Annex J

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

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1. CONVENOR'S OPENING REMARKS AND TERMS OF REFERENCE

Perrin welcomed the participants. The Terms of Reference for the Working Group continue to relate to issues of estimating human-induced mortality of great whales other than directed take so that such mortality can be subtracted from any catch limits that might be calculated using the RMP.

2. ELECTION OF CHAIR

Perrin was elected Chair.

3. ADOPTION OF AGENDA

The adopted Agenda is given as Appendix 1.

4. APPOINTMENT OF RAPPORTEURS

Leaper and Moore agreed to act as rapporteurs.

5. AVAILABLE DOCUMENTS

The following documents were relevant to the Working Group: SC/63/BC1-5; IWC (2011a); IWC and ACCOBAMS (2011b); Vanderlaan *et al.* (2009); Williams *et al.* (2011).

6. COLLABORATION WITH FAO ON COLLATION OF RELEVANT FISHERIES DATA

There has been an ongoing effort by the Secretariat and Sea Mammal Research Unit (University of St. Andrews, UK) to consolidate data on entanglements submitted in annual progress reports into a single database. Data for the period 2004-10 have now been entered by the Secretariat.

7. PROGRESS ON JOINING FISHERIES RESOURCES MANAGEMENT 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. Full partnership has not yet been pursued since the IWC database is not yet fully developed.

8. ESTIMATES OF BYCATCH MORTALITY OF LARGE WHALES

Entanglements of large whales reported in National Progress Reports are listed in Appendix 2.

9. ESTIMATION OF RISKS AND RATES OF ENTANGLEMENT

Mattila reported guidelines for improved collection and reporting of large-whale entanglement data developed at an IWC Workshop on Welfare Issues in Hawaii in 2010.

Guidelines for collection:

(1) Collection and analysis of debris and fishing gear removed from entangled whales;
(2) prioritising of necropsies;
(3) collection of standardised data on entanglement and health of the individual, with survival studies in areas not presently studied;
(4) collection of individual identification data; and
(5) further development and validation of assessment and condition indices for large whales.

Guidelines for reporting:

(1) establishment by coastal nations of programmes for monitoring entanglement and reporting through National Progress Reports;
(2) particular emphasis on areas of overlap between fishing effort and ranges of endangered and depleted populations of large whales; and
(3) enactment of mechanisms to investigate extent of possible incidents.

Use of a decision tree to collect adequate data was recommended. A preliminary list of 'health assessment' data fields was developed (IWC, 2010). A follow-up workshop is scheduled for October 2011, and any advice and guidance by members of the Scientific Committee is welcomed.

10. METHODS AND DATA SOURCES FOR ESTABLISHING TIME SERIES OF BYCATCH

SC/63/BC1 described a hierarchical Bayesian approach for estimating historical bycatch from a time series of reported bycatch data that only includes a fraction of the animals taken. The case study dataset was for reported bycatch of North Pacific minke whales caught in large trap nets (including salmon nets) in Japanese waters from 1979 to 2009. The form of the model is a hierarchical generalised linear model, with a time series of fishing effort (number of nets) used as a variable to convert BPUE estimates into bycatch estimates. Particular qualities of the bycatch dataset include a steady increase in reported bycatch over the span of the dataset, punctuated by a dramatic (approximately 5-fold) increase in reporting in 2001 relative to previous years. This increase coincides with regulatory changes in Japan that resulted in what is assumed by the Committee

for purposes of the RMP to be a 100% reporting rate after 2001 (SC/63/Rep3); thus, previous reported bycatches are assumed to be gross underestimates of true bycatch. One challenge of the analysis was to determine whether the reported bycatch trend is best explained by increasing reporting rate or BPUE or both (fishing effort itself was relatively constant over the duration of the time series). The assumption of 100% reporting accuracy allows post-2001 data to be used to accurately estimate BPUE trends and process error in BPUE. Conditional on these estimates and assuming the trend in BPUE is constant across the entire time series, sampling error and trends in reporting rates may also be estimated for the pre-2001 data. The result is an estimated historical bycatch time series that reflects two key forms of variance and trend estimates for both BPUE and reporting rate (which would typically be confounded parameters) and that provides valid uncertainty bounds (Bayesian credible intervals) on the historical estimates. The analysis provided bycatch estimates that seemed largely consistent with inference from other previous approaches but that fit the data much better, provided more useful upper limits of bycatch, and appropriately handled variance in the data.

