Annex J

Report of the Working Group on Estimation of Bycatch and Other Human-Induced Mortality

Members: Perrin (Convenor), Aguilar, Alves, Amaral, An, Andreu, Apostolaki, Baker, Best, Borodin, Bräger, Brito, Brownell, Butterworth, Cañadas, Carlson, Cerchio, Chilvers, Choi, Cipriano, Cooke, Cozzi, Deimer-Schuette, Donoghue, Double, Engel, Ferguson, Fortuna, Fuentes, Funahashi, Gallego, Galletti, Groch, Grønvik , Holm, Hucke-Gaete, Hughes, Ilyashenko, Iñíguez, Jaramillo Legorreta, Kaschner, Kasuya, Kock, Larsen, Lauriano, Leaper, Lens, Liebschner, Lovell, Lyrholm, Mattila, Mazzariol, Melton, Miller, Murphy, Nicolau, Northridge, Palacios, Panigada, Parsons, Podesta, Prieto, Ribeiro, Ridoux, Ritter, Robbins, Rogan, Rojas-Bracho, Rosa, Rose, Rosenbaum, Rowles, Scheidat, Sequeira, Siciliano, Silva, Simmonds, Stachowitsch, Strbenac, Taylor, Tejedor, Urbán, Vazquez, Vely, Verborgh , Víkingsson, Weinrich, Weller, Williams, Young.

1. CONVENOR'S OPENING REMARKS AND TERMS OF REFERENCE

Perrin welcomed the participants. The terms of reference for the working group relate to issues of estimating human-induced mortality of great whales, so that such mortality can be subtracted from any catch limits that might be calculated using the RMP.

2. ELECTION OF CHAIRPERSON AND APPOINTMENT OF RAPPORTEURS

Perrin was elected chair. Cipriano, Leaper and Weinrich agreed to act as rapporteurs.

3. ADOPTION OF AGENDA

The adopted agenda is given as Appendix 1

4. REVIEW OF DOCUMENTS

The following documents were relevant to the working group: SC/61/BC1-9, SC/61/E15, IWC/61/CC5, Kiska *et al.* (in press) and Lukoschek *et al.* (in press).

5. COLLECTING AND SHARING DATA

5.1 Progress on joining the Fishery Resources 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. Part of the FIRMS partnership work involves the elaboration of an inventory of fisheries, including gear characteristics and some indicators of fishing effort. Integration of whale entanglement or bycatch information held by the IWC with the FIRMS Fishery Global Information System (FIGIS) will help to gain a better understanding of the scale of possible entanglements at regional and global levels and should help focus effort on quantifying whale bycatch mortality. Full partnership awaits compilation of the catch, bycatch and entanglement data held by the IWC and the development of a coherent database, as the details of data structure and data access are part of the FIRM partnership agreement. Until recently neither whale capture data nor incidental catch and entanglement data have been held in a coherent format suitable for incorporation into FIRMS, but work has been progressing intersessionally on accomplishing this.

The Secretariat has begun by entering the most recent data that conform to the current reporting format, while the Sea Mammal Research Unit has been entering data from the early years and working forward, trying to maintain a standard format. These data, as submitted in annual progress reports since 1980, have never been consolidated into a single database and until recently have only existed either as (annotated) paper copies or as tabular text files. There are now about 1800 cetacean entanglement records entered from 2005-2008 and another 800+ from the period 1979-1992. Unfortunately a wide variety of reporting formats has been in use since 1980, so this is not a straightforward task and will take time to complete. So far there are 682 records of large whale entanglement, and overall about 40% of records involve gillnets, 20% traps or weirs, and about 10% trawls. The data structure and at least some of the data held by the IWC can now be communicated to the FIRMS secretariat in Rome to develop linkages with other existing fishery databases. Northridge reported that he has been in touch with the FIRMS secretariat and has arranged to visit FAO in early September 2009 to begin the process of establishing necessary links. This will begin the process whereby the IWC can join the FIRMS as a full partner.

