Report of the Scientific Committee

Bled, Slovenia, 7-19 June 2016

Annex J: Report of the Working Group on Non-deliberate Human-induced Mortality of Cetaceans

**This report is presented as it was at SC/66b.
There may be further editorial changes (e.g. updated references, tables, figures)
made before publication.**

International Whaling Commission

Bled, Slovenia, 2016

Annex J

Report of the Working Group on Non-deliberate Human-induced Mortality of Cetaceans (HIM)

Members: Leaper (Convenor), Baulch, Bell, Bjørge, Brockington, Cipriano, Collins, Cooke, Cozzi, Currey, Double, Findlay, Fortuna, Frey, Gallego, Galletti Vernazzani, George, Gerber, Greig, Gulland, Hall, Haug, Herr, Holm, Iñíguez, Jimenez, Kato, Kaufman, Kim, W., Lauriano, Lee, Long, Lundquist, Mallette, Marsili, Mattila, Minton, Moore, New, Øien, Panigada, Park, Porter, Reeves, S., Rendell, Reyes, Ridoux, Ritter, Rodriguez-Fonseca, Rojas-Bracho, Rose, Rosenbaum, Rowles, Ryeng, Scheidat, Simmonds, Sironi, Slooten, Smith, Sohn, Stachowitsch, Stimmelmayr, Thomas, Urbán, Víkingsson, Vlckova, Wade, Williams, Wimmer, Zerbini.

1. CONVENOR'S OPENING REMARKS AND TERMS OF REFERENCE

Leaper welcomed participants. He noted that the terms of reference for the working group had been expanded to include consideration of non-deliberate Human Induced Mortality in all cetaceans rather than just large whales. He noted that the term 'entanglement' is used within this report in line with the definition in IWC (2010) that entanglement involves the presence of line, netting, or other materials wrapped around body areas of a whale and may include cases in which animals are towing gear or anchored by gear. The term 'bycatch' is used in a wider sense but generally involves a fatal interaction between a cetacean and fishing gear.

2. ELECTION OF CHAIR

Leaper was elected as Chair.

3. ADOPTION OF AGENDA

The agenda was adopted.

4. APPOINTMENT OF RAPPORTEURS

Mattila and Thomas offered to serve as rapporteurs.

5. AVAILABLE DOCUMENTS

SC/66b/HIM01-10, SC/66b/SH04, SC/66b/SM01-03, SC/66b/SM09, SC/66b/SM15, SC/66b/BRG04, SC/66b/E13, SC/66b/ForInfo19, 28, 49.

6. ENTANGLEMENT

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

(i) Outcomes of the Workshop co-sponsored by IWC on Global Assessment of Large Whale Entanglement and Bycatch Reduction in Fishing and Aquaculture Gear (Portsmouth Workshop)

Forty participants from Australia, Brazil, Canada, Europe, Mexico, South Africa, South Korea, and the US convened at a workshop co-organised by the New England Aquarium, the Consortium for Wildlife Bycatch Reduction and IWC. The workshop was co-funded by NOAA (US) to exchange information on preventing large whale entanglements and held in Portsmouth, New Hampshire, USA from 23-26 May 2016. The focus of the workshop was on devices and techniques that can be incorporated into or in the vicinity of fishing gear.

The full workshop report was not yet available but sections of the report text relating to issues that were outside of the shared terms of reference, but of relevance to the Committee were discussed. These issues were;

GEAR MARKING – GOALS AND FEASIBILITY GLOBALLY

Identifying the source of gear that has caused an entanglement is important for developing mitigation measures but has proven to be challenging. In most cases of disentanglement of free swimming whales, the gear that is recovered is just rope.

FAO held a recent technical meeting on gear marking and this will be discussed further at the COFI meeting in July. The ultimate objective for FAO is to develop a system for tracing gear back to a licensed vessel. Discussion of gear marking within FAO has primarily focused on Illegal, Unreported and Unregulated (IUU) fishing and Abandoned Lost and Discarded Fishing Gear (ALDFG). The IWC Secretariat has been providing input to the FAO about the need to consider whale entanglement as it develops gear marking schemes. Relevant questions to assist in developing whale entanglement prevention measures include; distinguishing vertical line from ground line in pot or trap fisheries, assessing the relative risk from the different ways and water depths in which gear is set, evaluating whether sinking ground line reduces risk compared to floating line and evaluating effectiveness of gear modifications in reducing entanglement risk through

identifying incidents in modified and unmodified gear. The Working Group **recommended** that to be useful for identifying gear removed from entangled whales, marks need to be in more than one place on the gear, and preferably either continuous or approximately of the order of a whale's length apart.

