Annex J

Report of the Working Group on Non-deliberate Human-induced Mortality of Large Whales

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1. CONVENOR'S OPENING REMARKS AND TERMS OF REFERENCE

Leaper welcomed participants noting that this Working Group would continue the work of the Working Group on Bycatch and Other Human Induced Mortality. The new name reflects the emphasis on both bycatch and ship strikes. In addition, the Committee's agenda identifies closer links with the Commission's working groups. New items on the agenda included collaboration with Commission initiatives on entanglement and the Commission's Ship Strikes Working Group, including consideration of mitigation measures.

2. ELECTION OF CHAIR

Leaper was elected as Chair.

3. ADOPTION OF AGENDA

The Agenda was adopted.

4. APPOINTMENT OF RAPPORTEURS

Mattila offered to serve as rapporteur.

5. AVAILABLE DOCUMENTS

SC/65a/HIM01-04, SC/65a/SCP01, Vaes and Druon (2013), Neilson *et al.* (2012), Moore and Barco (2013), Moore *et al.* (2013), and Tejedor *et al.* (2013).

6. CRITERIA FOR DETERMINING CAUSE OF DEATH

Criteria for determining cause of death were discussed in a joint session with the environmental standing working group. The objective of the presentations and discussions was to assist the IWC in assessing human caused mortality. In particular, the Committee is hoping to agree to specific criteria by which its ship strike data review group could assess ship strikes reported to the IWC ship strike database. If standardised criteria became internationally accepted, this would assist countries as they report ship strikes to the IWC through their national progress reports.

Moore presented the relevant aspects of Moore *et al.* (2013) through a remote connection from Woods Hole, MA (USA). This recently published paper defines criteria for degrees of confidence in the diagnosis of human derived trauma as cause of death in cetaceans (and pinnipeds). Moore focused on the aspects of the paper regarding the diagnosis of sharp and blunt vessel trauma, and peracute and chronic fishery trauma in cetaceans, after giving brief remarks about issues related to examining large whales for human interaction evidence.

The amount of data needed to make an adequate diagnosis depends on the scenario. A floating carcass with severe dorsal propeller cuts or major entanglement with emaciation could be diagnosed at sea, but an at sea exam and sampling should never be regarded as a necropsy. Blunt trauma is often cryptic without an in depth beach necropsy. Data available for a determination can range from a single image at sea to a 100pp case report of a beach necropsy and consequent analyses. Regardless of the amount of available information, the most parsimonious diagnosis given available information always has value. Other useful references for examining carcasses include a handbook for recognising human interactions (Moore and Barco, 2013) and necropsy protocols (McLellan *et al.*, 2004; Pugliares *et al.*, 2007).

Floating carcasses reported at sea can be relocated using a plane depending on suitable weather, distance from land and landing site options. If a suitable boat is available then the carcass may be towed ashore for a beach necropsy. Viable strategies for relocating carcasses at sea have been derived using a US Coast Guard Search and Rescue drift model assuming that the drift of the carcass is equivalent to that of a 70% submerged 40ft (12m long) shipping container. For carcasses that wash ashore, beach surf maceration can orally eject viscera, muscle and then bones in a matter of hours. So a fully deflated carcass on a surf beach, with skin still attached, may have died more recently than might be assumed. A fully examined case will have gross and histopathology reports. Other analyses such as drift, propeller geometry, biotoxins, and paint fragments, can all be integrated into a peer reviewed and signed case report.

Blunt vessel trauma criteria

Confirmed cases will exhibit a number of: frank hemorrhage with edematous fluid in the subcutaneous tissue; hematoma, laceration or rupture with hemorrhage; hemothorax; hemoperitoneum; visceral displacement, herniation or rupture; skeletal fractures, luxations or subluxations with associated hemorrhage; microscopic fat emboli, acute hemorrhage, edema, rhabdomyocytolysis, and subcapsular and medullary draining hemorrhage in regional lymph nodes; history and/or abrasive evidence of the animal having been on the bow of vessel.

Probable cases will show similar gross necropsy and histopathology findings as a 'Confirmed Case' but insufficient information to conclude that other interpretations of the cause of death are not as likely.

Suspect cases will show blunt-trauma sequelae and/or bony lesions consistent with blunt trauma but may or may not have other signs of pathology from entanglement or disease.

Table 1
Criteria for diagnosis of underwater entrapment in cetaceans (see Moore *et al.*, 2013).

Cetaceans	Confirmed				Probable			Suspect
Reported by fisheries observer	X	-	-	-	-	-	-	
Entangled in gear	-	-	X	X	-	-	-	
Code 2 or 3	-	-	X	-	-	-	-	
Froth in lungs	-	-	-	-	X	X	X	
Whole/partially digested prey in stomach	-	-	-	X	X	X	X	Most parsimonious conclusion based on observer experience
Bruising at appendages/neck	-	-	-	-	X	X	X	
No other significant gross pathology		-	-	-	X	X	X	
Good nutritional status	-	-	-	X	X	X	X	
Net marks	-	X	-	-	-	-	-	
Rope/line marks	-	-	-	-	X	-	-	
Amputation/body slit	-	-	-	-	-	X	-	
Rostal/mandibular fractures	-	-	-	-	-	-	X	

Sharp vessel trauma criteria

Confirmed cases will show open wounds with sharp (incising) or sharp- and blunt-trauma (chop wounds) with histopathology supportive of gross findings of ante-mortem sharp trauma, or a reported, well documented vessel collision and resultant mortality with carcass present, where a necropsy may not be practical.

Probable cases show advanced decomposition, open incised wounds with sharp or sharp- and blunt-trauma sequelae, limited or no histopathology findings of trauma with open wounds and/or bony lesions consistent with sharp trauma, and may or may not have other signs of pathology (e.g. entanglement or disease).

Suspect cases involve a report/documentation of a carcass, no carcass in hand or minimal examination with limited or no necropsy. Findings can include open wounds and/or bony lesions consistent with sharp trauma, and may or may not have other signs of pathology (e.g. entanglement or disease).

Fishing trauma

This may present as whales anchored in gear, swimming, drowned, floating dead (after having bloated if a sinker), or beached dead. They may be in rope and/or net with wounds and/or scars. They are often largely stripped of gear if dead. Gear may include gillnet, single and pair trawls, and anchored pot gear such as lobster, crab and hagfish.

Peracute underwater entrapment

Evidence may include contact with fishing gear, evidence of hypoxia and physical trauma. Degrees of confidence are as shown in Table 1.

