Pteromylaeus bovinus)*	143	2699 (18%)
					Thintail thresher *(Alopias vulpinus)*	13	245 (29%)
					Piked dogfish/spurdog *(Squalus acanthias)*	374	7059 (20%)
					Smooth-hound *(Mustelus mustelus)*	80	1510 (15%)
Spain	Western Mediterranean GSA 6	Bottom and drifting longlines, trammelnets and bottom trawlers	NA	NA	Loggerhead turtle	NA	481 (95% CI: 472–491)
		Bottom trawlers					249 (95% CI 83–415)
		Drifting longlines					124 (95% CI: 40–199)
Turkey	Mediterranean GSA 22,	Driftnets	1999-2000	NA	Striped dolphin	13	NA
					Bottlenose dol-	4	NA

		24			phin		
					Grampus griseus	2	NA
Turkey	Black Sea GSA 29	Turbot gillnets	April-June 2002 and 2003	NA	Harbour porpoise	40	NA
					Common dolphin	1	NA
					Bottlenose dolphin	1	NA

Table B-4. Overview of EU elasmobranch bycatch extracted WGEF Report (ICES 2009b).

SPECIES	GEAR	COMMENTS
Spurdog	Mixed trawl, hand-held gear, longlines, gillnets	The 5% bycatch limit on North Sea fisheries (2007–2008) is no longer in force, as it was reported that it was difficult for vessels to avoid large aggregations of this species. Instead a maximum landing length was introduced in 2009 (100 cm). A reduction in effort in mixed trawl fisheries should result in lower bycatch of this species. A review of the catch composition of fixed gear fisheries that capture spurdog should be undertaken and those taking a large proportion of adult females should be strictly regulated. There is limited discard data available for this species and more information of discard survival rates is necessary.
Siki sharks	Mixed trawl fisheries, gillnet, longline	The term siki shark is used to encompass a number of deep-water shark species including Portuguese dogfish and leafscale gulper shark. Council regulation (EC) No. 41/2007 bans the use of gillnets by community vessels in waters over 600m while fishing for deep-water sharks in Community waters is prohibited by Council Regulation (EC) No. 881/2008. WGEF 2009 presented data on deep-water shark bycatch by Russian vessels in ICES Divisions I, V, VI and XII.
Kitefin shark	Mixed deep-water fisheries in Subareas V–VII	In 2006 the advice from ICES was that Kitefin shark be managed as part of deep-sea shark fisheries and that "No targeted fisheries should be permitted unless there are reliable estimates of current exploitation rates and sufficient data to assess productivity." There were no discard rates available for this species.
Skates and Rays	Mixed trawl fisheries, Beam trawl fitted with outrigger, longlines, VHO trawls	Under EU legislation, there are a number of restrictions on mesh size, which can be used when targeting rays and skates, and in UK waters there are local bylaws, which state the minimum landing size allowed for these species. A bycatch quota for skates and rays of 25% of live weight applies to vessels over 15 m in the North Sea. A number of bycatch and discarding estimates exist for demersal elasmobranchs in certain areas of the ICES region. However the group again notes that these species are prone to being unidentified or underreported. In 2009 the requirement to identify ray and skate landings to species level was extended to all community waters. No discard data were available for sharks or rays in the Norwegian sea. In the North Sea, Skagerrak, Kattegat and eastern Channel discard data and length frequency data are being collected for these species by a