Given the challenges and complexities there were different views expressed at the workshop on the value of gear marking in developing measures to prevent large whale entanglements. It was **agreed** that there is a need for resources that disentanglement teams can use to find out information about the gear that they find on whales. The USA is currently using a fairly detailed gear marking scheme on its Atlantic coast (which distinguishes between fisheries and sub-regions). The Working Group looks forward to hearing of results from these schemes. In addition, the Working Group **agreed** that it may be useful to identify other areas where developing regional gear marking schemes might be particularly relevant and feasible. Such schemes would likely need well-studied populations of whales, manageable fisheries and well-established stranding and entanglement response networks.

The workshop also recommended a review to investigate the potential for biological forensic techniques (based on fouling organisms on the gear) to assist in identifying the origin of the gear. The Working Group was not aware of any studies related to such biological forensic techniques but **agreed** that a review of the potential would be valuable. The difficulty of using forensics to determine the geographic origin of the gear was noted, given many documented instances of whales dragging gear for long time frames (e.g. years) and over great distances (e.g. full migrations).

Recognising the similarities between gear marking with the objective of understanding whale entanglement and issues associated with ALDFG or Marine Debris, work on this issue will need to be coordinated across the Committee (see E report, Annex K).

ROLE OF DISENTANGLEMENT EFFORTS IN PREVENTION

Disentanglement is not itself a prevention measure and only a small fraction of the entanglements that occur are likely to be successfully disentangled. Even in the Gulf of Maine off the US east coast with highly developed reporting systems, the likelihood that an entangled whale is reported is only around 10-15%. However, disentanglement does provide an opportunity to gather information which can assist in developing prevention measures (Mattila *et al.,* 2007). It was noted that any disentanglement without collecting data does not achieve one of the key objectives of the IWC consensus principles and guidelines (Annex E, Provincetown, 2011), that is, to gather data that leads to prevention.

The Working Group therefore **endorsed** the workshop recommendation that all data collection opportunities are maximised.

ABANDONED LOST DISCARDED FISHING GEAR /MARINE DEBRIS

The proportion of entanglements in lost gear compared to active gear is not well known. Most estimates are around 5-15% but could be as high as 30% in some areas. The majority of entanglements that have been attributed to marine debris appear to originate from gear that was original used for fishing. The Workshop considered ALDFG to be gear that had been lost for some time. Recently lost gear such as static gear cut by large commercial ships cannot be readily distinguished from actively fished gear.

Given the relatively low proportion of entanglements attributed to ALDFG the Workshop **recommended** that large whale entanglement prevention should focus primarily on active gear. However it also **recommended** that recovery of ALDFG should continue. It was noted any prevention techniques should try to avoid a higher risk of creating ALDFG. The Working Group **endorsed** these recommendations.

(ii) Evaluation of measures to reduce risks of large whale entanglement

The Western Australian population of humpback whales (Breeding Stock D) is recovering rapidly but between 1990 and 2011 the reported entanglement rate in gear from the western rock lobster (*Panulirus cygnus*) fishery averaged around two per year. However, in 2012 and 2013, reported entanglements jumped to 12 and 17 respectively and this increase was linked to changes in fishery practices. To address the rise in entanglements the fishery implemented a series of gear modifications aimed at reducing the amount of rope in the water, eliminating surface rope in waters deeper than 20 meters and a reduction in float numbers to reduce possible entanglement points. The effectiveness of these measures to reduce entanglement was assessed using the incidents reported between 2000 and 2015. The assessment model incorporated expected changes in whale population size, reporting rate, commercial fishing effort and the implementation of gear modifications (which started in July 2014). The analyses suggest that gear modifications reduced entanglements by around 60%. The model also highlighted the northern part of the migration and water depths of 37 - 55m as the times and areas most associated with entanglements. This study highlights the importance of incorporating all factors which may impact entanglement rates in order to assess the effectiveness of gear modifications.