5.2 Review of progress on including information in National Progress Reports

The working group discussed a suggestion for development of a mechanism for online submission of the information on bycatch and entanglements currently submitted in National Progress Reports (Appendix 2) to supplement the online data entry system for reporting ship strikes. It was noted that although a large amount of effort would be required to develop the system, such a mechanism would encourage uniform reporting and could also be used to streamline and expedite the collation of such information from the National Progress Reports submitted by member governments to each year's Scientific Committee meeting. Having this information in electronic form would also enable archiving and analysis of this information. In particular, there will be increasing need for data exchange with the ship strike database for cross-referencing between Progress Reports and the database. The working group noted that there would need to be careful consideration by the Secretariat and full Committee of the process by which the information in Progress Reports could be provided and stored in electronic form. Appendix 2 includes some suggestions to start these discussions and particular consideration of aspects relevant to the development of the ship strike database (7.3 below).

Reported large-whale deaths due to entanglement and ship strikes are summarised in Appendix 3. These totalled 290--292, not an estimate of total mortality due to these factors but only the reported incidents. They showed similar patterns in terms of species and areas to previous years. Some Progress Reports did not include data on ship strikes or entanglements of large whales, and the working group repeats its previous recommendation that Progress Reports should specifically state whether zero mortality has been reported rather than just leaving blank fields.

6. ESTIMATION OF BYCATCH MORTALITY OF LARGE WHALES

6.1 Estimation of risks and rates of entanglement-related mortality

SC/61/BC3 described a new approach for estimating entanglement mortality using scar-based inference. Entanglement impacts are typically assessed from eye-witnessed events, but these represent minimum counts of interactions and deaths. Since 1997, studies of caudal peduncle scarring have provided an alternate measure of entanglement frequency among Gulf of Maine humpback whales. Although based on survivors, scar-based entanglement rates can potentially be used to extrapolate total entanglement mortality Nm as follows: ((Nt*E)/S)-(Nt*E), where Nt = population size, E = the non-lethal entanglement rate (from scar-based inference) and S = entanglement survival rate. The entanglement survival rate remains a difficult parameter to estimate. A preliminary value of 76.6% was calculated from data used to evaluate humpback whale entanglement events for U.S. management purposes, but efforts to improve this estimate are on-going. Assuming a minimum population size of 783 GOM humpback whales in 2003 and an average annual scar-based entanglement rate of 12.1%, this approach suggests that approximately 95 individuals survived entanglement annually. By extension, there would have been 124 total entanglements in this population per year, with approximately 29 likely lethal. Although these estimates were much higher than expected, a 3-4% entanglement mortality rate is within the bounds of independent survival estimates. This is the first study to estimate unobserved entanglement deaths, and the authors noted the approach requires some refinement. However, estimates exceeded observed cases by an order of magnitude (Glass *et al*., 2008), suggesting that entanglement may be having a much greater effect on the population than previously supposed. Under-estimates of this magnitude likely also affect humpback whales in other oceans, as well as other large whale species that interact with fixed fishing gear.

The study was welcomed as the first time that an entanglement mortality rate had been estimated indirectly, without relying exclusively on observed cases. The working group discussed the potential for bias in the parameters required for this calculation. Although estimating the entanglement survival rate requires further refinement, SC/61/BC3 calculated the value from data that are already being used in the management of this stock. However, the authors noted there are a number of ways that the severity of reported entanglements may be biased. Entanglement reports come from many sectors, some which are more likely to witness a minor entanglement or consider it necessary to report. The reports from whale watching vessels were likely the least biased with regard to event severity because these platforms look carefully at whales and are aware of the entanglement issue and how incidents should be reported. On the other hand, the most severe entanglements (immediately fatal) may be less likely to be witnessed by any type of observer. In the future, alternate measure(s) of entanglement survival may be used.

The authors clarified that two approaches have been used to estimate annual entanglement rates in the Gulf of Maine. One is based on directly observed changes in entanglement-related injuries between years of individual whales, while the other is based on the frequency of certain types of unhealed injuries. The two types of estimates produce similar results. Scar-based entanglement estimates can be obtained for some species in a relatively short period of time. The parameter that remains difficult to estimate for other populations is the entanglement survival rate. Once a value is calculated using the relatively large volume of information from the Gulf of Maine, that value might be used as a proxy in other areas until better information is obtained. However, entanglement survival does likely vary regionally with type of fishery and other factors.

There are no estimates of population growth rate for the period covered by these estimates. However, previous estimates of population growth rate for both the local GOM population and the oceanic population of which it is a subset range from 0-6.5% (Clapham *et al*., 2003; Stevick *et al*., 2003). These estimates are lower than those for most other humpback whale populations where trend data are available.