		number of countries. Thornback Ray (IVc) may be bycaught in gillnet and trawl fisheries targeting sole and cod and longline fisheries targeting cod. The group noted that the use of outrigger trawls may lead to increased bycatches of skates and rays. They also suggested that fishermen may start to target skate to compensate for reduced catches of sole. Under EC regulation 23/2010 it is forbidden to land angel shark, *Squatina squatina*, common skate, *Dipturus batis*, undulate ray, *Raja undulata* and white skate, *Rostroraja alba*; and bycaught specimens must be returned alive where possible.
Basking shark	Gillnets, entanglement in pot ropes	Basking shark are caught in gillnet and trawl fisheries in most of the ICES area, but quantitative catch data are lacking. Proper quantification of bycatch and discarding rates for this species in the entire ICES area is required. There have been no directed fisheries in Norway since 2006 and this ban has continued to 2009. Live basking sharks caught as bycatch must be release immediately while dead or dying individuals must be landed. From 2009 all data relating to Basking shark landings must be reported. Under Council regulation (EC) No 41/2006 the fishing, retaining, trans-shipping or landing of Basking sharks is prohibited by any vessel in EU waters or EU vessels fishing elsewhere.
Blue shark	Major bycatch in Tuna fisheries	EU regulation 1185/2003 prohibits the removal of fins from these species and subsequent discarding of the body by all community vessels in all waters, and other vessels in community waters. As blue sharks have a low commercial value discard rates for this species are unknown and a better quantification of these rates will be needed to conduct proper stock assessments. Observer records demonstrate substantially more blue sharks are caught then reported. This species can comprise up to 70% of the total catches in many fisheries targeting tunas and billfish. They are also bycaught in recreational fisheries in the ICES area.
Porbeagle shark	Longline fisheries Demersal fisheries	Bycaught in mixed fisheries mainly in the UK, Ireland, France and Spain. Major bycatch in tuna fisheries. WGEF recommend that additional measures should be taken to prevent porbeagle bycatch in fisheries targetting other species and suggest that live porbeagles should be released from longline fisheries as a method of bycatch mitigation. However further studies are required on porbeagle bycatch and post-release survivorship. Because this species is of high commercial value discard rates are thought to be low. Fisheries targeting Porbeagle sharks were banned in Norway in 2007, although it is legal to land bycaught individuals Under Council regulation (EC) No 23/2010 the fishing, retaining, trans-shipping or landing of porbeagle

		sharks is prohibited by any vessel in EU waters or EU vessels fishing elsewhere. In 2009 observers in the French fishery under the EPPARITY program have noted individuals greater then MLL being release alive.
Shortfin-mako shark	Major bycatch in Tuna fisheries	Estimates of shortfin mako bycatch are difficult, as available data are limited and documentation is incomplete. A report of the US pelagic longline observer programme stated that of the sharks caught alive, 23% were released alive and 61% retained. EU regulation 1185/2003 prohibits the removal of fins from this species and subsequent discarding of the body by all community vessels in all waters, and other vessels in community waters.

Annex 5: Description of current database tables/excel spreadsheets

The current version of the SGBYC database structure is outlined in Figure A5.1.

1. Database description

Table DB 1. Fleet characteristics

This refers to the general characteristics of each fleet for a specified gear type. Fleet information can be entered for fleets where monitoring is required and for fleets where monitoring is not required but pinger deployment is obligatory. Information contained in this table is not currently required under the EP standard format but may be available in some instances and may be desirable to collect in future. Utilisation of a Fleet characteristics table where fleets can be picked from a list or new fleets can be added will also reduce duplication of data. A Fleet ID field is included as a unique index to link the table to other tables in the database. The Member States and other countries can be included in a country field. A vessel size range has been included which will permit, where available, analysis of vessels required to use pingers (>12 m), vessels required to have observers on board (>15 m) and vessels on which pilot observer programmes are carried out (<15 m). A field for the general fishing areas targeted by the fleet is included in the table with a view to obtaining general information on the characteristics of the fleet. Multiple ICES areas (Level 2 and or 3) can be input in each record. More specific spatial information can be provided in the total fleet effort table. Multiple Fishing seasons can also be entered in the season(s) field with perhaps more detailed individual season data provided in the Fleet Effort table. A Code for Fleet Segment as required in the EP standard format has been changed to Code for Gear Segment based on Appendix IV of 2008/949/EC. Prior to the EP standard format being issued, gear data were collected at both level 3 and 4 as required under 812/2004 so two gear code fields have been included in the database to take account of this. Mesh size is easy to include here and may be useful, for example, in analysing gear effects on bycatch in set-net fisheries. A field for information on target species has been included which may permit some analysis of fishery characteristics in relation to bycatch, which may be useful for example for fisheries seeking certification. A 'percentage monitoring required field' is included to denote if and how much monitoring is required under 812/2004 in relation to each fleet. This table is linked to Table 2 on a one to many basis.

Table DB 2. Fleet effort

This table provides spatially (ICES area level 3) and temporally (year and fishing season) aggregated fleet effort data. Month has also been included in case data are provided in this format. **All total effort data, including total effort data which does not have an associated observed effort record in the Observed Effort table (Table 3.), should be included to permit total estimates of fleet effort to be calculated.**

Soak time generally refers to the time a net is deployed. Total km.h has been inserted as the correct measure of effort to remove any confusion on what is required. Total effort for both towed and static gear are provided in one table but separate reports by gear class can easily be produced. This table is linked to Table 3 on a one to many basis.