The Working Group welcomed this report, as it indicates that significant risk reduction appears to have been achieved, and encouraged the authors to publish these findings. The Working Group also encouraged continued monitoring in order to confirm the results. It was noted that the recording of entanglements will continue, and that additionally satellite tagging is planned in order to determine the extent to which whales may utilise waters further offshore. There is some evidence that entangled whales may alter their behaviour, based on some tagged entangled individuals. Further tagging will help understand the context of these observations. Given the size of the population, and its highly transitory migratory

behaviour, it is not currently possible to conduct follow up studies of entangled whales, and scarring studies would not be as informative as those in some areas with small, highly studied populations (e.g. Gulf of Maine humpback and right whales). Regional disentanglement teams do their best to retrieve all entangling gear which allows modified gear to be distinguished from unmodified. A gear catalogue with descriptions of the gear types used has also been developed in cooperation with the local fishers. However, currently the primary identifying marks are at the marker buoy, and if this is missing then identification of the gear can be challenging.

Entanglement mitigation measures for reducing the risk to large whales including examples of their implementation and evaluation of effectiveness were reviewed in SC/66b/HIM07. The focus of the review was on fishing gear since this is by far the dominant source of line in the water and consequently the main source of entanglements. Although there are many factors that affect the risk of entanglement there are rather few measures that have been demonstrated to substantially reduce risk. Keeping static gear out of areas used by whales is the most effective method. If this is not possible then reducing the amount of fishing effort, modifying gear to reduce risk of contact, and modifying gear to reduce the consequences if contact occurs, are the main strategies known to reduce risk.

The Working Group commended the author for this review and noted that it appears to agree with many of the outcomes of the Portsmouth Workshop. The Working Group **agreed** that the Portsmouth Workshop report and SC/66b/HIM07 together will provide a good reference from which to move forward on this issue. The Portsmouth Workshop had also recognised that switching gear, reducing effort, or spatial-temporal management have important roles in managing bycatch of large whales but did not discuss these directly. A future output from the Working Group could be a summary table of potential mitigation measures, similar to that produced for ship strike mitigation. This could be helpful in a number of ways, including the identification of mitigation measures which have been tried but found not to work when carefully evaluated.

Long noted that the US Take Reduction Team (TRT) process has documented success when the team's scope and size are appropriate, for example involving just one fishery and one cetacean population (McDonald et al. 2016). McDonald and Rigling-Gallagher (2015) found that a majority of surveyed TRT members were largely supportive of the consensus based process and preferred it to the alternative (i.e. U.S. government developing measures on its own). The Atlantic Large Whale TRT is an outlier in that the scope is quite broad, including two gear types (gillnet and trap/pot) across nine fisheries that span the entire U.S. Atlantic coast, and is composed of many members (60), which challenges the team's ability to reach consensus as required. While this team and the resulting mitigation measures have had limited success as noted in Pace *et al.* (2014), two major gear modification requirements (sinking groundline and reduced number of buoy lines), as well as a comprehensive gear marking scheme, were implemented subsequent to the analysis in Pace et al. (2014). Thus, the effectiveness of those measures cannot yet be evaluated.

SC/66b/HIM09 identifies data gaps regarding understanding entanglement in active or derelict fishing gear, including inadequate reporting and a general underestimation of welfare concerns. The authors suggest that understanding the mechanisms by which whales become entangled in gear, as well as ongoing development and evaluation of gear modifications to reduce entanglement risk is essential. They also suggested a number of recommendations concerning measures to modify gear, fisheries restrictions, engagement of stakeholders, and the need to include provisions in legislation on welfare grounds, as well as to assess cumulative and synergistic effects of different threats on cetaceans. Gear removed from entangled whales should be collected, analysed and archived. Other recommendations in SC/66b/HIM09 include increasing understanding of the sub-lethal costs of entanglement; development of an IWC entanglement database, with adequate implementation and resourcing, including outreach for better reporting; ongoing expansion of disentanglement training, including for fishermen; data on temporal and spatial distribution of large whales and fishing configuration and effort; estimation of the financial impact of gear lost to entanglement.

The Working Group welcomed the information and it was noted that several of the author's recommendations such as disentanglement response training were already part of IWC initiatives. Consideration of a global database is discussed under 6.3. It was also noted that discussions with stakeholders and mitigation measures need to take into account both animal welfare and socioeconomic impacts.