The working group noted that the approach in SC/61/BC3 could possibly be applicable to estimating ship strike mortality, provided that an unbiased method were used to estimate the frequency of non-lethal events. It would also be necessary to obtain a representative rate of scarring across the population by taking photographs of all whales. There was a question as to whether photographing only the right side of fin whales would bias such a comparison, but this would only be a bias if whales were more likely to be struck on one side than the other.

Kiszka et al. (in press) aimed to characterise the level of interactions between small cetaceans and fisheries around the island of Mayotte in the northern Mozambique Channel using photo-identification photographs. Photographs were taken of Indo-Pacific bottlenose dolphins, melon-headed whales and short-finned pilot whales during dedicated cetacean surveys between July 2004 and April 2008. Injuries on the dorsal region (especially the dorsal fin) were characterised and associated to fisheries or intra/-inter-specific interactions. Although conducted on small cetacean species, the study demonstrated an example of the use of occurrence of body scars as an indicator of fishery exposure.

6.2 Estimation of bycatch from genetic data

Baker presented SC/61/BC8, which reports on species identification of whale meat products purchased directly and via the Internet from commercial markets of Japan from early July 2008 to early April 2009. A total of 59 products included six species of baleen whale (humpback (1), fin (27), Bryde's (1), sei (3), common minke (18) and Antarctic minke (6)) and one species of beaked whale, Baird's (1). The individual identity of the fin whales was considered by comparison to products purchased since scientific hunting of fin whales in the Antarctic was initiated in the austral season of 2005/06 as part of the JARPA II program. Although only 13 fin whales have been reported in the JARPA II program since its initiation (excluding the 2008/09 season) with a further 2 North Pacific fin whales reported as coastal bycatch (Japanese progress reports), a minimum of 20 individual fin whales were represented by products on the market. Only one of the 2008/09 products matched those purchased before 2005/06 (see SC/59/BC9 and SC/60/BC2). The importation of fin whales from Iceland, released from Japanese customs in October 2008, was considered an unlikely source of products in the survey but could not be excluded with certainty in the absence of access to the Icelandic DNA register. The 20 individual fin whales observed on the market in the years 2006-2009 cannot be accounted for by the total of 15 individuals reported by JARPAII and as Japanese coastal bycatch. However, it was not possible to identify which of the 20 individuals were likely to have originated from illegal, unreported or undocumented (IUU) exploitation, or the likely geographic source of these takes.

Baker noted that since all scientific-hunt catches and bycaught large whales in Japan are intended to be included in the DNA registry, comparison of microsatellite profiles from the market samples and the registry could be used to determine which whales were absent from the registry. The geographic source of those samples might be investigated further using information from mtDNA sequence data that in some cases indicates the geographic origin relative to documented fin whale population differences, although the limited reference samples currently available makes this difficult. As two individual fin whales were detected after the importation and release to the market of fin whale products from Icelandic hunts, additional comparisons to the DNA registry held by Iceland would also be helpful in determining which individuals were derived from imports from Iceland.

Baker explained that, as in previous attempts to diagnose the origin of market products to explain inconsistencies with catch and bycatch records, he had already requested exchange of the relevant data with the DNA registries in Iceland and Japan. As in previous years, the working group

agrees that access to DNA registers would improve estimates of bycatch and in this case could help resolve discrepancies between combined reported total number of caught and by-caught animals and individuals identified on the market. The working group repeats its earlier recommendation that information from DNA registries be made available through the Data Availability Agreement for help with identification of unreported bycatch.

Cozzi suggested that with the very large amounts of meat derived from fin whales, and the effects on that meat from the likely struggle of a bycaught animal prior to death, such products would be inspected by health authorities before release for human consumption. He asked whether those inspection records could be found to assist in documentation of bycatch. The working group noted that previous attempts to obtain information on health inspections of bycaught whales had been unsuccessful.