Table DB 3. Observed effort

This table refers to the Observer sampling effort carried out in relation to the strata defined in the Fleet effort table. Regarding the type of Monitoring carried out, the

accompanying text in the standard format should clarify what is required. For example "Standard" can refer to standard monitoring of vessels over 15 m without pingers as required under 812/2004, "Pilot" can refer to monitoring carried out on vessels less than 15 m without pingers, "Scientific" can refer to technical or scientific trials such as pinger or pinger spacing assessment. A further field could be added for assessment of the effects of pingers over time such as "Pinger Effect". Further information on the nature of monitoring carried out can be provided in the accompanying Member State report. A yes/no "Required under 812" field has also been added as a method of describing if observations have been carried out as required under 812/2004 or not. This information can also be provided at fleet level in the "Required Coverage (%)" field, but it is easy to include this extra field to assist in removing any ambiguity regarding the nature of data collection at observer level. This could also have an impact on extrapolation of raised bycatch figures (see next section). A percentage coverage field which equates to the proportion of Observed days to Fleet Effort days for a given strata can be entered by the Member State and/or calculated automatically in the database. This table is linked to Table 4 on a one to many basis.

Table DB 4. Bycatch

This table contains details of protected species bycatch landed under the strata defined in the above tables. Multiple records (numbers of animals and numbers of bycatch incidences) of different species can be added to the table for each Observed effort record. A field has also been included to permit scientists to provide estimates of Coefficient of Variation (CV%) in relation to bycatch estimates. Estimates of raised/total bycatch for each species in each defined strata can be provided or calculated by query on data already provided. Bycatch incidences can be recorded with (e.g.. pilot studies) and without pingers. In order to avoid over complicating estimation of total bycatch, only bycatch incidences without pingers should be used in extrapolations of raised/total bycatch in relation to areas where monitoring is required and pinger deployment is not required. Collection of data on bycatch from gear with pingers will permit analysis of the effectiveness of pingers but this is not a primary objective of the SGBYC.

Table DB 5. Mitigation measures

This table provides data required under the EP standard format Table 2.2 and provides information on the numbers of vessels using pingers and the types of pingers used. The table includes a yes/no pingers mandatory field to denote if pingers are legally required by the related fleet. This table is currently linked to the Table DB1 on Fleet Characteristics and not the Fleet Effort table as required by the EP standard format. The EP format requires this information to be collected to area level 3/Ices Division e.g. VIIc which suggests that the table should be linked to the Fleet Effort table. SGBYC 2009 Table 7 was compiled in similar format to that newly required by the EP. The small amount of information which was provided in this table was, however, made available at a level corresponding to multiple ICES areas. It therefore makes sense to link this table to the Fleet characteristics table (DB1) in the database given the current database structure. This link can be altered in future if more detailed data become available.

2. Importing SGBYC data into the database

A standard format was used to compile data at SGBYC 2009 so these data were uploaded to the database first followed by SGBYC 2008 data which were available in a different format.

SGBYC 2009 data were obtained from spreadsheets corresponding to the Report tables which were available in the working documents on SharePoint. A spreadsheet containing SGBYC 2008 data were also available on SharePoint but some discrepancies between data in this table and data outlined in the SGBYC 2008 Report tables were observed so data were extracted directly from the Report tables.

Ni (No information) was converted to blank values, to represent no information and zero values (0) were assumed to represent zero. The data should be checked to ensure that blank and zero values are properly classified.

Table DB1. Fleet characteristics

SGBYC 2009

Some simple edits to SGBYC 2009 Table 3 made it possible to paste all of the information from this table into DB 3. Target species data from SGBYC Table 5 was input to DB 3.

SGBYC 2008

In order to prevent duplication of data it was necessary to review the list of fleets compiled in SGBYC 2009 to select corresponding fleets and Fleet IDs or add new records for new fleets. This exercise was carried out in the main excel spreadsheets used to compile the data. SGBYC 2008 data were mainly provided by fleet size (<>15 m) whereas SGBYC 2009 data were not, so new fleet records were created for most of the SGBYC 2008 in order to retain the fleet size data.

Table DB2. Fleet effort

Only ICES area level 3 data were included in the area field and seasonal data were converted to the required EP format e.g. 1–3.

SGBYC 2009

Tables SGBYC 4A and B, which refer to Fleet and Observed effort, were divided into two tables in relation to the type of gear i.e. set-net or pelagic trawl in the SGBYC Report. It made sense to combine these tables in order to maintain a relatively simple database structure. Observed effort data were, however, placed in separate database table again to facilitate a suitable database structure. It was relatively simple to modify data in these tables as input to the database. These were entered to the database as a single record under fleet segment 5. It was attempted to calculate effort in days, when not provided, based on other effort metrics in order to facilitate simple analyses. Two fleet segments, 5 and 6, were combined in SG 4b.