6.2 Estimation of rates of large whale entanglement, risks of entanglement and mortality

Entanglement in static fishing gear, especially shellfish creels (pots or traps), is a known problem for humpback whales. SC/66b/HIM01 describes an apparent rise in recent entanglements of this species in Scottish coastal waters. Boat based survey effort between 1992 and 2016 indicated the relative abundance of humpback whales in this region was very low with just four sightings from 86,000km of search effort. During the same period there were 213 sighting records of humpback whales from community sighting schemes including 12 reported entanglements of this species. Over half of the known entanglements (n = 7) involved creels, three others were of ropes consistent with creels, and one involved an aquaculture (salmon) pen. Rescue responses to six of the 12 entangled whales resulted in successful disentanglements. Based on the estimated daily probability of entanglement, a whale that was resident year-round would have an annual probability of entanglement of 0.46. This suggests that with current fishing practices Scottish inshore waters could not support a population of humpback whales. This highlights entanglement concerns for minke whales which are much more abundant but less likely to be reported.

The Working Group noted that the gear the modifications involving shorter vertical lines that appeared to have reduced risk in the Australian lobster fishery may also be effective in Scottish waters and encouraged investigation of this.

SC/66b/BRG04 describes results from aerial photographic surveys for bowhead whales conducted near Point Barrow, Alaska, USA in 2011. Approximately 3% of the whales had scars induced from anthropogenic sources, most of which were from line entanglement. The scoring criteria for photographic matching does not explicitly include the peduncle, where rope scars typically occur. Preliminary results suggest a higher rate of entanglement when photo quality of just the peduncle region was evaluated. However, the aerial method may only see major scarring, and it was suggested that a more detailed comparison of scarring results from landed animals and aerial photography might be useful to calibrate the aerial methodology. The area of primary risk of entanglement for this population is in the Bering Sea. For example, SC/66b/BRG03 describes a dead bowhead entangled in crab gear identified to a fisher from the American side of the Bering Sea.

In discussion it was noted that the caudal peduncle was not always clearly visible from the air and that relatively smaller scars (e.g. those from killer whale bites) were difficult to detect, and that this therefore might explain the lower percentage determined to have entanglement scarring compared to those from the landed data. It was suggested that a more detailed comparison of the two might be useful to calibrate the aerial methodology.

Analysis of a database with more than 32,000 images collected from platforms of opportunity over 15 years in the Strait of Gibraltar yielded a total of 245 cetaceans with scars and injuries (SC/66b/E13). Fishing gear and ship strikes were likely reasons for most of them. Whether these injuries resulted in mortality is less clear. However, a follow-up of several animals with severe injuries which were never sighted again suggests that they eventually died due to these injuries. In addition, six animals were found dead, either in the water or stranded.

The Working Group encouraged the authors to enter the ship strike data into the IWC database and it was suggested to communicate with researchers using tags in the area, regarding wounds that appeared to be from tags. It was noted that this study also showed the value in data collected from whale watching operations as platforms of opportunity.

Information on baleen whales from the west coast of India collected between June 2015 to May 2016, including details of confirmed sightings and strandings, were presented in SC/66b/SH34. Marine mammal research teams have been working from five locations along the west coast of India in Gujarat, Maharashtra, Karnataka, Kerala provinces and the Lakshadweep archipelago. Strandings were dominated by blue and Bryde's whales although identification was sometimes uncertain. Eight baleen whales stranded along the coast of Maharashtra out of total of ten baleen whale strandings during the study period. The authors note that a concentrated effort with an in-depth analysis of baleen whale carcasses is required to understand the causes and seasonality of mortalities. This requires the collaboration of local administrative authorities along with the forest department and trained veterinarians licenced to carry out necropsies or deal with live strandings. Towards this end it was noted that a marine mammal research methods workshop was organised in February 2016 with funding from the UNDP and the Government of India along with the Maharashtra Forest Department.

In discussion it was noted that recent attempts to train and establish stranding networks in other parts of the region have not succeeded, and there have not been any systematic sighting surveys in the wider region. However, there is increasing interest in monitoring and the coast guard are getting involved in some areas. The authors suggested that a regional coordination might be a way to encourage such initiatives. The Working Group welcomed these efforts and noted that the IWC has held two recent stranding workshops and **endorsed** a proposal to establish an expert panel to advise on strandings (see recommendation in Environmental Concerns Standing Working Group).

SC/66b/SH04 described seven confirmed cases of entanglement of humpback whales in Brazilian waters in 2015, including two juveniles found dead with attached gillnets in the southern coast. The Working Group noted these observations but this paper was not discussed in detail.