Following an initial workshop in 2005, progress on developing a second workshop on the use of market sampling for estimation of bycatch has been delayed. The Committee had agreed in 2006 that considerable new data would have to be available before holding the second workshop. In recent years, an increase in published studies has indicated a wide interest in the use of market sampling for addressing problems of wildlife exploitation and trade, such as studies of the identification and tracking of 'bushmeat.' The working group noted that there is still interest in holding a second workshop, possibly as a collaborative effort with other organizations or agencies, since monitoring tracking and controlling trade in wildlife products through the analysis of market samples is of critical interest to a variety of governmental and inter-governmental agencies and non-governmental organizations. Last year, Baker sent letters of inquiry to a variety of potential funding sources for a collaborative workshop with other disciplines facing similar issues, but he has not yet received any positive response. The working group thanked Baker for his efforts and recommended continued efforts to secure resources to allow such a workshop to occur. Baker agreed to further pursue the issue.

Lukoschek *et al.* (in press) described a revised analysis of data first reported in SC/57/NMP6 on the geographic distribution and temporal changes in stock composition of North Pacific common minke whale products sold on Japanese markets between December 1997 and June 2004. A primary objective of the analysis was to improve the estimate of 'true takes' of J-stock minke whales, including unreported fisheries 'bycatch' and other Illegal, Unreported or Unregulated (IUU) exploitation. The hypothesis that the proportion of J to O stock products on the market changed in 2001 when changes to Japanese domestic regulations 'commercialised' the sale whales taken as bycatch was tested. A substantial increase in the annual reported bycatch coincided with the changed regulations, from 19 - 29 whales/year in the period 1997-2000 to 89 - 137 whales/year in the period 2001-2004. During the 7-year period examined in the present study, 1,174 'whale meat' products were purchased and identified to species by analysis of variation in mitochondrial control region and cytochrome *b* sequences. A total of 250 common minke whale products were indentified and found to represent 201 unique 'market individuals' after exclusion of replicate products using microsatellite genotypes, mitochondrial sequence variation and molecular sex information. The overall proportion of J-type on the market was high, representing 44% of all market individuals. There were moderate differences in the proportions of J-type products found in coastal prefectures, but no significant differences before and after 2001, despite the 4- to 6-fold increase in reported bycatch after the regulatory change. From this comparison, it was concluded that the reported bycatch of all minke whales along the coast of Japan was, in fact, of a similar magnitude before and after the 2001 regulatory change but was substantially under-reported before this date. After combining data over the entire survey period, a mixed-stock analysis based on haplogroup frequencies estimated that 46.1% (SE, 4.2%) of market individuals originated from the J stock. This estimate is higher than expected from even the higher reported bycatch after the 2001 regulatory changes, unless the proportion of J stock in the bycatch is higher than the 60% previously assumed by the IWC and/or the proportion of J stock in the scientific hunt has increased since this was reported for the years 1994-98.

It was noted that this study had implications for the estimation of bycatch in the context of ongoing discussions within the Committee regarding current and possible future coastal whaling for minke whales around Japan. In particular, high levels of bycatch of J-stock may have serious consequences due to recent evidence that the distribution of this stock is broader than was previously recognised.

7. REVIEW OF METHODS TO ESTIMATE MORTALITY FROM SHIP STRIKES

7.1 New information on ship strikes

A global review of collisions between cetaceans and sailing vessels was described in SC/61/BC1. An online survey was set up including questions about the most important features of a collision or near-miss event. Additionally, the internet was searched for reports involving sailing vessel-cetacean collisions. A total of 81 collisions and 42 near misses were identified, spanning from 1966 until 2008. Collisions and near misses occurred in all oceans, often during ocean races and regattas, and were most frequent in the North Atlantic. A larger proportion of cases were reported in the past few years, indicating an increasing trend. Vessel type and speed as well as circumstances of the incident varied widely, but most often large monohulls were involved, predominantly sailing at speeds between 5 and 10 knots. Most reports referred to 'large whales' as opposed to 'small whales' or 'dolphins'. The species could be identified in 44 cases. Most recognized animals were humpback or sperm whales. Injuries to the whales varied from 'no visible injury' to 'dead after collision', but mostly the severity of the injury and thus likelihood of mortality could not be determined. It was emphasized that while in some cases the whale was seen before the strike, it was seen immediately before the collision, when evasion by the vessel was not possible.

There was some discussion of the rise in reported collisions in recent years, which is a common feature of ship strikes across most types of vessel. There will be an inevitable bias towards better reporting of more recent events, but nevertheless there does appear to have been an increase in collisions with sailing vessels in recent years. This could be due to increased speeds, particularly during ocean races.