It was noted that this analysis had been discussed during the first RMP intersessional workshop for western North Pacific common minke whales in Busan, Republic of Korea, 14-17 December 2010. The Workshop had agreed that pre-2001 estimates of bycatch based on any of the statistical approaches using pre-2001 reported-bycatch data were not considered reliable because of the suspect quality of the data themselves and the dependence of earlier estimates on assumptions of unverifiable validity (SC/63/Rep3). The presentation of SC/63/BC1 therefore concentrated on the potential of the methods example for dealing with time series data generated by a mixture of trend processes and variance sources.

11. PROGRESS ON INCLUDING INFORMATION IN NATIONAL PROGRESS REPORTS

The Committee is developing a mechanism for online submission of information on bycatch and entanglements currently submitted in National Progress Reports. A template for this has been drafted but is not yet online. Work is ongoing, and a test version is being evaluated.

12. SHIP STRIKES

12.1 Scientific aspects of IWC-ACCOBAMS workshop on ship strikes

The Joint IWC-ACCOBAMS Workshop on Reducing Risk of Collisions between Vessels and Cetaceans held 21-24 September 2010 in Beaulieu-sur-Mer (France) included 45 participants from 17 countries, representing a broad range of research groups, shipping companies and organisations, agencies and NGOs. The scientific objectives of the workshop were to: (a) exchange, evaluate and analyse data on temporal and geographical distribution of cetaceans, shipping and reported collision incidents, with a view to identifying priorities for mitigation; and (b) identify mitigation measures and methods to examine their efficacy. The geographical focus was on the Mediterranean Sea and the Canary Islands.

The workshop report included abstracts of presentations providing background information covering different aspects of the key aims of the workshop. Key data needs were identified as baseline absolute abundance, trends, and the identification of 'high risk areas' for ship strikes. This information can be collected via a range of methods, including: (a) visual surveys; (b) passive acoustic surveys; (c) mark-recapture techniques; (d) telemetry; (e) fixed passive acoustic recorders; and (f) platforms of opportunity. Additionally, spatial modeling is a powerful tool for providing estimates of abundance and understanding distribution patterns. However, for the Mediterranean there are only a few well-covered areas; most of the region is either poorly covered or not covered at all. Likewise, in the Canary Islands region, available data on abundance and stock structure are insufficient to allow proper quantitative assessments.

A histochemical technique based on detecting fat emboli in the lung blood vessels that has been developed for identifying whales struck by vessels was described. The workshop welcomed the potential for using this technique to examine evidence of ante-mortem or post-mortem trauma in archived samples where lung tissues had been collected and recommended that collaborative validation studies to look for fat emboli in such samples should be undertaken.

The workshop also recommended that stranding networks standardise examination, documentation and reporting protocols. In the US, drift models are calculated for floating carcasses to estimate the location where death might have occurred (hindcasting), while forecasting drift models may also be used to warn mariners of hazards. The workshop recommended further such studies, because the drift characteristics of carcasses may also be of value in evaluating whether the proportion of reported stranded ship-struck whales is representative of the actual proportion of mortality due to collisions.

With reference to direct observations, the workshop recommended that every effort be made to try to improve reporting of such incidents. Data entry should be done using the IWC web-based interface: *http://data.iwcoffice.org/whalestrike/* or by e-mailing the IWC Secretariat at: *shipstrikes@iwcoffice.org* . It was further recommended that countries examine the potential use of dedicated observers for identification and reporting of strikes and near miss incidents. Furthermore, the workshop strongly recommended continued work to facilitate further development of the centralised database and to encourage reporting of all collision events. Where national or regional reporting systems exist, the workshop agreed that these should be the first point of contact. The workshop recommended collaborative efforts to ensure that data in national and regional databases are shared with the global database, ensuring that all reports including those involving governmental vessels can be made available from a single source.

Data on shipping density and movements are of value in identifying potential 'hotspots'. Recent developments in electronic navigation and reporting systems have greatly increased the available data on shipping movements and density; the situation will continue to improve. Of particular value are AIS (Automatic Identification System) and LRIT (Long-Range Identification and Tracking). In addition, the Voluntary Observing Ships (VOS) Scheme may provide data on historical shipping patterns. The workshop therefore recommended that collaborative efforts between cetacean scientists and shipping experts be undertaken.