6.3. Data collection and proposal for entanglement database

6.3.1 National Progress Reports

In reviewing National Progress Reports the Working Group noted that only a minority of member countries report extensively and consistently on bycatch and entanglement, and this number is dwindling. Given the Committee's and Commission's growing concern with this issue, this trend is inconsistent and troubling, as generally the numbers of reports of bycatch tend to increase with more focused attention. The current level of reporting is not sufficient for the Working Group to use in its work to understand rates and impacts of bycatch. The Working Group discussed if streamlining the data requested would increase reporting from those countries that are not currently doing so, and **recommended** that the Committee address this issue, perhaps through an ad hoc working group. In addition, the group requested that the Secretariat inquire with member countries if there were changes that would increase reporting to levels that would allow the Working Group to advance its work. There was also discussion of how to solicit bycatch reporting by non-member nations, and it was noted that this was most likely, and appropriate, to occur through the establishment of an IWC hosted entanglement database.

Table 1

Non Direct Mortality of Large Whales 2013

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Females: Seriously Injured	Unknown: Dead	Unknown: Seriously Injured	Submitted to Ship Strikes	Contacts
PR/R/5331	2013	2016	Atlantic Ocean - North	humpback whale	USA		0	2	0	Unknown	PR/C/123 | Tim Cole (tim.cole@noaa.gov)
References	PR/B/611 | Mortality and Serious Injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2009–2013 | Henry, A.G., T.V.N. Cole, L. Hall, W. Ledwell, D. Morin and A. Reid | Published										
PR/R/5332	2013	2016	Atlantic Ocean - North	fin whale	USA		0	1	0	Unknown	PR/C/123 | Tim Cole (tim.cole@noaa.gov)
References	PR/B/611 | Mortality and Serious Injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2009–2013 | Henry, A.G., T.V.N. Cole, L. Hall, W. Ledwell, D. Morin and A. Reid | Published										
PR/R/6194	2013	2016	Atlantic Ocean - Caribbean Sea	humpback whale	FRANCE	French Carribean	0	0	1	No	PR/C/574 | Observatoire Pelagis (pelagis@univ-lr.fr)
PR/R/6196	2013	2016	Atlantic Ocean - Caribbean Sea	sperm whale	FRANCE	French Carribean	1	1	0	Unknown	PR/C/574 | Observatoire Pelagis (pelagis@univ-lr.fr)

Table 2

Non-direct Mortality of Large Whales 2014

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Unknown: Dead	Unknown: Seriously Injured	Unknown: Injured	Submitted to Ship Strikes	Contacts
PR/R/6591	2014	2016	Pacific Ocean - North	fin whale	USA	Ventura, CA	1	0	0	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Vessel strike; call received from naval base ventura county-port hiueneme port operations of a dead whale floating in harbor next to ship. cimwi volunteer went to site to confirm. took pictures. notified stranding coordinator-nmfs,base biologist,cimwi director, and circu. 7/30/14 arrangements being made between nmfs and navy to have whale towed to a site for necropsy. necropsy performed by members of nmfs,cimwi,circu,etc. vessel assist towed remains out to sea. external and internal exam and necropsy										
PR/R/6592	2014	2016	Pacific Ocean - North	humpback whale	USA	Monterey, CA	0	0	2	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Vessel strike; whale surfaced 30 feet in front of 57.8 ft commercial fishing vessel moving at 7.5 kts. whale slapped tail and apparently struck bow. whale described as uninjured, 'cosmetic' damage above waterline on vessel indicated on self-reporting form. whale resurfaced and dove with no apparent injury. large whale criteria l6c applied for non-serious injury as vessel was moving <10 kts and no discernable injury to whale.										
PR/R/6593	2014	2016	Pacific Ocean - North	humpback whale	USA	San Diego, CA	0	1	0	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Large laceration across back between blowhole and dorsal fin. Laceration approximately 4 inches long and 10 inches deep. Mainly using left pectoral flipper for mobility, occasionally flukes, not at all with right pectoral flipper. Assumption is boat strike. Did not appear to be too thin, but it was obvious this animal was unable to dive or use its right pectoral flipper and only some movement from tail flukes.										
PR/R/6594	2014	2016	Pacific Ocean - North	humpback whale	USA	San Diego, CA	0	1	0	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Animal first sighted alive off orange county october 3rd with healing dorsal propellor wound & limited mobility. Sighted alive again off oceanside oct. 6 and del mar oct. 7, 3/4 mile offshore. Multiple vertebral, rib, scapular fractures, and hemorrhage observed at necropsy. Details of laceration / injury lacking when animal seen alive, however use of l5a criteria reflects likely severity of injury because whale had limited mobility when observed.										
PR/R/6595	2014	2016	Pacific Ocean - North	humpback whale	USA	Monterey, CA	0	1	0	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Entangled around caudal peduncle with waverider buoy; caught in bungee between 10 ft chain and line that runs to 300 lb anchor; successfully disentangled 10/29/14.										
PR/R/6596	2014	2016	Pacific Ocean - North	Common minke whale	USA	MENDOCINO, CA	0	1	0	Unknown	PR/C/473 | Jim Carretta (Jim.Carretta@noaa.gov)
Comments	Animal reported live on beach rocks with blood coming from different parts of the body. The animal had bruising in the thoracic area where there was evidence of human interaction, thought to be a metal cable of some kind, that fractured the vertebra in that area. Used criteria l5a due to evidence of blood coming from body.										