Chronic entanglement

Confirmed cases show sufficient evidence to say entanglement was the proximate cause of death or leading to death from consequent factors such as: inanition from emaciation, metabolic exhaustion from increased drag, exertional myopathy, overwhelming infection, starvation, or amputation, secondary to the chronic effects of ischemic necrosis and loss of energy stores.

Probable cases are diagnosed if some or all of the above factors were present, but carcass quality could not allow confident linkage of entanglement evidence with observed condition of the mortality.

Suspect cases show evidence of current or past entanglement, without sufficient findings to link the entanglement to major consequent changes in the animal, but that still had a suggestion of linkage. Moore concluded that evidence of the value of this approach has been recently published (Van der Hoop *et al.*, 2012) for NW Atlantic large whale mortalities and analysed in the context of management strategies designed to mitigate these impacts.

The working group thanked Moore and commended the authors on this work. Moore also drew attention to data from Van der Hoop *et al.* (2012) which showed the geographic and temporal trends in reports of both entanglements and ship strikes along the Atlantic Coast of the USA and Maritime Canada. The coast from Cape Hatteras to New York harbour showed the greatest number of reported vessel strikes, while the Gulf of Maine had the greatest number of entanglement reports. The trend in numbers (and location) of reports of vessel strikes and entanglements did not differ significantly before or after 2003, when a number of management mitigation initiatives were begun along the Atlantic coast of the USA. With regard to sharp trauma from vessel strikes, Ritter noted that, besides skegs, rudders and propellers, the sharp bows of certain types of vessels might also produce sharp trauma.

Rowles presented Moore and Barco (2013) on behalf of the authors. As an introduction to the presentation and in subsequent discussion she noted that much of the work for this handbook, and the Workshop that produced Moore *et al.* (2013), was motivated by regulations in the USA that require the determination of when human activities are the cause of death (mortality) or are more likely than not (51%) to lead to the death (serious injury) of a marine mammal. It was noted that welfare concerns are not currently being considered in injury determinations (NOAA, 2012). The human interactions handbook was the result of several years of work by the authors. The goal of the handbook is to standardise the evidence or observations collected to determine human interactions with cetaceans. The handbook contains: explanation of the goals and objectives of the data collection, definitions of terms, with descriptions, and multiple examples. The handbook stresses a process of making objective observations first then, if any potential external evidence of human interaction is found, the handbook gives instructions on how to fully document this so that it can be used later in making a final determination, when all evidence is collected. If a full necropsy is possible, then the criteria in Moore *et al.* (2013) may be followed, but if this is not possible, the handbook attempts to maximise the possibility of determining human interaction in the absence of forensic necropsies. The data collection form, with the handbook as an 'instruction manual' is used routinely by many

stranding network organisations in the US. For the purposes of examining for evidence of ship strike, the handbook has very good examples of both sharp and blunt trauma. Data collected in a consistent manner has assisted in making determinations of the likely outcomes of free-swimming cetaceans with wounds similar to those categorised on carcasses. The manual and associated training have assisted the stranding network in distinguishing between a 'no' for human interactions (meaning the animal was examined and there was no evidence of human interactions) and a 'cannot be determined' which means that no assessment was possible due to decomposition or other factors. Distinguishing between cases that cannot be determined and those that are negative is critical in determining prevalence of interactions and cause of death due to human activities.

The working group thanked Rowles and commended the authors for this work. It was noted that this handbook, and Moore *et al.* (2013), represented very important tools for stranding networks globally. In order to help disseminate both of these the Working Group **recommended** that the IWC Secretariat should notify the stranding contacts list it maintains from member nations of these documents. In addition, Moore noted that he and a co-author (Gulland) had developed a curriculum for a joint IWC-UNEP-SPAW training Workshop for Spanish-speaking nations of the Wider Caribbean, hosted by Mexico in November, 2012. This had been very well received by the 36 veterinarians, researchers and government representatives in attendance. He added that another IWC-UNEP-SPAW training was planned for the French and English speaking countries of the Wider Caribbean in November, 2013. In further discussion it was noted that the two papers describe complementary actions and criteria, as the handbook (Moore and Barco, 2013) provides examples and instructions for primarily visual assessments and Moore *et al.* (2013) primarily provides the most current forensic examples, instructions and criteria. While it was noted that a full forensic necropsy might be very difficult for developing countries, the ability to conduct full necropsies of large cetaceans is challenging under almost all conditions in all countries, and that this should be the goal to aim for. The two papers provided a progression of data collection options, and the visual options in the handbook should be feasible almost anywhere.

In response to a question about how the current budget cuts in the USA would impact this type of work in the future, it was noted that a primary source of grants for this work was proposed to be phased out. In response to several questions about particularly unusual wounds observed by members of the working group, Rowles noted that much of the data collected using these protocols was being archived with the ultimate intent of making some images available on the web, including the IWC website, for consultations and training and that there are several large whale veterinarians and biologists who regularly consult in this manner. It was noted that Woods Hole Oceanographic Institute houses a large and varied collection of wound images. In response to a description of a particularly severe wound, Moore noted that if a whale does not die quickly from blood loss, and if it is otherwise relatively healthy, it can over time heal from remarkably severe wounds leaving major scars. However, he also cautioned that apparently 'healed' wounds can reopen as a result of normal changes, such as the case of healed propeller wounds which reopened during a female right whale's pregnancy, ultimately killing her.

Neilson *et al.* (2012) presents criteria for categorising reports of ships strikes as well as summarising 108 ship strike reports in Alaskan waters between 1978-2011. In order to assess the reliability of these reports, which ranged from well documented with full necropsies to second hand reports with sparse documentation, the authors developed 'confidence criteria'. The authors had suggested that these confidence categories be adopted internationally.

There was some discussion about terminology used in all three papers, especially, whether 'vessel' is more appropriate than 'ship' in the context of these papers and the IWC database, as they all record contact from all types of 'vessels' including those as small as kayaks. There was also some discussion about whether a whale making contact with an anchored or drifting boat should be considered a 'strike'. The Working Group used the criteria explained in these three papers to develop the criteria and definitions in Appendix 2 and **recommended** that these be adopted for the IWC ship strike database.