The workshop also briefly considered issues arising out of climate change. Here, it was agreed that an evaluation of predicted changes in cetacean distribution, and changes in

key prey species resulting from climate change, along with predicted future changes in shipping density (especially in the Arctic) would be a valuable exercise.

Concerning risk assessment, shipping and whale data overlays can be a first step in identifying areas of higher probabilities of encounters between whales and vessels. Modelling using associated environmental parameters may be used to predict relative or absolute cetacean densities in areas or for seasons with low survey effort. The workshop recommended that whale-shipping overlays should be compared with locations of ship strike fatalities. The workshop further recommended that whale-shipping overlays should be created for areas where they have not been fully developed (e.g. the Canary Islands). It also recommended that methods be developed to make uncertainties in models clearer to policy advisors and decision makers.

The Working Group **endorsed those recommendations** from the workshop that related to its terms of reference of developing methods to quantify ship strike mortality. It was noted that an updated version of the worldwide strandings network recently became available on the IWC website.

The workshop had also recommended six areas within its geographic focus of the Mediterranean and Canary Islands as priorities for collecting data to allow improved risk assessments of ship strikes: (1) the Strait of Gibraltar; (2) the Pelagos Sanctuary; (3) the area southwest of the island of Crete; (4) the area around the Balearic Islands; (5) the area between Almeria and Nador at the eastern side of the Alborán Sea; and (6) the Canary Islands.

Finally, the workshop proposed a joint two-year work plan to address ship strike issues, including the development of a protocol for investigating and documenting ship strike injuries and mortalities in cetaceans. The workshop recommended that the IWC and ACCOBAMS Scientific Committees establish a Joint Stranding Investigation Working Group to carry out, *inter alia*, the following actions:

(1) review existing protocols and tools for determining the presence or role of human interactions in the stranding of cetaceans;
(2) identify, develop, review, and validate tools, techniques and/or methods;
(3) develop and implement training; and
(4) build capacity in range states with no strandings programmes.

The Working Group agreed that a protocol for investigating and documenting ship strike injuries and mortalities in cetaceans would be very valuable and **recommended** that the proposed joint working group be constituted. Mazzariol, Rowles, Bernaldo de Quirós and A. Fernandez agreed to contribute if a Joint Stranding Investigation Working Group is established.

To develop appropriate modelling techniques to identify high priority areas, a further Workshop of experts in cetacean and shipping distribution to agree on appropriate analytical and modelling techniques had been recommended. The Working Group noted the potential value of such a workshop to risk assessments that potentially could contribute to estimating mortality. However, such a workshop would benefit from further compilation of data, including identifying areas and data sets of particular interest. An intersessional working group (Leaper [Convenor], Moore, Panigada, Ritter) will develop a proposal for such a Workshop intersessionally.

The Working Group noted the uncertainty in abundance for all whale populations within the Mediterranean area and re-iterated the previous Committee **recommendation** for an ACCOBAMS basin-wide survey.

12.2 Development of a ship strike global database

The IWC has been developing a global database of incidents involving collisions between vessels and whales since 2007. The Working Group re-iterated previous **recommendations** to facilitate further development of the centralised database and to encourage reporting of all collision events. The database has been developed through work by individual members of the IWC Scientific Committee, the IWC Secretariat and small contracts for data entry and to a database consultant. These informal arrangements have allowed progress, but the Committee also recommended in 2010 that consideration be given to the appointment of a dedicated coordinator, noting that this is the practice for other similar successful databases of this scale. Despite efforts to publicise the database, utility and existence of the database is still not sufficiently widely recognised to encourage mariners and others to report data. Only one unsolicited data entry has been received so far in 2011 (SC/63/BC4).

Based on the experience of the last two years when the data entry system has been up and running, it is not realistic to expect a significant number or proportion of collisions to be reported to the database by mariners or scientists who have not been directly involved with the database. This suggests the need for a more proactive approach in which entries for the database are actively solicited.

It is important that a proactive approach by the IWC complements and does not conflict with national data gathering efforts. This will require good communication between IWC and national contacts that could best be achieved at the IWC end by a single point person. The Working Group therefore **recommended** the appointment of a dedicated IWC ship strike data coordinator. Tasks required in the job description are listed in Appendix 3; these include data gathering, communication with potential data providers and data management. It was also noted that efforts to improve reporting is a long-term task that is required over several years. In Hawaii reporting has gradually improved over an 8-10 year period following outreach initiatives, and it took some time to overcome a mutual distrust between mariners and regulatory agencies. In particular it is important that mariners are confident that there will be no stigma or blame attached to reporting collisions with whales.