Table 3

Non-deliberate Mortality of Large Whales 2015.

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Local Taxonomy	Females: Dead	Unknown: Dead	Seriously Injured	Injured	Unk	Submitted to Ship Strikes
PR/R/6124	2015	2016	Pacific Ocean - Coral Sea	Common minke whale	AUSTRALIA	Western side of Peel Island (153.32326°E; -27.50918°S)	Dwarf minke	0	1	0	0	0	No
Comments	Suspected interaction with a commercial vessel. Reported by crew of a commercial vessel at 153.35565°E; -27.5279°S. Carcass located at 153.32326°E; -27.50918°S with four dorsal propeller wounds; 17 cm, 14 cm, 15 cm and 19 cm across. Genetic and toxicology samples taken. Juvenile size, unsexed. 4 m.												
PR/R/6125	2015	2016	Pacific Ocean - Coral Sea	humpback whale	AUSTRALIA	Offshore, Sunshine Coast (153.11134°E; -26.66551°S)			0	1	0	0	0 No
Comments	. Suspected vessel interaction. Reported to have suspected propeller cuts by DAF contractor but no photos were provided. Calf sized. Sex unknown. 7.50 m. Genetic samples taken. Towed out to sea.												
PR/R/6126	2015	2016	Pacific Ocean - Coral Sea	humpback whale	AUSTRALIA	Hay Point (149.3121°E;-21.25833°S)			0	1	0	0	0 No
Comments	Suspected interaction with a commercial vessel. A tugboat had engine failure during port manoeuvres and found a small humpback whale lodged between the propeller and rudder. The carcass was fresh but it could not be ruled out that the interaction before death without a necropsy. Genetic, baleen and toxicology samples taken. Carcass removed piecewise by divers and disposed off-site.												
PR/R/6195	2015	2016	Atlantic Ocean - Caribbean Sea	humpback whale	FRANCE	French Carribean			0	0	1	0	0 Unknown
PR/R/6220	2015	2016	Atlantic Ocean - Mediterranean Sea	fin whale	SPAIN	Gulf of Valencia			1	0	0	0	0 No
Comments	whale found on the bulbous bow of a commercial ship. Probably from other area.												
PR/R/6484	2015	2016	Atlantic Ocean - North	Common minke whale	NETHERLANDS	North Sea	Balaenoptera acutorostrata		0	1	0	0	0 Unknown
Comments	British vessel - Ro-Ro ship ‘Opaline’ Total length ship 195 meters; sailing route between Killingholme (England) and Rotterdam in less than a day per trip. It entered the harbour of Rotterdam. Animal was found on 7 November 2015												
PR/R/6679	2015	2016	Atlantic Ocean - North	fin whale	UNITED KINGDOM	Kent, England.			1	0	0	0	0 No
Comments	Diagnosed as ship-strike through necropsy carried out under the UK strandings scheme. Multiple parallel, linear incisions on lateral caudal peduncle. Tail flukes excised, majority of viscera missing.												
PR/R/6797	2015	2016	Atlantic Ocean - North	humpback whale	ICELAND	Iceland			0	0	0	1	0 Unknown