SGBYC 2008

Data were easily imported from the SGBYC 2008 Report table.

Table DB3. Observed effort

SGBYC 2009

Observed Effort in days was input to the database for Fleet ID 9 based on Fleet effort data. It was not possible to update the record for Fleet ID 5 as total fleet hours provided (74 260), when converted to days (3094) did not correspond to the total trips provided (60, this would provide trip durations of over 50 days). All other records had fleet and observer data available in days at sea.

SGBYC 2008

Fleet Effort data for SGBYC records 47–54 (UK fleets, Observer ID records: 150, 151, 155, 157, 159, 161, 169) were provided in days. The same effort figures (ranging from 299–86 836) were entered as observed hauls and this is most likely incorrect. These haul records were omitted from the database but can be included if the relevant Member States provide more information.

Table DB4. Bycatch

SGBYC 2009

Bycatch data were obtained from SGBYC 2009 Tables 5 and 6. Modifying the data collected in SGBYC Table 5 to make it suitable for entry to the database was quite labour intensive due to the different format, linking this table to other tables via a Fleet segment ID, which was previously used. This should not be a problem in future of the standard SGBYC spreadsheets are used. The data in the Bycatch table to data in the Observed effort table using a unique value index. The method for doing this is outlined in the SGBYC excel spreadsheets.

No data were entered into the Fleet or Observed effort tables in the database for Fleet segments 39 and 40 but bycatch observations were submitted. New records based on the entries in the Fleet table were entered into these tables so the bycatch observations could be entered. These records may need to be reviewed to provide updated information on observed effort, etc.

SGBYC 2008

No information was available in the SGBYC table on whether pingers were used in relation to bycatch incidences, so in order to facilitate extrapolation of total bycatch, it was assumed that all bycatch incidences occurred when pingers were not used.

Table DB5. Mitigation measures

Data were imported from SGBYC 2009 Table 7. No data were available for this table from SGBYC 2008.

3. Uploading data to SGBYC spreadsheet/database

The SGBYC excel data file on the SharePoint site contains data in the same format as the database tables. New data should be entered in the spreadsheets prior to uploading to the database. This was carried out for Ireland 2008 data to examine how the process worked. The Fleet Codes table was examined and new fleets were added. A Pivot table was applied to raw data to extract data in relation to gear, vessel size, season and area and combined with the fleet codes to produce fleet effort data. Observed Effort IDs were left blank in the spreadsheet as these are produced automatically in the database. Observed Effort data were sorted by the same fields and printed. These data were then manually entered in the same rows corresponding to Fleet Effort data. Unique bycatch IDs starting from the previous highest value, were applied to all of the new Fleet/Observer Effort IDs. Bycatch Ids for which bycatch information was available were entered in the Bycatch table with corresponding bycatch information. Once the excel datasheets were completed, the data were pasted directly into the database tables. Report tables were speedily produced by querying the database and are outlined in the Ireland 2009 Member State Report.

4. Producing SGBYC tables from the database (based on SGBYC 2009 tables)

Table 1 which summarizes Member States reporting status can be compiled without using the database. Table 2 on Observer coverage achieved by country can be produced by creating a simple query in the database. Table 3 essentially corresponds to the Fleet characteristics table (DB1) in the database. Tables SG4A and B on Fleet and Observed Effort, for trawl and set-net operations, and Tables 5 and 6 on cetacean bycatch and aggregated cetacean bycatch, can also be produced by querying the database. Total bycatch estimates in Table 6 can be provided by Member States and/or calculated in a query from observed bycatch, observed effort and Fleet effort data. Table 7 corresponds to the Database Mitigation Measures table (DB5). Other tables in SGBYC 2009 can be compiled without using the database.

5. Issues with observations where pingers were being used

It was noted that bycatch estimates in previous years may have been made for fleets in which pingers were used on some of the observed nets; under the old SGBYC format it would not have been clear how many specimens were caught in nets with or without pingers. Submission of data in the new format it is to be hoped will clarify this issue in future.

6. Data issues

Temporal data

The only description of temporal resolution required in 812/2004 consists of "Monitoring Schemes shall be made sufficiently representative by adequately spreading observer coverage over the fleets, time and fishing areas". It was therefore up to member states to decide on appropriate temporal resolutions. The EP standard format has requested temporal information to be provided by fishing season e.g. May to June. The problem with this approach is that Member States may simply define a fishing season as anything from 1 to 12 months in a given year and seasonal effects of fishing gear on bycatch will not be detected. Also temporal information provided in this format will not permit simple aggregation of data or extrapolation of total estimates of bycatch across countries or fleets. Definition of a standard season e.g. months 1–3, 4–6, 7–9 and 10–12 would undoubtedly improve analyses of data submitted under 812/2004.