7. ENTANGLEMENT

7.1 Collaboration with FAO on collation of relevant fisheries data and progress on joining the Fisheries Resource Monitoring System (FIRMS)

The IWC is currently an observer to the FIRMS partnership (Fisheries Resources Management System), a collaborative partnership organised by the FAO, which enables fishery management bodies to share information. It had been hoped that FIRMS may hold data on fishing effort that could be useful in estimating bycatch but FIRMS appears to have changed its focus somewhat since initial discussions with the IWC. This has been on the agenda for some years and last year it was agreed to wait for a database of IWC bycatch data to be developed.

After some discussion, it was decided that the Working Group should drop this agenda item, but that the chair should continue to monitor any new developments intersessionally, that might warrant its return to the agenda.

7.2 Progress on including information in National Progress Reports

The Working Group was reminded that the process for including known entanglements, ship strikes and other anthropogenic mortalities in national progress reports, is now accomplished through an electronic portal. There has been considerable discussion about data entry, extracting data and the level of detail that should be included in national progress reports. The Working Group was not in a position to review this year's data but noted that the Committee as a whole would be discussing Progress Reports in more detail.

7.3 Estimation of rates of entanglement, risks of entanglement and mortality

A recent incidental catch of a baleen whale in longline fisheries off the Brazilian coast was described (SC/65a/HIM02). The incidental capture of a small to medium sized baleen whale was documented on 29 April 2011, *ca.* 80 n.miles south of São Sebastião, off São Paulo State, Brazil. It resulted in severe mutilation of the whale fluke and as such probably caused its immediate death. The tail fluke was the only part of the carcass found entangled in the longline gear. Despite uncertainty in the identification of the whale, the episode documented here seems to be the very first in its nature resulting in the severe mutilation of the peduncle of a small whale entangled in a longline gear off Brazil. As so, it demonstrates the need for more investigation of the magnitude of such interactions in the southwest Atlantic Ocean.

In response to a question about the size of the longline fleet, the author noted that there are approximately 170, 12-16m boats operating out of São Sebastião, however this may be relatively small in relation to fleets operating out of other ports along Brazil's southern coast, which also fish in the path of migratory whales. The fleets are not monitored and they are not likely to report whales entangled in their gear since it is forbidden to entangle a whale, and there are regulations that entanglements are reported, but they are not effective.

Iñíguez noted that, just to the south of this area, the Argentine Department of Fisheries and Department of the Environment co-hosted a meeting, September 2012, consisting of researchers, government managers, and NGOs, in order to develop an action plan to mitigate bycatch and entanglement in similar Argentine fisheries. It is hoped that a report of the action plan developed will be available at next year's meeting.

7.4 Collaboration with Commission initiatives on entanglement, including consideration of mitigation measures

At IWC/63 the Commission endorsed a proposal by Australia, Norway and the USA for a technical advisor to be seconded to the Secretariat in order to assist the Commission's work on mitigating human impacts, especially entanglements and ship strikes (IWC, 2012b, Item 7). A technical advisor, loaned by the USA, has been seconded to the Secretariat since October 2011, and much of the work conducted has been devoted to capacity building on the issue of large whale entanglement.

Working formally through the appropriate Governments, Commissioners, partner IGOs and agencies, over 500 scientists, conservationists, government managers have been engaged, in over 20 countries, including: Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Korea, Mexico, Norway, Panama, Peru, the United Kingdom and many Pacific Island countries of the South Pacific. Following the capacity building strategy for large whale entanglements endorsed by the Commission at IWC/64 (IWC, 2012a), the first step is to provide an overview seminar for scientists and government managers, followed by detailed training and assistance with setting up entanglement response networks, if requested. Using the IWC endorsed curriculum developed by the IWC's expert advisory panel on entanglements (IWC, 2012a), these detailed trainings have been conducted for: Argentina, Brazil, Mexico and the UK. Over the remainder of 2013, more detailed trainings are scheduled for Ecuador, with participants from the other Commission for the South Pacific (CPPS) countries, as well as national training in Panama, and joint IWC-UNEP-SPAW training for the French and English Caribbean.

The Working Group commended this work, noting that, besides assisting countries to establish relatively safe entanglement response capabilities which had already released a number of individual whales, it has stimulated other local and national initiatives on the issue of entanglement, including actions intended to both understand and mitigate them. With regard to prevention, a member noted that this largely falls into either some form of effort reduction, or the design of low or risk free gear, and that expertise in these fields could be brought to the Committee by invited participants. The working group agreed that prevention was the ultimate solution, as has been noted by the Commission, and the chair encouraged members to actively bring the results of prevention studies to next year's meeting. In response to this call, it was noted that work is being done in New England (USA) by the New England Aquarium, through the Bycatch Consortium, and that a large whale pinger study was underway in Australia. These initiatives among others might produce relevant results for consideration by the Committee.

7.5 Time series of data relevant to RMP and AWMP

In previous years the Working Group has discussed time series of bycatch used in RMP *Implementations* and particularly for minke whales in the northwest Pacific. No specific requests had been made for time series of data for input into RMP or AWMP discussions this year.

8. SHIP STRIKES

8.1 Progress on the global database

Last year the Committee had recommended the appointment of a dedicated IWC ship strike data coordinator with the tasks described in IWC (2013). Ritter and Panigada had been contracted to jointly conduct this work.

Ritter presented the first progress report on IWC ship strike data coordination. The primary objective was to progress the conservation and management work of the IWC with respect to the issue of vessel collisions with cetaceans, to raise awareness about the ship strike data base and to stimulate its use. A number of the tasks assigned to the ship strikes coordinators were addressed during the first six months of work.

Outreach activities included messages to MARMAM and European Cetacean Society (ECS) email lists. Consultation with a representative from Parcs Canada who had not been aware of the data base resulted in another 50 new entries to the data base. Contact was also made with researchers and authorities in Sri Lanka. Moreover, IWC papers and other scientific publications as well as internet and press reports have been evaluated, and scientists, maritime institutes and organisations such as ASCOBANS were contacted. These efforts resulted in a number of new cases being entered into the data base. Several cases reported for Arabia are expected to be entered soon. Moreover, raw data on a large number (>100) of ship strikes in Alaska were received and are currently being entered into the data base. A total of 111 entries of collisions between sailing vessels and cetaceans are expected to be entered by the end of 2013. A new edition of the IWC ship strike leaflet, supported by Belgium, and available in six languages (English, French, Spanish, Arabian, Chinese, Russian) has been distributed. A self-standing banner display has been developed and two copies were produced, and one was displayed at the recent ECS conference in Portugal.