Table 4

Bycatch of Large Whales for 2013

id	Data Year	Year Submitted	Large Area	Species	Country	Females: Injured	Unknown: Dead	Unknown: Seriously Injured	Unknown: Injured	Gear	References
PR/R/5327	2013	2016	Atlantic Ocean - North	North Atlantic right whale	USA	1	0	0	0	[NK] GEAR NOT KNOWN OR NOT SPECIFIED	PR/B/611 | Mortality and Serious Injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2009–2013 | Henry, A.G., T.V.N. Cole, L. Hall, W. Ledwell, D. Morin and A. Reid | Published
PR/R/5328	2013	2016	Atlantic Ocean - North	humpback whale	USA	0	2	1	1	[MIS] MISCELLANEOUS GEAR	As above
PR/R/5329	2013	2016	Atlantic Ocean - North	fin whale	USA	0	0	1	0	[FPO] TRAPS - Pots	As above
PR/R/5330	2013	2016	Atlantic Ocean - North	Common minke whale	USA	0	1	1	2	[NK] GEAR NOT KNOWN OR NOT SPECIFIED	As above
PR/R/5333	2013	2016	Atlantic Ocean - North	Common minke whale	USA	0	1	0	0	[TM] MIDWATER TRAWLS - Midwater trawls (not specified)	

Table 5

Bycatch of Large Whales for 2014.

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Unknown: Injured	Unknown: Unknown	Targeted Species	Gear
PR/R/4714	2014	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	1. Cabarita, 2. Kiama	2	0		[FIX] TRAPS - Traps (not specified)
Comments	MAR20140586; MAR20140503									
PR/R/6000	2014	2016	Indian Ocean	humpback whale	AUSTRALIA	western Australia, Yallingup	0	1	Rock lobster	[FPO] TRAPS - Pots
Comments	10/04/2014 Humpback whale wrapped in lobster gear around the tail. The observer watched the Humpback, thrash violently throwing the amateur gear after dragging it 200 m west of the initial entanglement. The initial report was 300 m off Yallingup beach.									
PR/R/6001	2014	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, off Geraldton	0	1	Rock lobster	[FPO] TRAPS - Pots
Comments										
PR/R/6002	2014	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, 5.7nm north off Lancelin	0	1	Rock lobster	[FPO] TRAPS - Pots
Comments	16/05/2014 (Latitude -31.0983 & Longitude 115.3775) The rig was a 11mm 30fm polypropylene mainline to a 12mm polypropylene float rig that had a lead of 1fm before a medium size torpedo float then a 1.5fm gap to the 8inch round float and a short tag.									
PR/R/6003	2014	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, Flat Rock, 9.7 km WNW of Wedge Island community	0	1	Rock lobster	[FPO] TRAPS - Pots
Comments	23/06/2014 (Latitude -30.78333 & Longitude 115.0966) in 18.5 fathoms, snapped the rope leading to the western rock lobster pot. Seen trailing an unknown length of rope, appeared to be wrapped around the forward area of the whale with surface gear and floats (orange rope and red and white floats) extending back along the body to the caudal fin. The fisherman followed the whale for some distance as it traveled in a southerly direction before it was lost from view.									
PR/R/6004	2014	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, 7nm off Ledge Point	0	1	Rock lobster	[FPO] TRAPS - Pots
Comments	25/06/2014 (latitude -31.1646 & longitude 115.2247) A 9 metre humpback entangled around the tail and towing 36 fathoms of 11mm silver rope with lobster pot still attached was reported from Ledge Point and was swimming north. This whale was accompanied by a second whale, reported to be pretty agitated.									

Table 6

Bycatch of Large Whales for 2015

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Males: Dead	Females: Dead	Females: Unknown	Unknown: Dead	Unknown: Injured	Unknown: Unknown	Gear
PR/R/5000	2015	2016	Pacific Ocean - Coral Sea	humpback whale	AUSTRALIA	Gold Coast	0	0	0	0	0	1	[NSC] SHARK CONTROL NETS
Comments	153.536°E; -28.15517°S												
PR/R/5131	2015	2016	Southern Ocean - Great Australian Bight	southern right whale	AUSTRALIA	Port Elliot SA, En-counter Bay	0	0	0	0	0	1	[NK] GEAR NOT KNOWN OR NOT SPECIFIED
Comments	Date: 29/07/2015. Fate unknown - the incident was not noticed until its sighting photos were reviewed a few days later.												
PR/R/5268	2015	2016	Pacific Ocean - Coral Sea	Unidentified large baleen whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Large animal unknown species to me. Had a dolphin like head on a grey body with white spots. 4 metres in length. Mainline wrapped around snout. Cut mainline went to following float and winched back. Mainline came free no physical damage to animal. Spoke to another skipper maybe a baleen whale.. -21.53 154.53												
PR/R/5269	2015	2016	Pacific Ocean - Coral Sea	melon-headed whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -25.25 154.17												
PR/R/5270	2015	2016	Pacific Ocean - Tasman Sea	short-finned pilot whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -28.27 153.93												
PR/R/5271	2015	2016	Pacific Ocean - Tasman Sea	short-finned pilot whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -28.30 160.52												
PR/R/5272	2015	2016	Pacific Ocean - Coral Sea	short-finned pilot whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -18.73 155.1												