Particular concerns have been raised about high rates of ship strikes involving fin and sperm whales in the Mediterranean. SC/61/BC2 described published data on collisions with fin whales and data on sperm whales which are expected to be published soon. The paper also describes a planned project by scientists and research institutes from Italy, France and Spain to address ship strikes affecting large cetaceans in the Mediterranean within the framework of ACCOBAMS. Much of the project relates to designing mitigation measures, but the action points of relevance to the working group's remit include data gathering, data control, and mapping the temporal and spatial distribution of large cetaceans in relationship to similar information on vessel traffic. AIS (Automatic Identification System) data collected during cetacean surveys will be used to describe patterns of shipping density and relate them to whale distribution and risk of ship strikes. Data gathering initiatives for evidence of collision incidents include interviews with captains and crews, reviewing existing strandings networks, and ongoing photo-identification studies. Data will be collected in a format compatible with the IWC ship strike database. The project will be managed by a steering committee established under the auspices of the ACCOBAMS Scientific Committee and the Pelagos Sanctuary Secretariat.

SC/61/BC4 reviewed three incidents involving ship strikes of humpback whales on the breeding ground of the Abrolhos Bank in Brazil between 1999 and 2005. One case involved a calf accompanied by its mother with wounds consistent with propeller injuries. A second case involved the

necropsy of a carcass which showed broken bones consistent with a collision with a vessel. The third case involved observations of a whale made by a passenger on a ferry which was also damaged during the collision.

A report of a Bryde's whale believed to be struck by an unidentified large ship in the southwest coast of Ecuador was reported in SC/61/BC5. The whale was found floating around the Guayaquil port facility in April 2009. Photographs taken while the carcase was in good condition showed skin lesions and bruising in several parts of the body, particularly on both sides of the head and genital region.

Details of a whale brought into the port of Puerto Montt in southern Chile were described in SC/61/BC7. The whale was identified from photographs as a female sei whale with an estimated total length of 13.7m, also based on the photographs. The whale was hit by a 293m-long cruise ship which was in transit between Punta Arenas and Puerto Montt. The authors believe the whale was alive when it was struck, based on the freshness of the carcass. They pointed out that it is important to have a contingency plan in place to deal with such occurrences.

The working group welcomed these detailed reviews of collision events and noted the value of such papers for entering data into the ship strikes database. The working group also noted the value of tissue samples for species identification in cases such as described in SC/61/BC7. In some cases there is a reluctance to provide data because of potential legal issues, and in this instance the only information available was from photographs. This incident also raises the general issue of trying to identify whether a live whale or a carcass was struck. The ship strike database does include questions relating to the evidence of whether whales are alive or dead when struck, which could allow for more detailed analyses in the future.

The objective of the study presented in SC/61/BC6 was to know more about fin whale movements through the high maritime traffic area of the Strait of Gibraltar. An annual mean of 17 (range 1-30) whales was sighted 1999-2008, with an average of 1.6 (range 1-6) animals per sighting. In 92% of the sightings, fin whales were travelling, with 88% swimming west into the Atlantic and 8% east into the Mediterranean Sea. Most sightings occurred in summer, when sighting effort was greatest. Twenty-two individuals have been identified. Three individuals (14%) were resighted once, swimming to the Atlantic Ocean over different time intervals (range 1-6 years). Migrating whales could represent only a small portion of the Mediterranean population. Observations should be conducted all year long to better identify collision risks in this high-maritime-traffic area where two collisions were registered during the study. The authors proposed real-time monitoring of fin whale movements in the Strait of Gibraltar in relation to ship traffic. In discussion, the potential for shore based tracking of fin whale movements in the Strait of Gibraltar was noted. This could provide an insight into whale response to vessels and data that could be used to help model collision risk.

7.2 Estimating mortality

The Conservation Committee continues to work on issues related to ship strikes, and a proposal for a joint IWC/ACCOBAMS workshop on reducing risk of collisions between vessels and cetaceans was outlined in IWC/61/CC5. The working group reviewed aspects of this proposal relevant to estimating mortality. The terms of reference of the workshop relevant for the BC working group include to exchange data on temporal and geographical distribution of cetaceans, shipping, and reported collision incidents and to develop scientific recommendations and a two-year work plan for consideration by the convening organisations, IMO and other bodies. The proposal is to focus on the Mediterranean Sea and the Canary Islands, based on the amount of research available and the number of collisions in these regions. Preparatory work for the workshop will include the collation of data to elaborate distribution maps for relevant species in the two regions, to collate data on known number of ship strikes per year and to collate data on vessel activity (shipping routes; number, type and frequency of vessels). Thus modelling and identification of areas with high collision risk, both spatially and temporally, as well as identifying the most threatened species, shall be facilitated. The proposal identified and listed a number of issues to be addressed and papers to be prepared before the workshop. The workshop will be hosted by ACCOBAMS in Monaco, preferably in September 2010.