The technical maintenance and user friendliness of the data base are being developed on an on-going basis. Data from around 100 incidents were entered in the last year and the data from around a further 200 incidents are expected to be incorporated during 2013. From the new data, it became clear that ship strikes are an issue in areas previously not dealt with in greater detail, for example, the Gulf of St. Lawrence (Canada). Also, according to data recently published (raw data has been provided to IWC, see above), Alaskan waters appear to be another emerging high risk area.

The Working Group commended Ritter and Panigada on the work described, noting that a modest financial investment by the IWC seemed to produce good results, and **recommended** that funding at the same level requested for 2012/13 should continue.

The working group was informed that Australia has developed a database with a compatible schema, definitions and criteria to the IWC ship strike database in order to facilitate data exchange. It is ready to launch when the IWC criteria are confirmed, but until that time, unofficial reports from Australia need to be treated as unverified. In response to related questions about the USA ship strike database and reporting infrastructure, Rowles explained the review process that ship strikes reported in the USA go through at the regional and national level, and that there is inevitably a time lag before these data make it into the USA's National Progress Reports. The USA is also working to make sure that its ship strike database is compatible with the IWC database, and that data fields can be accurately mapped between the two. The objectives of the IWC ship strike database were previously identified as to:

(1) allow use of all available data to generate larger sample sizes in order to investigate how factors such as speed and vessel type relate to collision risk – this should lead to better ways to model risk and identify high risk areas;
(2) improve ability to identify areas where the impacts of ship strikes may be of particular conservation concern at the population level, based on the numbers of reported incidents and/or modelling of risk; and
(3) improve potential to develop the most effective mitigation measures.

It was suggested that populations identified as possible candidates for development of CMPs should be prioritised for proactive data gathering outreach efforts. The Working Group **recommended** this addition to the work plan for the ship strike database coordinators.

8.2 Estimating rates of ship strikes, risk of ship strikes and mortality

Ritter presented SC/65a/HIM01, dealing with underwater noise measured from vessels off the Canary Islands (Spain), where a large fleet of commercial ferries operates on a year-round basis, and at the same time, a high number of stranded cetacean carcasses in the area have shown injuries typically attributed to ship strikes. Recordings of underwater sound were made during September 2012 off the island of La Gomera after the recording vessel was positioned in the projected track of an approaching ferry. Distance to the recording vessel and speed were obtained from an automatic identification system (AIS) receiver. Three different ferry types characterised by propulsion type and cruising speed were recorded: a regular ferry (propeller driven, travel speed: 15kn), a fast ferry (propeller driven, travel speed: 20-25kn), and a jet driven high-speed ferry (travel speed: 30-35kn). Each ferry type showed a unique frequency- and distance-specific energy content signature. Based on assumptions about critical ratios between the received sound from the approaching ship and background noise, the authors concluded that whales may be capable of hearing approaching vessels at distances that enable them to react fast enough to avoid a collision, however there are numerous behavioural, physiological and other factors to be considered in evaluating the actual collision risk. The estimated times available from detection to avoid a potential collision were found to be heavily dependent on the (suspected) cetaceans' hearing thresholds. As such, the calculated values, ranging from 0.53 to 3.5min, probably represent overestimates. They concluded that jet-driven ferries travelling at high speed, combined with comparably low intensity bow-radiated noise, result in an especially high risk of collision. These results confirm that vessel speed is a crucial factor, and hence reinforce the need to reduce vessel speed so as to minimise the risk for the animals, vessel crews and ferry passengers alike.

In discussion it was noted that a key issue is whether whales are able to assess when and where to swim so as to avoid being hit.

Two pygmy blue whales were struck and killed in Sri Lankan waters within a 12-day period in early 2012. The southern coast of Sri Lanka is one of the busiest shipping routes in the world and overlaps with an area of high whale sightings. Because there is no abundance estimate for the local population of blue whales, we do not know what impact these deaths might have on the population. However, the reported deaths can only be considered minimum values. These deaths and the unknown population size highlight the urgent need for long-term monitoring of the blue whale population in Sri Lankan waters and elsewhere in the northern Indian Ocean (SC/65a/HIM03). The group thanked the authors for providing a paper describing information that had been presented informally last year.

Methodology to model the seasonal ship strike risk of fin whales in the Western Mediterranean Sea by making use of data on vessel traffic from AIS data and satellite-derived data on fin whale habitat (Vaes and Druon, 2013) was also discussed. Habitat was modelled by using data from earth observation satellites (surface temperature and chlorophyll-*a* content). This 'potential habitat' was then extrapolated to the entire western Mediterranean Sea and 'calibrated' against 1,732 fin whale sightings recorded since 1995. Derived favourable habitat covered about 10% of the western Mediterranean Sea. AIS data were used to estimate vessel distribution and density, vessel speed and vessel size on a basin wide scale. Both vessel traffic and habitat data were then integrated by accounting for relative risk according to vessel speed as well as daily variability of traffic density and habitat data. The mean risk per month was then estimated from daily risk estimates.

AIS data were available for May, July and October. July was the busiest month in terms of vessels transiting the Mediterranean with significantly less traffic in October. Two areas were identified to have an especially high collision risk for fin whales: (a) The Liguro-Provençal Basin north of Corsica (including the Pelagos cetacean sanctuary), which shows a potential risk higher in mid-summer than late spring or autumn due to a higher traffic of passenger ferries in July-August notably towards Corsica and Sardinia; and (b) the Alboran Sea shows an even higher potential risk but fin whales are rarely observed in this area. The authors suggest that noise disturbance from hundreds of vessels crossing this narrow area each day may be a reason for low whale density in an area of potential good habitat. The near real time maps of potential fin whale habitat have been computed on a daily basis since 2010 and provided to partner research groups.

In discussion it was noted that this type of approach had been previously encouraged by the Committee, but that the use of habitat indicators (e.g. surface temperature and chlorophyll-*a*) as a proxy for whale presence represented a different approach to actual data on whales. The Working Group **agreed** that it would be useful to see this approach further compared with contemporary whale sighting data.