12.3 Activities of Conservation Committee

The Working Group discussed the 2010 report of the Conservation Committee, including the work of the Ship Strikes Working Group, and noted the need for an improved dialogue, particularly in view of the overlap on many scientific issues relating to developing mitigation measures that rely on quantified assessments of risk and estimating mortality. The Conservation Committee may also be able to assist with outreach efforts to improve data reporting, including liaison with IMO.

12.4 Modelling risk of ship strike

12.4.1 Experience in Hawaii with humpback whales

Data collected from a fleet of whale watching vessels in Maui County waters, Hawaii during the 2011 humpback whale breeding season (January-April) were analysed to estimate collision risk based on observations of near-miss events (SC/63/BC2). Humpback whale density around the vessels was estimated during 15-minute scans, and a 'surprise encounter' was recorded each time a whale surfaced within

300m from the vessel without being detected by observers and crew. Of a total of 2,464 humpback whale sightings, 133 (3%) were surprise encounters. The proportion of calves and sub-adults in the 'surprise encounter' sample was significantly greater than the proportion found in the general population. Wind speed influenced detectability of surprise encounters and likely drove the counter-intuitive inverse relationship between the increase in wind and decrease in the odds of detecting a 'surprise encounter'. The model predicted an 8.2 % increase in the odds of a surprise encounter for a velocity increase of one knot. It was estimated that 5.5% chance of 'surprise encounters' become likely whale-vessel interactions.

The utility of data on near misses to estimate actual collision rates has been discussed previously, and the Working Group agreed that to interpret near-miss data a consistent definition was required. Kaufman noted that for the data in SC/63/BC2 a near miss had been defined as a situation which required evasive action from the vessel to avoid a strike. It was also suggested that some of the analytical developments developed to analyse sightings data based on radial distances may be more appropriate for estimating the detection probability in SC/63/BC2.

SC/63/E4 described ship strike mitigation efforts around Hawaii but also included information relevant to estimation of mortality. Perhaps the most significant of these was the development, beginning in 2003, of a major awareness campaign on the part of Federal (NOAA), State and NGO agencies, with regard to the growing risk of collisions between whales and vessels. Coincident with this campaign, a reporting hotline and response capability was initiated. The authors suggest that this campaign, along with the growing population of wintering humpback whales, was likely the explanation for the increase in ship strike reports witnessed after 2003. Increased awareness, reporting and investigation had resulted in more accurate information being gathered. Through 2011, 47.1% (24 of 51) of all confirmed collisions were reported to be with calves, and most (93%) occurred in January through March. Of the animals where the sex was known, 5 were males and 4 were females. It is not known how many collisions resulted in fatalities. 92% of the vessels involved in collisions were equal to or less than 19.8m in length and therefore not equipped with AIS. Average (estimated) speed at time of collision was 11.5 knots.

SC/63/E4 also described a case study of a high speed ferry which operated in Hawaiian waters for 11 months in 2007 and 2008. The ferry operated under a number of legally mandated and self-imposed operational constraints during 'whale season' (January through March). These included a requirement to reduce speed to 25 knots when in the humpback whale Sanctuary, or in other known whale habitat (depths <183m), and a requirement to record any close encounters (<91m) with whales while in transit. Interestingly there were as many close encounters inside the Sanctuary boundaries as there were in whale habitat outside. Unfortunately, the number of miles traversed in each area cannot be compared at this time, but most of the close encounters outside of the Sanctuary were on approach to the harbour on Maui. It was suggested that as the crew's attention diverted to preparation for entering the harbour, their vigilance for whale spotting may have diminished. Finally, even though (sometimes many) whales were seen during daytime legs, the crew did not detect any whales during the night time legs on the same days despite the vessel being equipped with sophisticated radar and night vision systems.

It was noted that in view of similar situations (e.g. in the Canary Islands), the kind of cooperative dialogue between agencies and industry seen in Hawaii with respect to high-speed ferries can serve as a good example.

Mattila reminded the Working Group of a previously reported questionnaire study of mariners in Hawaii that asked about collisions they were aware of, including those that they believed were not reported. This resulted in an apparent reporting rate of only 25% (Lammers *et al.*, 2007).