Gear

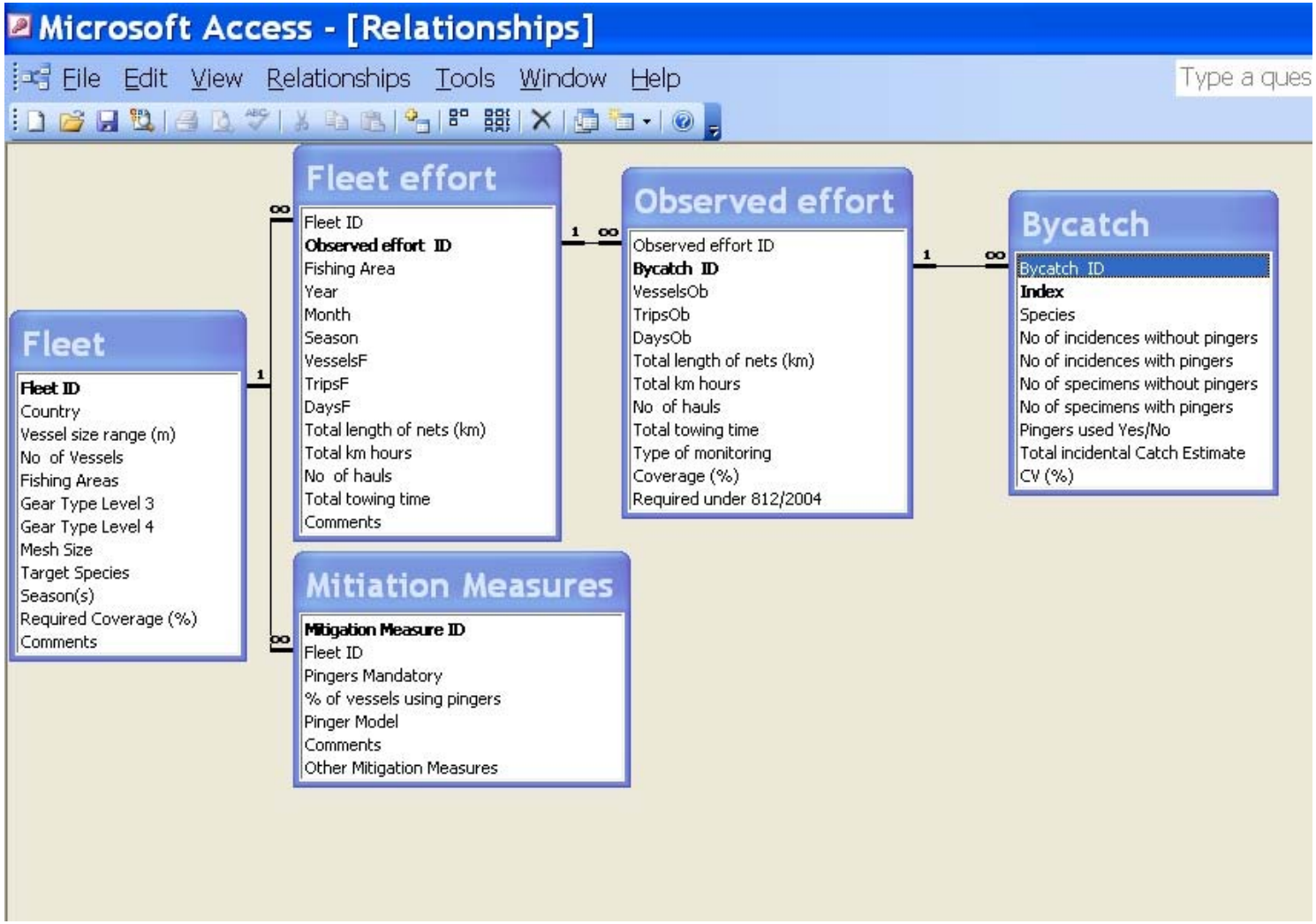
Data on gear type is required in the new EP format to Level 4 in Council Reg. 199/2008. Under Annex III of Council Reg. 812/2004, however, some fisheries have been defined at Level 3 e.g. pelagic trawl gear which has been defined as "Pelagic trawls (single and pair)". Member states have therefore previously submitted some data at Level 3 in accordance with the requirements of 821/2004. This difference in requirements under the Council Reg. and EP standard format needs to be addressed.