The working group noted that several of the tasks identified in preparation for the workshop had arisen directly from recommendations from the Committee. The working group endorsed the proposed workshop, which will represent an opportunity to progress these issues.

7.3 Progress in developing global database of ship strike incidents

The need for a global database of incidents involving collisions between vessels and whales has been recognised by both the Scientific Committee and the Conservation Committee, as well as other bodies such as the International Maritime Organization (IMO) and ACCOBAMS. The format and structure of the database was agreed by the Committee in 2007, and subsequently the database was populated with data, mainly from published sources. As of April 2008, there were 763 records in the database. Last year the Committee recommended a number of tasks and established a Ship Strike Review Group. SC/61/BC9 provided an update on progress on these tasks. The main intersessional work was to develop a web-based data entry system. The data entry system is designed to be accessible for use by mariners and the general public with limited knowledge of cetaceans. It is a compromise between trying to gather all the available information without seeming too complex and onerous. The structure of the database has been altered to some extent to facilitate web-based data entry, but the basic fields remain the same. The IWC website now has a section dedicated to ship strikes *http://www.iwcoffice.co.uk/sci_com/shipstrikes.htm* that links to the database which is held on the IWC server and can be accessed remotely. Accredited persons can also install a front end on their own machines in order to view data and run queries. Web-based data entry is available to all users, and an email address shipstrikes@iwcoffice.org has been established. Messages sent to this address are forwarded to the data review group. The combination of data presented at IWC60, historical reviews and new incidents reported from 2008/09 amounted to around 150 potential new records for the database. Many of these are still in the process of being entered and validated. The data entry system was only available in May 2009 and so there was little scope for the data review group to work on new records.

The design of the data entry system is intended to be flexible, and members of the working group were encouraged to test the system and make suggestions for improvements. The working group thanked the Ship Strike Review Group and Secretariat for their work on the database and noted that there was now a need to ensure that it was as widely known about as possible. A presentation on the database had been made to the Marine Environment Protection Committee of the IMO in 2008. The Government of Belgium has also produced a leaflet on ship strikes including information about the database which is intended to have a wide distribution. Ritter volunteered to post a message on the MARMAM email list, and Panigada will circulate a similar message to the European Cetacean Society email list. One suggestion was that partner organisations should be sought which could provide links to the database. Some data holders may be more willing to share data if the IWC were seen to be in partnership with other organisations such as IUCN.

The working group **recommends** that the Ship Strike Review Group of Leaper (convenor), Cañadas, Donovan, Double, Ferguson, Mattila, Panigada, Ritter, Rowles, and Weinrich continue their work intersessionally. A proposal for further development and maintenance of the database (Appendix 4) was reviewed and is endorsed by the working group.

8. METHODS FOR ASSESSING MORTALITY FROM OTHER HUMAN ACTIVITIES

8.1 Acoustic sources

The working group noted plans for a Workshop on Cumulative Impacts of Underwater Noise with Other Anthropogenic Stressors on Marine Mammals to be held in August 2009 (SC/61/E15). The workshop will consider lethal and non-lethal impacts at individual and population level. The working group noted the potential relevance of this workshop to estimating mortality and looked forward to receiving a report from the workshop at next year's meeting.

8.2 Marine debris

No new information on this topic was available to the working group.

9. Work plan and budget requests

The working group agreed to carry over a number of items from this year's agenda and to give attention to the topics intersessionally:

(1) collaboration with FAO on collation of relevant fisheries data and joining FIRMS,

(2) estimating rates of entanglement and entanglement mortality,

(3) progress in including information in national Progress Reports,

(4) review of methods to estimate mortality from ship strikes,

(6) continued development of the international database of ship strike incidents,

(7) review of methods for assessing mortality from acoustic sources and marine debris.

No new items were proposed for the agenda, but other topics may emerge intersessionally. Work on the ship strike database will proceed intersessionally.