Ritter presented Neilson *et al.* (2012) on behalf of the authors and reported that data from the incidents described in the paper had been made available to the IWC database. It analysed all reported whale-vessel collisions in Alaska between 1978 and 2011. Each record was assigned to one

of four confidence categories using standardised criteria that were created for this study: definite ship strike (*n*=89), probable ship strike (*n*=9), possible ship strike (*n*=10), or rejected report (*n*=11). 108 reports were classified as definite, probable or possible ship strikes. Most reports (*n*=86, 80%) were based on collisions witnessed at sea, while the remaining 22 reports (20%) were based on dead whales where no collision was reported. Most strikes involved humpback whales (*n*=93, 86%). Twenty-five collisions are known to have resulted in the whale's death but in most cases (72%) the fate of the whale was unknown. All types and sizes of vessels collided with whales; however, small (<15m) recreational vessels as well as commercial recreational vessels were the most common. When vessel speed was known, 49% of the collisions (*n*=37) occurred at vessel speeds ≥12kn. Maximum speed reported was 35 knots. Among the 25 mortalities, vessel length was known in seven cases (190-294m) and vessel speed was known in three cases (12-19kn). In 36 cases, human injury or property damage resulted from the collision, and at least 15 people were thrown into the water (i.e. collisions are a human safety issue as well). In 15 cases humpback whales struck anchored or drifting vessels. This suggests that the whales did not detect the vessels and that being in a silent vessel may increase the risk of a collision. Collision hotspots were identified; these are areas that warrant special attention in the form of vessel speed limits, public service announcements, increased law enforcement presence or other measures.

The authors of Neilson *et al.* (2012) had also recommended the wide distribution of the IWC's leaflet on vessel strikes that had been funded and co-ordinated by Belgium. The Working Group noted the value of the leaflet to highlight the issue and create an ongoing dialog on whale avoidance in the maritime industry. It was also encouraging to see others recommending the use of the leaflet.

In discussion it was noted that even though this paper presented a large number of cases, there were still relatively few in which the circumstances of the collision and outcome could be related to the size, speed and type of the vessel involved. This highlights the need of a central global database such as the IWC ship strike database which will increase the likelihood of obtaining a sample size sufficiently robust for meaningful analyses of factors related to risk.

8.3 Collaboration with the Commission's ship strikes working group including consideration of mitigation measures and plans for future Workshops

Mattila summarised the report of a Commission endorsed ship strike mitigation Workshop (Tejedor *et al.*, 2013), held in Tenerife in October 2012. He noted that this was primarily a management and mitigation oriented Workshop to discuss how best to distribute the current ship strike avoidance information to professional mariners who receive training and information through the IMO. The specific goals summarising the approach are listed as item 1.2 of the report. In brief the objectives were to:

- determine what information needs to be delivered to mariners to effectively reduce the risk of ship-strike of cetaceans? How (by what systems/technologies) can such information be delivered?
- what actions need to be taken and what key stakeholders need to be engaged to initiate the development of an international mariner outreach and training program?

The Workshop included a broad cross section of participants representing the IMO, shipping associations, shipping managers, ship companies and scientists working on the issue. While the Workshop did spend some time reviewing current ship strike avoidance schemes and strategies, there was a recognition that there is currently no technological equipment or system which has been proven to effectively mitigate ship strikes with whales. There was broad recognition and acceptance that currently, the best way to avoid ship strikes with whales is for ships to avoid them, and if they can't avoid whale habitat, then they should maintain a vigilant watch and slow down as appropriate. Several participants from the industry agreed that they and their captains would rather know of a whale 'hot spot' well in advance, and be able to plan their routes accordingly to avoid them, rather than getting a message upon arrival at an area that they need to re-route around, effectively adding more distance and time to their transits. Finally, the Workshop did recognise the IWC as a significant resource and stakeholder in the process of developing and disseminating the best available information to shipping, and saw the IWC as an important partner in this process. It was stressed that contacts established through this Workshop can potentially be used by the ship strike data coordinators to strengthen the dialogue with the maritime industry.

In discussion, it was noted that the idea of mapping cetacean hotspots for the purposes of estimating risk and avoiding ship strikes, had previously been discussed by the Committee. The apparent willingness of a significant number of key stakeholders at this Workshop to investigate the feasibility and utility of voyage planning to avoid high density areas represents an opportunity for the Committee to play an important role in this effort. The working group agreed that this was a potentially productive way forward on this issue, and **recommended** that the topic of defining and identifying critical whale 'hot spots' and engaging the shipping industry in the process of communicating this information was a valuable agenda item for the Commission's next ship strike Workshop. Members noted that there were already some initiatives underway to identify cetacean 'hot spots' and that these might be useful to the work of the IWC and the upcoming Workshop. These include: modeling work conducted by NOAA, for the west coast of the USA, and the Eastern Tropical Pacific, the mapping of current Marine Mammal Protected Areas by the ICMMPA and the identification of 'important cetacean habitat' by its new partner group, the IUCN Task Force on Marine Mammal Protected Areas.

Finally, the Working Group recognised that the Tenerife Workshop was primarily concerned with management and mitigation, and as such, **recommended** that the Commission's next ship strike Workshop review the report in full, and consider endorsing it and seeking partnerships with stakeholders to carry out appropriate recommended actions.

A funding proposal from researchers at the University of Auckland, New Zealand for aerial surveys of Bryde's whales in the Hauraki Gulf was also discussed. The population is believed to be less than 200 individuals and there have been 16 confirmed ship strike mortalities between 1996 and 2013. A Bryde's whale ship strike group has been established including major stakeholders such as Maritime New Zealand, Department of Conservation and the Port of Auckland. The primary objective of the proposed research is to provide an abundance estimate for Bryde's whales throughout their primary range in New Zealand and to use this and data on distribution to inform mitigation measures to reduce ship-strike mortality. The Working Group **recommended** that this project should be funded.

8.4 Time series of data relevant to RMP and AWMP

The Working Group has not yet been in a position to provide estimates of ship strike mortality beyond confirmed reports that would be suitable for use in the RMP and AWMP. However, developing methods to quantify mortality remains an objective for the Working Group.

9. INPUT INTO CONSERVATION MANAGEMENT PLANS

Entanglement and ship strikes are the highest cause of non-deliberate anthropogenic mortalities for large whale populations. The Working Group is focused on ways of estimating the numbers of such mortalities for use in assessments and evaluating mitigation measures. Both of these aspects of the work are relevant to Conservation Management Plans (CMPs).

The Working Group discussed ways in which it could assist in responding to the request from the Commission to create a list of priority populations for CMPs. This process was guided by the criteria for populations to be considered as candidates for CMPs in SC/65a/SCP01. These include populations that have been assessed, in which case the Committee has already considered human induced mortalities, but also populations whose status has not been assessed where human impacts are believed to be substantial and thus of concern. It is these latter populations for which some of the estimation and risk modelling approaches considered in the Working Group may be particularly relevant.

The Working Group drew up a preliminary list of areas in which, or populations of, large whales believed to be subject to particularly high levels of ship strikes and entanglements.