Mitigation measures

It is assumed that Table 2.2 in the EP standard format on Mitigation measures is supposed to collect data on compliance of Member State fleets with using pingers in areas were pingers are required. Reporting of pinger compliance in Annual reports is not currently required under 812/2004. Section 7 in the introduction to the Regulation states that "Member States should report annually on the use of pingers". Article 6 of the Regulation states that "Each year, Member States shall send the Commission, by 1

June, a comprehensive annual report on the implementation of Articles 2, 3, 4 and 5 during the previous year." The sole reference to collection of data on pinger use in Articles 2, 3, 4 and 5 is found in Article 2, Section 4 which concerns pilot projects and scientific studies on the effects of pinger use and this is covered in Section 1.1 of the EP standard format. The data required under Table 2.2 of the EP standard format is therefore a new requirement and the EP may wish to address the fact that no specific reference is made to this requirement in 812/2004.

Figure 1. SBYC database structure.



Annex 6: OSBOMB-Terms of Reference from ACOM

A Joint Workshop with NAMMCO on observation schemes for bycatch of mammals and birds (WKOSBOMB) (co-) chaired by Simon Northridge, United Kingdom*, will be established and will meet at ICES Headquarters, Denmark, 28 June–1 July 2010 to:

a) Review and describe the advantages and disadvantages of existing observation schemes for marine mammals and seabirds;

b) Recommend best practice when establishing and implementing by-catch observation schemes.

WGOSBOMB will report by 15 September 2010 for the attention of the Advisory Committee.

The output from this workshop is linked to a CRR (see separate Resolution).

Supporting information

Priority	High. ICES has been approached by NAMMCO with the intention of combining resources and expertise to address the issue of best practice in designing and implementing bycatch observation schemes..
Scientific justification	Term of Reference a) 1. To review methods used to quantify bycatch of mammals (and other uncommon species) in commercial fishing operations 2. Toprovide an assessment of best practices for the development and implenetation of such bycatch monotorig schemes, 3. To exchange information with NAMMCO on bycatch rates of shared stocks of species that are considered protected in EU waters. Term of Reference b) SGBYC will elaborate a draft outline manual on bycatch monitoring schemes this will be alborated at the workshop and a final product will be a manual that will be considered by ACOM and published in a suitable publication series (to be decided) during 2011.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	Between 20 and 30 participants are expected. NAMMCO funds will be used for some invited experts. The European Commission will be invited..
Secretariat facilities	The Atlantic Room plus one other breakout room for three days. Aside from the usual helpful attitude from the Secretariat, few other requirements are foreseen..
Financial	No financial implications.
Linkages to advisory committees	ACOM will consider the final report with a view to possibly providing advice.
Linkages to other committees or groups	SCICOM (SSGHIE, SSGSUE, SSGESST), PUBCOM, WGFTFB, WGFAST
Linkages to other organizations	NAMMCO, European Commission (DG Mare and DG Environment), ASCOBANS, ACCOBAMS, OSPAR would all be interested.

Annex 7: OSBOMB-Initial draft agenda

Introduction

Why do we need bycatch observer schemes in the context of monitoring protected species mortality?

Indirect methods of quantifying bycatch

- Overview of indirect measures.
- Discussion

Direct methods: observations of bycatch

- Using observers
- Use of CCTV monitoring
- Alternative observation platforms
- Contracted fleet; use of fishermen to collect data on themselves
- Discussion; attempt to build consensus on when and why each method is more appropriate than any other

Observer data: data management issues

- Data collection, collation, control.
- Data validation and quality control
- Discussion

Related fleet data

- Describing fleet effort
- Reliability of effort data
- Discussion

Fleet data and raising procedures

- Accuracy and precision
- Extrapolation measures
- Discussion

Industry cooperation and outreach

- View from Industry.
- Reconciling industry and scientific views of bycatch estimates.
- Discussion

Development of guidelines for best practice

Discussion and synthesis

Annex 8: WGBYC Terms of Reference for the next meeting

The **Working Group on Bycatch of Protected Species Fishing Behaviour** [WGBYC] (Interim Chair: Simon Northridge, UK) will meet in Copenhagen at ICES Headquarters. The date will be set when workshop commitments to review of Regulation 812/2004 for the Commission have been established.

WGBYC will report by April 30th 2011 to the attention of ACOM.