12.4.2 Estimating risk and effects of ship strikes in the Mediterranean

Ship strikes are one of the main non-natural causes of death for fin whales in the Mediterranean, however the population level effects are not known (SC/63/BC3). Evaluation of this anthropogenic mortality requires at least an: (a) understanding of the abundance (and trends) of the population; and (b) estimates of the anthropogenic mortality. In order to begin to assess population level effects of anthropogenic mortality, including ship strikes, the Italian Ministry of the Environment has started a series of aerial surveys to provide baseline information on cetacean distribution and abundance in the seas around Italy in the central Mediterranean Sea. Abundance estimates for fin whales in the surveyed areas were presented in SC/63/BC3 using both conventional distance sampling and multiple covariate distance sampling. The estimates are negatively biased, as the data are not yet available to correct for availability or perception bias. Three aerial surveys have been conducted. The first in winter 2009 in the Pelagos Sanctuary resulted in just one fin whale sighting, giving insufficient data for a full analysis and therefore no abundance estimate was possible. The survey in summer 2009, also in the Pelagos Sanctuary, resulted in 16 primary sightings and an abundance estimate of 148 animals (CV=27%; 95% CI 87-254). The last survey was conducted in summer 2010, with 59 primary sightings and an estimated abundance of fin whales in the Tyrrhenian, Corsica and Sardinia Seas (including the Pelagos Sanctuary) of 625 (CV=25.83%; 95% CI=378-1,032). Although previous acoustic data indicated some presence of fin whales during the winter, the single fin whale sighting during the winter survey suggested very low abundance.

Although differences in methods and design precluded a valid quantitative comparison, a simple comparison of the estimates with published information from past shipboard surveys of either the whole Pelagos Sanctuary area or parts of it suggests an appreciable decrease in the summer density and abundance of fin whales in the Pelagos Sanctuary area since the early 1990s. If this represents a real decline, either in the use of the Sanctuary by fin whales or in the total population of fin whales, it is important to investigate the possible explanations; if it is a true population decline then serious conservation actions would be required.

In discussion, the higher numbers of whales towards the northwest portion of the survey region were noted. Panigada commented that based on the first survey results the survey area had been extended to the west, but it would be useful to extend the surveys even further west in future. However, no new surveys are planned for this year. Further monitoring of abundance (e.g. through this aerial survey programme) and anthropogenic impacts is required to facilitate conservation of fin whales in the Mediterranean. Efforts to ensure better information on ship strikes in the area are also needed.

12.4.3 Use of AIS data to estimate risk

Data on shipping density patterns are required for assessing ship strike risk and developing mitigation measures. There are several commercial and government initiatives to develop databases of data that could be used for analyses

of shipping density. The IWC-ACCOBAMS workshop had agreed that approaches to data holders of shipping data for access for research use may be facilitated by the support of organisations such as IWC, ACCOBAMS, IMO or UNEP. However, before the support of IWC is given to any specific requests, the workshop had recommended that researchers requesting support clearly specify the objectives of the work, the data required and the analytical methods proposed and that these are reviewed by the Committee. SC/63/BC4 described some of the issues associated with analysis of shipping density data from Automatic Identification System (AIS) transmissions. Several different measures of density exist, and methods were described for converting these to comparable units. The limited range of terrestrial AIS complicates analysis and limits spatial coverage. New developments in AIS received from satellites (S-AIS) have allowed correction factors to be applied for vessels missed and provided the first quantitative estimates of average shipping density at a global scale. These highlight the concentrated nature of global shipping, with the majority of under-way vessels concentrated in 2% of the global sea area when shipping density is averaged over 1° blocks. Although of relatively coarse resolution, these data provide new opportunities for comparative ship strike risk assessments, and S-AIS data may be available at a finer spatial scale for areas of specific interest identified as high risk.

While AIS is mandatory on the active global fleet of around 60,000 large commercial vessels, many smaller vessels do not carry AIS. This includes recreational and fishing vessels, although in some areas such as the EU, new regulations are being introduced that will require AIS on fishing vessels longer than 15m by 2014.

12.4.4 Estimating total ship strike mortality

Estimates of total ship strike mortality for the North Atlantic right whale are given in Vanderlaan *et al*. (2009). This study was discussed in context of identifying methods that have been (and may be) used to estimate total ship strike mortality of large whales. In this study, three estimators of ship strike mortality were presented. In all cases, estimates were presented using cumulative distribution functions to obtain upper confidence estimates. The first estimator calculated the expected mortality as a simple mean known rate or number per year. The second estimator added a fraction of the observed but unknown-cause mortality that may be attributed to ship strikes (estimated based on necropsy information) to the known ship strike mortality. Both of these estimators only quantified minimum known mortality. The third estimator used information about the proportion of total mortality in the population that is undetected, to provide an estimate of true mortality.