Areas or populations where high levels of reported ship strikes occur that have been discussed by the Committee include:

- Arabian Sea humpback whales;
- blue whales in the northern Indian Ocean;
- Bryde's whales in the Hauraki Gulf, New Zealand;
- fin whales in the Mediterranean;
- North Atlantic right whales;
- sperm whales around the Canary Islands; and
- sperm whales in the Mediterranean.

In some cases this list includes areas of known high ship strikes rather than the geographical extent of populations. In addition, this list includes some populations (e.g. Bryde's whales in the Hauraki Gulf) whose distribution may only extend across a single range state. Hence not all the areas or populations listed may be suitable for CMPs. These are also not listed in any order of priority but the Working Group noted that the status of the Arabian Sea humpback whales would make this population a priority for addressing ship strikes.

With the exception of North Atlantic right whales and Arabian Sea humpback whales, these populations have not been subject to assessment but concerns over their status have been largely driven by levels of mortality, often in the absence of abundance estimates. The Working Group noted that any population which is known to spend significant time in areas of high density shipping should be considered, even with a low number of reports. This is especially true if there is no local stranding network or ship strike reporting infrastructure.

In 2010, the Commission sponsored a Workshop on the Welfare aspects of Large Whale Entanglement (IWC, 2012c). In order to understand the magnitude of the problem, the Workshop was asked to review the global scope (regions and species) and impacts of large whale entanglement, and they were asked to prioritise populations at risk. In addition to the list identified by participants at the Workshop which identified species or stocks that were considered to be of the highest concern from a population or conservation perspective with respect to entanglements the Working Group added Arabian Sea humpback whales and **agreed** that this population should also be a priority for measures to address entanglement. This resulted in the following list:

- Arabian Sea humpback whales;
- J stock of minke whales in the western Pacific;
- North Atlantic right whales;
- North Pacific right whales (*Eubalaena japonica*);
- western Pacific gray whales; and
- other small populations (e.g. bowhead whales (*Balaena glacialis*) in the northeast Atlantic).

The Workshop had cautioned against highlighting specific species and interactions of concern to the exclusion of others, as environmental changes such as climate change may alter distribution of whales or fishing effort, resulting in new areas and species at increased risk of entanglement. Also, the Workshop had expressed concern that information is incomplete for many regions and/or species.

The Working Group also noted that entanglement is a potential concern in any area in which whales and stationary or drifting gear in the water overlap. Thus, any population should be considered at potential risk where overlap exists, even in the absence of confirmed reports. Areas of known or potential overlap of whales with gear in the water should also be prioritised when formal reporting and response capability is known to be limited or absent.

The concerns over mortality levels have largely been driven by the number of reported incidents in these areas. As a more quantitative understanding of how to evaluate risks develops, it may also be appropriate to propose populations for consideration where the risks from entanglement or ship strikes appear high, even in cases where there is limited data on reported mortality. There are many areas of the world where systems for reporting mortality such as fisheries observer programmes or stranding schemes do not exist. The Working Group noted that it was not currently in a position to propose any populations based just on risk analysis where reporting is very limited, but further developing such methods so that this could be possible in the future could be an objective for the Group.

The Working Group also discussed scientific input once CMPs have been developed. Some key components of CMPs are listed in SC/65a/SCP01 and include that the focus should be on practical and achievable actions. In addition a key component is that IWC involvement can bring in the involvement of other IGOs and scientific/technical expertise. For ship strikes in particular, IWC has consultative status to the International Maritime Organization (IMO) and so can assist with IMO involvement. The IMO is responsible for all measures outside of national waters that affect shipping and so an effective dialogue with IMO is critical for all measures related to ship strikes. It was also noted that the IWC and ACCOBAMS had developed a joint work plan on ship strikes. The Working Group agreed to maintain close links with the ACCOBAMS ship strike group and Ritter agreed to act as a liaison with this group.

For entanglements the IWC has established a large whale entanglement expert advisory group, with members from Australia, Canada, New Zealand, South Africa and the US, to advise countries on the issue, and has initiated

a program to build capacity in prioritised areas, when requested. In addition, the Working Group **recommended** that the Secretariat bring the IWC's most current scientific and mitigation information to the relevant bodies within the FAO.

The mitigation aspects of measures considered within CMPs will need to be evaluated to assess what risk reduction is expected or being achieved. The Committee has had discussions about evaluating mitigation measures, for example for ship strikes at the joint IWC/ACCOBAMS Workshop in 2010 (IWC, 2011) and in future this work will be directed to the Working Group. There is therefore a need to especially encourage studies that fill any data gaps regarding ways that entanglement or ships strikes may be reduced for input into CMPs. This may be in areas where CMPs have already been developed (western gray whales; southwestern Atlantic right whales; and southeast Pacific right whales); are currently under consideration as candidates (Arabian Sea humpback whales) or are high on the list of priority candidates. Recognising that CMPs continue to evolve, the Working Group noted that it would welcome requests to further evaluate non-deliberate human induced mortality in the context of existing CMPs.

With regard to CMPs and the ship strike issue, Iñíguez noted that as part of the CMP for the southwest Atlantic population of southern right whales, the range states have agreed to collect information on ship strikes with this species and report them to the IWC.

10. OTHER ISSUES, INCLUDING ASSESSING MORTALITY FROM ACOUSTIC SOURCES AND DEBRIS

The discussion of marine debris including direct mortality is under the report of the SWG on Environmental Concerns.

11. WORK PLAN AND BUDGET REQUESTS

The focus of the group will remain on estimating mortality of large whales due to entanglement and ship strikes. The Working Group agreed that it would be beneficial to identify issues for priority attention within a longer-term plan of work. An intersessional group was established to make suggestions for such a plan which would be considered next year. Double offered to convene the group; other members are Brockington, Leaper, Mattila, Ritter, Rowles, Schweitzer.

The Working Group **agreed** that the ship strike data review group should continue to work intersessionally. The group consists of Donovan, Double, Leaper (Chair), Mattila, Panigada, Ritter and Rowles. Previous members of the group who were not at the meeting would be contacted to ask if they would be willing to continue.

The Working Group made two budget requests. One for £10,000 to continue the work of the database coordinators (see Item 8.1) and one for £27,050 for Bryde's whale surveys related to ship strikes in the Hauraki Gulf. Noting the importance of the work of the database coordinators to the group it was **agreed** that the request for funding for this work should be prioritised. The recommended tasks for the database coordinators are listed in Appendix 3 however it was noted that this was a long list and that not all the tasks would be expected to be completed within the funding period.