Supporting Information

Priority:	HIGH
Scientific justification and relation to action plan:	Overall areas of interest: Unintended catches of non-commercial or limited commercial value species of conservation concern. • Methodologies of bycatch estimation; • Bycatch estimate clearing house; • Development and review of mitigation measures; • Coordinating activities conducted under EU Regulation 812/2004.
Resource requirements:	None beyond usual Secretariat facilities.
Participants:	13–21 members.
Secretariat facilities:	Secretariat support with meeting organization and final editing of report.
Financial:	No financial implications.
Linkage to advisory committee:	ACOM
Linkages to other committees or groups:	WGFTFB, WGMME, WGSE, WGEF, PGCCDBS, SCICOM.
Linkages to other organizations:	NAMMCO, ASCOBANS, ACCOBAMSM, GFCM, EC

Annex 9: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY:
1.A standardized reporting format for national reports under Regulation 812/2004 should be agreed as soon as possible and should be in place for the June 2010 deadline for national reports.	European Commission via ACOM
2.Data reported to the Commission under Regulation 812/2004 should be provided in spreadsheet format for ease of data handling	European Commission via ACOM ; SGBYC members
3. Clarity is needed in defining what is required under the pilot projects and scientific studies mandated under Regulation 812/2004	European Commission via ACOM ;
SGBYC recommends the EU adopts a more flexible approach to define monitoring needs under Regulation 812/2004, enabling member states to focus monitoring as and when most needed	European Commission via ACOM ;
4. Work to develop new monitoring technologies such as CCTV or remote platforms should be continued and promoted	SGBYC members; European Commission via ACOM; WKOSBOMB Steering Group
5. The Group again recommends that Canada appoint a scientist with expertise in protected species bycatch in Canadian waters to the SGBYC.	Secretariat; Canadian ICES delegates
6.Collaboration with PGCCDBS to make better use of discard sampling surveys in recording protected species bycatch occurrence in a range of other fisheries	PGCCDBS

Annex 10: Technical minutes from the Protected Species and Mammals Review Group

- RGPROT/MAM
- By correspondence, 10 May 2010
- Participants: Nicole LeBoeuf (USA, Chair), Henrik Skov (Denmark), Paul Thompson (UK), Mette Bertelsen and Michala Ovens (ICES Secretariat)
- Working Group: SGBYC

Protected Species and Mammals Review Group (RGPROT/MAM) dealing with EC request on 'Impacts of fishing on seabirds, mammals and habitats'

Review of

- Sections 4 and 11 and Annex 9 of ICES Report of the Study Group for By-catch of Protected Species (SGBYC) 2010

ICES (SGBYC) was asked by the European Commission to review annual national reports submitted to the Commission under Regulation 812/2004, to collate bycatch estimates from such reports and review mandatory and pilot projects and scientific studies carried out under this regulation. Additionally, the Commission asked ICES to make an assessment of the national reports from 2007 and 2008, as well as specific scientific reports provided by Member States in the Context of Regulation 812/2004. The RGPROT/MAM was asked to review Sections 4 and 11 and Annex 9 of ICES Report of the SGBYC 2010. Only one Reviewer offered comments on this document.

The Reviewer was impressed with the work of the SGBYC in carrying out the request of the European Commission and found the assemblage of information regarding the implementation of the regulation insightful. In particular, the reviewer noted with concern that implementation was reported in a wide variety of ways and, in respect of many provisions of the regulation, not at all. Whether this reflects a lack of compliance with these provisions or a lack of full compliance with respect to reporting is entirely unclear. The reviewer generally concurs with the findings of the SGBYC. In particular, the reviewer agrees that implementation of Regulation 812/2004 "has provided a much more comprehensive picture of cetacean bycatch in European fisheries." This is a significant development and something for which the Commission could be commended.

With respect to the remaining points raised by the SGBYC, the Reviewer concurs with them and believes that to increase their usefulness to the Commission, it would be helpful to consider their influence on one another. To this end, some of the main points have been binned to the following categories: 1) Technological and Research Needs; 2) Reporting and Implementation; and 3) Regulatory Review. In particular, the Reviewer believes that considering related points together would assist the Commission in responding to the SGBYC's findings as a matter of priority to facilitate full and effective compliance with Regulation 812/2004.

1) Technological and Research Needs

- The current acoustic deterrent devices available are not reliable and this acted as a dis-incentive for fishermen to use them.
- Research into new monitoring technologies should be encouraged and continued.

- Monitoring of pinger use has been problematic although new technologies are being developed.