It was noted that North Atlantic right whales are exceptionally well studied compared to most other large whale populations and that direct estimates of undetected mortality (that could be used to estimate total ship strike mortality) will not be available for most other populations. However, it was suggested that carcass recovery rate estimates for right whales and some other cetaceans stocks could be useful as proxy parameters (or informed priors in Bayesian terms) for estimating true ship strike mortality from observed or reported mortality in other systems, noting that caveats concerning different forms of bias would have to be appropriately dealt with. Vanderlaan *et al*. (2009) had used relative indices of shipping and whale density in their spatial risk models. It was noted that if absolute estimates were available, alongside estimates of absolute mortality, then it would be easier to make quantitative inferences about possible rates in other areas.

The Working Group noted the qualitative comparisons in SC/63/BC4 of the ship strike risks to North Atlantic fin whales and the need for estimates of ship strikes for these populations for use with the RMP. Based on overall abundance estimates and numbers of ships, areas to the west of the Bay of Biscay and the Iberian Peninsula might be expected to have a much higher number of fin whale ship strikes than the east coast of the US. Nevertheless, there are more reports (average of 1.6 per year between 2003 and 2007) from the east coast of the US. It was noted that these differences may be due to reporting or to finer scale overlap in whale and shipping distribution, resulting in higher risk. The Working Group **agreed** that with recently available data, this would be a useful case study to further explore the development of quantitative risk models. A small intersessional working group (Leaper [Convenor], Moore, Panigada and Williams) agreed to investigate this and provide an analysis for next year's meeting.

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

13.1 Estimating mortality rates from strandings

One issue that needs to be considered when making estimates of mortality from strandings data is the proportion of carcasses that are discovered and reported. Williams *et al*. (2011) presented information on the probability of recovering a cetacean carcass in the Gulf of Mexico. The *Deepwater Horizon*/BP oil spill in the Gulf of Mexico was the largest in US history, but some reports implied modest environmental impacts, in part because of a relatively low number (101) of observed marine mammal deaths. The authors estimated historical carcass detection rates for 14 cetacean species in the northern Gulf of Mexico for which information was available on abundance, survival rates and annual counts of stranded animals. Carcasses were recovered, on average, from only 2% (range: 0-6.2% across species) of the estimated number of cetacean deaths that occur annually in the region. Thus, the true death toll could be 50 times the number of carcasses recovered, given no additional information. The authors discuss caveats to this estimate but present it as a starting point for discussions about methodological development to develop appropriate multipliers to translate opportunistically recovered carcasses to total mortality.

Additional studies and analytical methods are required to account explicitly for low probability of carcass recovery from cryptic mortality events (e.g. oil spills, ship strikes, and acoustic trauma). Field studies might include programmes of tagging and release of fresh carcasses to estimate the tag recovery rate on-shore. Although some stranded, more or less decayed carcasses are towed out to sea and could be tagged to see if they subsequently strand, these are unlikely to be a representative sample. The buoyancy, and hence drift characteristics, of carcasses will be dependent on the state of decomposition. Ridoux noted that tag studies had been undertaken from bycatch in pair trawls off the coast of France, indicating an 8% recovery rate. Similar studies in Brazil revealed a 10% recovery rate for bycaught franciscanas, *Pontoporia blainvillei* (Prado, 2009). There may be substantial differences in recovery rates between populations. For example, Perrin *et al.* (2010) estimated that carcasses of inshore bottlenose dolphins off California were 50 times more likely to be recovered in strandings than those from the off-shore population.

13.2 Mortality from acoustic sources and debris

No new information on these topics was available to the meeting.

14. 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) progress in including information in National Progress Reports;
(3) estimating risk and rates of bycatch and entanglement;
(4) development of methods to estimate mortality from ship strikes;
(5) continuing development and use of the international database of ship strikes; and
(6) review of information on other sources of mortality.

Two intersessional working groups were organised, to:

(1) develop a proposal for a workshop to identify priority areas for assessment of ship strike risk; and
(2) attempt to estimate ship-strike mortality of fin whales in the North Atlantic.