The work plan will include the following.

(1) Reviewing progress in including information in National Progress Reports.
(2) Entanglement:
  (a) estimation of rates of entanglement, risks of entanglement and mortality;
  (b) collaboration with Commission initiatives on entanglement, including:
    (i) consideration of mitigation measures;
    (ii) assist with communication of key scientific issues related to entanglement;
    (iii) review entanglement issues related to Conservation Management Plans; and
  (c) involvement with other international organisations who have complementary or overlapping mandates with respect to entanglement.
(3) Ship strikes:
  (a) estimation of risks and mortality from ship strikes;
  (b) collaboration with the Commission's Ship Strikes Working Group including:
    (i) consideration of mitigation measures including review of Bryde's whale surveys in Hauraki Gulf, New Zealand and ways these can inform measures to address ship strikes for this population;
    (ii) assist with communication of key scientific issues related to ship strikes;
    (iii) review ship strike issues related to Conservation Management Plans;
  (c) continuing development and use of the international database of ship strikes:
    (i) review progress by database coordinators on work programme in Appendix 3;
    (ii) review progress with reviewing new reports and application of new criteria; and
  (d) review scientific information from forthcoming Workshop organised by the Commission.
(4) Review of information on other sources of non-deliberate human induced mortality.
(5) Developing a five year plan with suggestions for priority work by the Committee to estimate and address non-deliberate human induced mortality; review work of intersessional group.

12. ADOPTION OF THE REPORT

Leaper thanked the group and particularly David Mattila for doing an excellent job as rapporteur. The report was adopted at 18:50 on June 10, 2013.

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Appendix 1

AGENDA

1. Convenor's opening remarks and Terms of Reference
2. Election of Chair
3. Adoption of Agenda
4. Appointment of rapporteurs
5. Available documents
6. Criteria for determining cause of death
7. Entanglement
   - 7.1 Collaboration with FAO on collation of relevant fisheries data and progress on joining the Fisheries Resource Monitoring System (FIRMS)
   - 7.2 Progress on including information in National Progress Reports
   - 7.3 Estimation of rates of entanglement, risks of entanglement and mortality
   - 7.4 Collaboration with Commission initiatives on entanglement, including consideration of mitigation measures
   - 7.5 Time series of data relevant to RMP and AWMP
8. Ship strikes
   - 8.1 Progress on the global database
   - 8.2 Estimating rates of ship strikes, risk of ship strikes and mortality
   - 8.3 Collaboration with the Commission's ship strikes working group including consideration of mitigation measures and plans for future Workshops.
   - 8.4 Time series of data relevant to RMP and AWMP
9. Input into Conservation Management Plans
10. Other issues, including assessing mortality from acoustic sources and debris
11. Work plan and budget requests
12. Adoption of the Report

Appendix 2

CRITERIA FOR EVALUATING VESSEL STRIKE EVENTS

Table 1

Criteria for evaluating vessel strike events.

IWC category	Neilson *et al.* (2012) category	Neilson *et al.* (2012) description	IWC description
Confirmed based on report	Definite *There is evidence that a strike occurred beyond a reasonable doubt.*	Strike was witnessed by the vessel operator/crew or by the operator/crew of a nearby vessel	Strike of live whale was witnessed by the vessel operator/crew or witnessed with certainty by the operator/crew of a nearby vessel. Outcome in this case may be either: **Confirmed mortality** if witnesses observe floating carcass shortly following impact; *or i*mages or forensic documentation collected at the time of the impact, links the event to a floating or beach cast carcass found later. **Serious injury** if witnesses observe level of impact that is most likely to be fatal given the type, tonnage and speed of the vessel; *or* witnesses observe whale with injuries expected to be fatal; *or* significant amount of blood in the water associated with severed body parts. **Injury** if witnesses observe level of impact that is unlikely to be fatal given the type, tonnage and speed of the vessel; *or* witnesses observe whale with injuries unlikely to be fatal. **Undetermined** if insufficient additional information.
Definite Based on report	Definite *There is evidence that a strike occurred beyond a reasonable doubt.*	Strike was not witnessed but evidence of a collision was found on the vessel (e.g. whale skin or tissue); *or* whale was found on the bow of a ship.	Strike was not witnessed but evidence of a collision was found on the vessel (e.g., whale skin or tissue) location of collision evidence on the carcass suggested whale was alive when struck. Whale carcass [category 2 fresh dead] was found on the bow of a ship.
Whale initiated collision	Subcategory: whale struck stationary vessel.	Vessel was stationary at the time of the collision (i.e. anchored or drifting) or whale actively approached slow moving vessel	
Confirmed based on carcass	Definite	Strike was not witnessed but whale has massive blunt impact trauma (defined by disarticulated vertebrae or fractures of one or more heavy bones including skull, mandible, scapula, vertebra or adult rib, and a focal area of severe hemorrhaging); *or* strike was not witnessed but carcass has apparent propeller wounds (i.e. deep parallel slashes or cuts into the blubber) on the dorsal aspect; *or* strike was not witnessed but carcass has propeller wounds on the ventral and/or lateral aspect which a necropsy confirms were produced ante mortem; *or* strike was not witnessed but carcass has an amputated appendage (e.g. fluke or flipper) which a necropsy confirms occurred ante mortem due to a sudden and traumatic laceration (versus an entanglement injury causing a slow, ischemic loss of the appendage).	Confirmed according to criteria in Moore *et al.* (2013) for blunt or sharp trauma.
Definite Based on carcass			Strike was not witnessed but whale has massive blunt impact trauma (defined by disarticulated vertebrae or fractures of one or more heavy bones including skull, mandible, scapula, vertebra or adult rib, and a focal area of severe haemorrhaging); *or* strike was not witnessed but carcass has diagnostic propeller wounds (i.e. deep evenly spaced slashes or cuts into the blubber) on the dorsal aspect; *or* strike was not witnessed but carcass has diagnostic propeller wounds on the ventral and/or lateral aspect which a necropsy confirms were produced *ante mortem*; *or* strike was not witnessed but carcass has an amputated appendage (e.g. fluke or flipper) which a necropsy confirms occurred ante mortem due to a sudden and traumatic laceration (versus an entanglement injury causing a slow, ischemic loss of the appendage).
Probable based on report	Probable *The report is likely to be true; having more evidence for than against, but some evidence is lacking.*	Vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred but cannot confirm the strike with absolute certainty.	Vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred but cannot confirm the strike with absolute certainty; *or* whale was found on the bow of a ship in a more advanced state of decomposition than category 2 but there is other evidence that the whale was alive when struck (e.g. the time when the strike was thought to have occurred is consistent with decomposition).
Probable based on carcass		Strike was not witnessed, and the whale is a calf with smaller broken bones (e.g. ribs) that could have been fractured by another animal rather than by a vessel; *or* strike was not witnessed and the whale shows partial evidence of a collision other than as defined under definite strike: (i)whale has a focal area of severe haemorrhaging but no known broken bones; therefore, it is possible the trauma was caused by another animal rather than by a vessel; or (ii) carcass has propeller wounds on the ventral and/or lateral aspect; however, the necropsy is not able to determine if they were produced *ante mortem*.	Probable according to criteria in Moore *et al*. (2013) for blunt or sharp trauma.
Possible based on report	Possible *The report may be true; however, a majority of evidence is lacking.*	Vessel operator/crew or operator/crew of a nearby vessel believes that a strike may have occurred but there is significant uncertainty; *or* vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred, while the vessel operator/crew or operator/crew of a nearby vessel believes that a strike did not occur	Vessel operator/crew or operator/crew of a nearby vessel believes that a strike may have occurred but there is significant uncertainty; *or* vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred, while the vessel operator/crew or operator/crew of a nearby vessel believes that a strike did not occur; or whale found on bow but evidence is not clear whether strike was *ante-* or *post-mortem*.
Possible based on carcass		Strike was not witnessed, and the whale shows partial evidence of a collision other than as defined under definite or probable strike, such as damage to an appendage or skin, but the necropsy is incomplete or there is no close examination of the whale (e.g. whale is viewed from a distance only).	Suspect according to criteria in Moore *et al.* (2013) for blunt or sharp trauma.
Rejected report	Rejected report *The report is not credible.*	Third-hand report; *or* no credible eye-witnesses; *or* lacking sufficient detail or documentation to be credible; *or* necropsy determines an alternate cause of death.	Third-hand report; *or* no credible eyewitnesses; *or* lacking sufficient detail or documentation to be credible.
Not a strike			The incident was reported in the belief that it was a vessel strike, but the DRG concluded that based on the evidence there was unanimous agreement that the incident did not involve contact with a vessel.