10. ADOPTION OF REPORT

The report was adopted on 6 June 2009.

REFERENCES

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Appendix 1

AGENDA

1. Convenor's opening remarks and terms of reference
2. Election of Chair and appointment of rapporteurs
3. Adoption of agenda
4. Review of documents
5. Collecting and sharing data
   - 5.1 Progress on joining the Fishery Resources Monitoring System (FIRMS)
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6. Estimation of bycatch mortality of large whales
   - 6.1. Estimation of risks and rates of entanglement/related mortality
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7. Review of methods to estimate mortality from ship strikes
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8. Methods for assessing mortality from other human activities
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Appendix 2

PROPOSAL TO DEVELOP AND ONLINE FORM/DATABASE FOR SUBMISSION OF NATIONAL PROGRESS REPORTS

F. Cipriano, J. Gedamke, R. Leaper, S. Northridge

Information on bycatch, entanglements, and ship strikes is collected by the bycatch working group for use in developing methods to document and estimate total mortality of whale populations associated with fisheries and shipping/transportation activities, and collection of ship strike data is also the focus of recent efforts by the Conservation Committee. National Progress Reports submitted by member governments provide invaluable information on research efforts and the incidence of human-associated injury and mortality, but information included in these text-format reports must be converted into database/spreadsheet format by members of the Scientific Committee and the IWC Secretariat in order to collate the information for reporting and analysis (e.g. Annex J, Table 1, *J. Cetacean Manage*. 11 (Suppl.), 2009, Annex O, pp. 350-397, *J. Cetacean Manage.* 11 (Suppl.), 2009).

Collaborative agreements already in place with ACCOBAMS and being developed with the IMO and the FAO FIRMS (Fishery Resource Monitoring Scheme) involve the sharing of such information. For example, for ship strikes the objectives/benefits of more exhaustive and inclusive databases will *inter alia* 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 – and 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 (Annex J, pg. 260, *J. Cetacean Manage.* 11 (Suppl.), 2009). Following the recommendations of the Scientific Committee last year, an online form/database for documenting ship strike events was developed (Section 7.2, pp. 14-15, *J. Cetacean Manage.* 11 (Suppl.), 2009), in an effort to standardize, streamline, and encourage the submission of ship strike records. An important mechanism to validate such information was the coincident formation of the ship strike review group.

One way to reduce the bulk of the existing progress reports, to encourage uniform reporting, to make better and longer-term use of the data that are provided and arguably to help delegates from member states collate data for the report more easily and more efficiently, would be to establish a data portal on the IWC website to allow all the data tables usually submitted in the annual reports to be submitted online. This would allow people who use the data during the meeting to see at a glance which data had been supplied and which had not, it would allow those responsible for submitting the data to do so as soon as they become available rather than waiting for all sections of the report to be complete, and would also allow range- and error-checking routines to screen data for incorrect data entries. Drop-down boxes during data entry could also allow those entering the data to ensure they were, for example, entering the correct code for a specific fishing gear type. Overall, online data submission would have substantial advantages, but developing a suitable process would be a considerable amount of work and would need careful consideration to ensure that it was as efficient as possible.

There are important differences between the web-based data entry system developed for the ship strike database and what is needed for National Progress Reports. The ship strike data entry system is designed to prompt for information about single incidents using a questionnaire type approach, whereas the requirements for submitting data currently in progress reports will be in the form of tables.

One advantage of an electronic form for National Progress Reports would be the opportunity for links between the ship strike database and the Progress Reports. The data flow between the two systems could be two-way. Compilers of National Progress Reports should be able to query the ship strike database to find out whether there are any reports from that year within the relevant area. They would then decide on the basis of national review criteria which of these would be included in the official record of the Progress Report. Conversely, each report of a ship strike incident within a National Progress Report would form the basis of a record within the ship strike database which could then be further examined.