These points when taken together provide an indication that, while acoustic deterrent devices, such as pingers, have proven effective in some cases at reducing interactions between cetaceans and certain fishing gear (e.g. gillnets), they are not currently sufficiently reliable or available to solely achieve the objectives of Regulation 812/2004. In fact, a reliance on pingers predominately as a way to mitigate cetacean bycatch may undermine fishermen's willingness and ability to comply with the regulation and may complicate the Commission's ability to monitor pinger usage and evaluate their effectiveness over time. The Reviewer would emphasize the importance of the SGBYC's points regarding the development of new acoustic deterrence technologies. Fishermen involvement in identifying new deterrence/mitigation and monitoring technologies could be of critical importance to the uptake of current, as well as future measures.

2) Reporting and Implementation

- There is not sufficient sampling in the right fisheries or areas to enable sound management decisions.
- Adherence to the monitoring regime required has been inconsistent and some Member States have no dedicated observer programmes.
- The format of data remains inconsistent, making interpretation of the data difficult.
- A standard reporting format needs to be adopted as quickly as possible.
- The current mitigation measures are not well targeted.

When taken together, these points made by the SGBYC illustrate that the Commission must ensure accurate and consistent reporting on the implementation of Regulation 812/2004 as a matter of urgency, both with respect to assessing compliance with the regulation, but also in evaluating whether the regulation itself should be amended to facilitate enhanced compliance and effectiveness. For example, the SGBYC point regarding the point that current mitigation measures are not well targeted, is certainly true, but making changes to the measures that address this will not be possible if the Commission has little understanding of whether the measures are being implemented, and if so, whether they are adequate to achieve their intent.

The Reviewer also notes that the SGBYC point regarding inconsistent adherence to the required monitoring provisions of the regulation by some Member States may be true, but the veracity of this statement is unclear, and any mechanisms for addressing this problem will remain out of reach as long as there is a lack of standard and required reporting format. Indeed, the Reviewer believes that the varied formats and content of reports by Member States make it impossible to determine whether a lack of information within those reports reflects a true lack of compliance with the regulation provisions or a lack of full compliance with reporting. Either way, the Reviewer strongly concurs with the SGBYC that "a standard reporting format needs to be adopted as quickly as possible."

3) Regulatory Review

Elements within the previous two categories which, when examined in combination, may result in the need to revise Regulation 812/2004 in an attempt to better achieve its objective to provide protection for cetaceans within European waters. These items may include the revision of the regulations related to the use of pingers and reporting requirements, among other things. In addition to the potential need for changes to the

regulation to address these points, the Reviewer would like to emphasize the following points made by the SGBYC.

- The terminology used in the regulation is quite confusing, with a number of different types of "pilot project" allowed but poorly defined.
- A sampling strategy for vessels <15 m needs to be established taking account the specific problems with monitoring such vessels.

Addressing both of these points is central to ensuring full implementation and long-term effectiveness of the regulation. Regarding the SGBYC's point that the term "pilot project" is poorly defined within the regulation, the Reviewer wholeheartedly agrees and further notes that the purpose of conducting pilot projects is also not clear within the regulations. Pilot or other scientific studies conducted by Member States, whether related to acoustic deterrent devices, monitoring technologies, or anything else related to the reducing bycatch of cetaceans in European fisheries, could contribute considerably to achieving this objective. However, if the regulations are not clear as to what a pilot project is or to what incentives there may be to undertake such a project, fishers may be confused and may not see benefit to participating in such endeavours. This could potentially undermine any efforts to address points under the category of Technological and Research Needs above.

As for issues related to monitoring the bycatch of cetaceans by vessels <15 m, the Reviewer recognizes that smaller vessels present challenges with respect to monitoring compliance, as well as with respect to application of bycatch mitigation measures. Nevertheless, given the general belief that vessels of this size within coastal fisheries may have a relatively high likelihood of interacting with cetaceans, the Reviewer concurs with the SGBYC that priority attention should be paid to devising a way to assess the type and frequency of interactions. Whether this would require amending the current regulations is not certain. However, given that Article 2 exempts vessels of ≥12 m (use of acoustic deterrent devices) and Article 4 exempts vessels of ≥15 m (deployment of at-sea observers), any scheme developed to monitor these smaller vessels and/or to mitigate their bycatch would likely require changes to the regulatory requirements currently in place.

The SGBYC expanded on some of these findings, arranged by the articles of the regulation, with helpful comments regarding implementation and provided recommendations for improving implementation of key articles. The Reviewer concurs with all of the SGBYC's comments and recommendations. The Reviewer only notes that the Recommendations contained within Annex 9 are not entirely consistent with those noted within the narrative of Section 4 of the Report of the SGBYC 2010. These apparent inconsistencies may be resolved elsewhere in the Report of the SGBYC 2010, but not within the Sections reviewed. Therefore, the Reviewer would recommend that the SGBYC compare the two to each other to ensure that they are correct.