Neilson *et al.* (2012) note that the credibility of the eyewitness(es) was assessed on a case-by-case basis. The most credible eyewitness is someone who had 'something to lose' in reporting the collision (e.g. the captain and/or the crew of the vessel that struck the whale) because it is presumed they would not risk reporting the collision if it had not occurred. The least credible eyewitness is a passenger on a commercial vessel (e.g. whale watch vessel, cruise ship, etc.) who reports a collision, but there is no supporting evidence (photos, observation of wound, blood, etc.) or other eyewitnesses. In these cases, the report was rejected unless the passenger was an experienced observer and/or additional eyewitnesses were available to corroborate the report (assessed on a case-by-case basis).

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Appendix 3

TASKS FOR THE SHIP STRIKE DATABASE COORDINATORS

DATA GATHERING

(1) Liaise with regional databases in order to facilitate their submission to the global database – this will involve addressing issues of data confidentiality and classification, as well as facilitating easy submission to the database.
(2) Identify national contact points, organisations and groups that hold data on ship strikes that have not been contributed to the global database and encourage them to submit their data to the global database – this will involve use of mail lists (e.g. Marmam, ECS-talk) and will involve addressing issues of data confidentiality and classification, as well as facilitating easy submission to the database. Telephone interviews with identified contributors should be investigated to facilitate submission of data.
(3) Disseminate new criteria for ship strikes developed at SC/65a.
(4) Regularly contact national co-ordinators or stranding networks (from IWC list) providing them with any new updates relevant to ship strikes and helping to facilitate data entry of any new records to IWC database.
(5) Regularly review scientific journals for ship strike information and contact authors to collate data for entry into the database.
(6) Use search engines and other internet news monitoring tools for reports of ship strikes and follow up on reports of new incidents in order to gather information as soon as possible after the incident took place and facilitate its incorporation into the database – this will include informing national coordinators promptly of reported incidents within their area.
(7) Prioritise populations identified in CMPs for data gathering outreach efforts.

OUTREACH AND COMMUNICATION

(1) Work with the Secretariat to ensure that the IWC ship strike web site pages are kept up to date including:
- updating publicly available summaries from the database;
- providing links to other sources of information material e.g. that produced by international organisations such as ACCOBAMS, ASCOBANS, CMS, IMO as well as national groups; and
- consider whether there is value in highlighting recent cases/reports on the web page in a positive manner to encourage further reporting.

(2) Monitor and respond to emails addressed to the *shipstrikes@iwc.int* email address, including reports of new incidents, giving feedback to data providers and dealing with requests for summary information from the database.
(3) Work with the Secretariat to develop a communications strategy. This may include:
- developing approaches to ensure that the current leaflet on ship strikes prepared by Belgium with assistance from inter alia IFAW is as widely distributed as possible within shipping industry (direct to vessels), shipping management companies, and maritime academies;
- exploring ways of raising the profile of the database by contacting other organisations (including ECS, ACS, SMM, ACCOBAMS, ASCOBANS), NGOs, recreational boating associations, maritime organisations; and
- considering the need to update the leaflet.

(4) Liaise with national Port Authorities and Coast Guards for gathering information on ship strikes, to distribute awareness material and eventually access AIS data.
(5) Assist the Secretariat with maintaining links with IMO, ASCOBANS, ACCOBAMS etc.
(6) Provide an annual update to the Scientific Committee.
(7) Consider developing PowerPoint presentations/posters for use at Workshops, symposia, conferences, etc.
(8) Consider presenting information at specific conferences (e.g. ECS, SMM etc).
(9) Explore funding options for future IWC ship strike work.

DATABASE MANAGEMENT

(1) Work with the Secretariat to improve the user friendliness of the database (requires technical assistance) including in response to user problems and suggestions.
(2) Data entry of new records including data presented in meeting papers and National Progress Reports at annual meetings of Scientific Committee, including sailing vessel cases from Ritter – priorities for entry to be established with the Steering Group.
(3) Further development of database handbook, ensuring that the database documentation remains up to date, is widely distributed and that any changes are notified to all actual/potential collaborators.
(4) Work with data review group to ensure that all new records are appropriately reviewed including identification of potential duplicate reports.