Appendix 3

ANTHROPOGENIC MORTALITY (OTHER THAN DIRECTED TAKE) OF LARGE WHALES FOR THE CALENDAR YEAR 2009 AS REPORTED IN THE NATIONAL PROGRESS REPORTS

	Argentina	Australia	Denmark	France	Germany	Iceland	Japan	Korea	Mexico	NZ	Spain	UK	US	Total
Minke – Ship Strike								1						1
Minke - Entanglement	1		1			1	134	81			2	2		222
Humpback -Ship Strike		4											12 to 14	16 – 18
Humpback - Entanglement		16 (6)	3				3 (1)		1 (1)		1 (1)	1 (1)	6 (4)	31 (14)
Sperm - Ship Strike														0
Sperm - Entanglement													3	3
Fin - Ship Strike				1							2			3
Fin - Entanglement							1						2 (1)	3 (1)
Sei - Ship Strike													1	1
Sei - Entanglement													1 (1)	1 (1)
Bryde's - Ship Strike										1				1
Bryde's - Entanglement		1 (1)												1 (1)
Right - Ship Strike	2	1											5	8
Right - Entanglement		1 (1)											1	2 (1)
Bowhead - Ship Strike														0
Bowhead - Entanglement														0
Gray - Ship Strike														0
Gray - Entanglement														0
Pygmy right - ship strike		1												1
Pygmy right - Entanglement														0
Unk - Ship Strike		4												4
Unk - Entanglement														0
TOTAL														308-310(18)

Numbers in brackets indicate the subset of whales reported to have become free or released alive. These types of incidents are not reported in all Progress Reports. Ship strikes include incidents that may not have been fatal. Progress Reports of Croatia, Germany, Ireland, Italy, Netherlands, Norway, and Portugal reported no large whale deaths, while Brazil and Sweden did not report on incidental anthropogenic mortality.

Appendix 4

PROPOSAL FOR FURTHER DEVELOPMENT AND MAINTENANCE OF THE IWC SHIP STRIKE DATABASE

R. Leaper, G. Donovan, M. Ferguson, S. Panigada, F. Ritter and M. Weinrich

Background

The Committee agreed a plan of work at SC60 in order to continue development of the database. This included development of a detailed medium-term funding proposal for consideration at SC61 based on an assessment of the required workload during the intersessional period. Intersessional progress is described in SC/61/BC9.

In addition to meeting the needs of the Scientific Committee, the database is likely to be used in the work of the Conservation Committee, ACCOBAMS and IMO, including the proposed joint IWC-ACCOBAMS workshop (IWC/61/CC5). There may also be a need to exchange data with other regional or national databases.

Some countries are developing review criteria for validating ship strike reports at a national level. The data review group should draw on these criteria as appropriate in the process of validating records in the IWC database.

Proposed intersessional tasks

Data entry/validation

(1) Minor adjustments to current web based data entry system in collaboration with the contractor who developed the system to incorporate suggestions from Committee members including discussions at SC/61.
(2) Develop database front end queries and tools for the data review group to validate data, identify and link multiple records of the same event. These tools should also allow the periodic integration of carefully reviewed datasets into the database, allowing for the fact that there may already be records of the same incidents in the database.
(3) Publish the schema of the database in a downloadable form such that it could be reproduced in national databases
(4) Data entry and validation of new records including data presented to SC61 in meeting papers and National Progress Reports[1].
(5) Monitor and respond to emails addressed to the shipstrikes@iwcoffice.org email address, including reports of new incidents and dealing with requests for summary information from the database
(6) Develop email notification system to alert the data review group to new data entries (could potentially allow rapid follow up to obtain further information and may also be needed to meet some national reporting requirements).
(7) Follow up on reports of new incidents in order to gather information as soon as possible after the incident took place.
(8) Develop appropriate feedback mechanism for people who provided information.
(9) Decide upon and develop data summaries (including consideration of the possibility of allowing web-based queries for 'general' users) for inclusion on the web page.
(10) Clarify policy on data availability, access and use.

These tasks will require a combination of work by the Secretariat and members of the Committee, including the ongoing work of the data review group. It is suggested that one individual should take prime responsibility as database co-ordinator to ensure that these tasks are undertaken and reported back to SC/62. Based on the intersessional period between SC/60 and SC/61, in the medium term we would anticipate at least similar amounts of data to be generated annually, probably requiring around 30 days of work to process.

Budget

Database refinement, front end tools and email notification system (contractor , Secretariat, Leaper)	£4,000
Annual ongoing work by data review group including contributions of time by some members	£6,000

[1] SC/61/BC9 identified around 150 new records that needed to be entered into the data base between SC/60 and SC/61. Some of these were a simple matter of data entry, others needed considerable follow up work to obtain all the available information.