Work to maintain and promote use of the ship-strike database (Appendix 3) will involve a budget request of £10,000.

15. ADOPTION OF THE REPORT

The report of the Working Group was adopted at 16:10 on 4 June 2011.

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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. Collaboration with FAO on collation of relevant fisheries data
7. Progress on joining the Fisheries Resource Monitoring System (FIRMS)
8. Estimation of bycatch mortality of large whales
9. Estimation of risks and rates of entanglements
10. Methods and data sources for establishing time series of bycatch
11. Progress on including information in National Progress Reports
12. Ship strikes
    - 12.1 Scientific aspects of IWC/ACCOBAMS Workshop on ship strikes
    - 12.2 Report of intersessional group on developing a global database
    - 12.3 Activities of Conservation Committee
    - 12.4 Modeling risk of ship strike
13. Other issues, including assessing mortality form acoustic sources and debris
14. Work plan and budget requests
15. Adoption of the report

Appendix 2

ANTHROPOGENIC MORTALITY (OTHER THAN DIRECTED TAKE) OF LARGE WHALES AS REPORTED IN THE NATIONAL PROGRESS REPORTS FOR 2011

R. Leaper

Species	Argentina	Australia	Brazil	Chile	Croatia	Denmark (Greenland)	Germany	Iceland	Italy	Japan	Korea	Mexico	Netherlands	NZ	Norway	Spain	US (data for 2008)
Minke - Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Minke - Entanglement	-	-	-	-	-	-	-	-	-	124	70	-	-	-	-	-	4
Humpback - Ship strike	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1
Humpback - Entanglement	-	4	-	-	-	1	-	2	-	9	1	-	-	-	-	-	6
Sperm - Ship strike	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	4	-
Sperm - Entanglement	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Fin - Ship strike	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1
Fin - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brydes - Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brydes - Entanglement	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Sei – Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sei - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Southern right - Ship strike-		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Right - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N Atlantic right – Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N Atlantic right – Entanglement		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Bowhead - Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bowhead - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gray - Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gray - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blue - Ship strike	-	[1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blue - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unk - Ship strike	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unk - Entanglement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Ship strike reports include all reported incidents, not all of which may have been fatal. Number in [] indicate carcasses showing evidence of collision with a vessel, but not confirmed as a ship strike. Entanglements are deaths and serious injuries.

Appendix 3

PROPOSAL TO ESTABLISH A POSITION FOR AN IWC SHIP STRIKE DATA COORDINATOR

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The ongoing development of the IWC ship strike database requires data gathering, communication with potential data providers and data management. We propose a part-time post initially for 3 months a year to undertake the following tasks.

DATA GATHERING

- Identify national contact points, organisations or groups that hold data on ship strikes that have not been contributed to the database. Approach these organisations to facilitate and encourage contributing data to IWC database, including discussing preferred mode of delivery of ship strike reports in a way that complements national data gathering efforts.
- Regularly contact national co-coordinators 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.
- Follow up on reports of new incidents in order to gather information as soon as possible after the incident takes place. Ensure national coordinators are informed quickly of any reported incidents within their area.

OUTREACH AND COMMUNICATION

- Monitor and respond to emails addressed to the *shipstrikes@iwcoffice.org* email address, including reports of new incidents, giving feedback to data providers and dealing with requests for summary information from the database.
- Keep IWC ship strike web site pages up to date including updating publicly available summaries from the database.
- Develop and document a communication strategy. For example, ensure current leaflet on ship strikes prepared by Belgium is as widely distributed as possible within shipping industry (direct to vessels), shipping management companies, and maritime academies. Explore ways of raising the profile of the database by contacting other organisations including academic (e.g. ECS, ACS), NGOs, recreational boating associations, maritime organisations.
- Assist Secretariat with maintaining links with IMO.
- Explore funding options for future IWC ship strike work.
- Provide an annual update to Scientific Committee.

DATABASE MANAGEMENT

- Data entry of new records including data presented in meeting papers and National Progress Reports at annual meetings of Scientific Committee.
- Work with data review group to ensure that all new records are appropriately reviewed including identification of potential duplicate reports.
- Further development of database handbook including criteria for determining whether ship strike was a cause of death. Ensure database documentation remains up to date.
- Maintain database and data entry system, making adjustments as appropriate in response to user problems and suggestions.
- Communicate any changes in database schema to all potential collaborators.