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Males: Dead	Females: Dead	Females: Unknown	Unknown: Dead	Unknown: Injured	Unknown: Unknown	Gear
PR/R/5273	2015	2016	Pacific Ocean - Tasman Sea	long- or short-finned pilot whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -28.64 154.12												
PR/R/5274	2015	2016	Pacific Ocean - Coral Sea	Unidentified large whale	AUSTRALIA		0	0	0	0	0	0	[LLD] HOOKS AND LINES - Drifting longlines
Comments	Released alive -23.98 154.68												
PR/R/5630	2015	2016	Pacific Ocean - New Zealand	humpback whale	NEW ZEALAND	Cook Strait	0	0	0	0	0	3	[RG] RECREA-TIONAL FISHING GEAR, [FPO] TRAPS - Pots
Comments	3 separate incidents of humpback whales entangled in craypot lines. One disentangled by response team, one partially disentangled by scientists, one not released but still alive when last seen.												
PR/R/5639	2015	2016	Pacific Ocean - New Zealand	Unidentified large whale	NEW ZEALAND	East Coast South Island	0	0	0	1	0	0	[TX] MIDWATER TRAWLS - Other trawls (not specified)
Comments	Jaw bone and baleen from decomposed whale												
PR/R/5964	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, Coral Bay, Ningaloo Marine Park	0	0	0	0	0	1	[FPO] TRAPS - Pots
Comments	Rock lobster gear (red and white float, haul rope) from WA South Coast, Southern Ocean. 30/07/2015 Approximately 46 metres of rope was cut from the whale. Rope and floats were still attached. Rope wrapped around the tail and also wrapped around the tail flukes like one would tie off on a bollard. The yellow rope is 10 mm and more pliable than the 12 mm orange rope. The 3 floats still attached to the whale were small and white painted red. Abrasions were observed on the left side of the animal. Once the rope had been cut away it moved off to the north. Acquisition of an image taken by the reporting tour boat out of Coral Bay has provided a confirmation that the entangled humpback reported at Coral Bay is a dorsal match with a whale that was reported 17/06/2015 by a whale watch tour boat at Flinders Bay, Augusta. At first reporting an attempt to assess and disentangle was made however the whale was in a competitive pod and travelling quite fast and weather deteriorated. The entangled humpback has at least taken 43 days to reach Coral Bay before being reported by a second wildlife tour boat within a lagoon of the Ningaloo Marine Park, near the 'elbow', Coral Bay.												
PR/R/5973	2015	2016	Southern Ocean	humpback whale	AUSTRALIA	Western Australia, Flinders Bay, Augusta.	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Comments	23/06/2015 Live - Poor body condition, length = 12 metres. Entanglement gear BAZ E65, mix of gear, commercial crustacean gear. Likely initial entanglement many months old, new gear picked up on return to southern coast on the 2015 north bound migration. Deployed a satellite tracking buoy to the trailing gear.												
PR/R/5974	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, West of Lancelin.	0	0	0	0	0	1	[FPO] TRAPS - Pots
Comments	9/07/2015 Entanglement report from a fisher off Lancelin. The whale, suspected to be a Humpback, was towing a pot but the fisher has since removed that, but trailing ropes and floats remain. Rock lobster gear, rope was described as light green, two floats, no colour. The whale took off towards the north at a fast rate of knots.												
PR/R/5975	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, 20 fathom line, west of Dongara.	0	0	0	0	0	1	[FPO] TRAPS - Pots
Comments	10/07/2015 Freed itself from commercial rock lobster gear in 20 fathoms of water west of Dongara, before rescue crew arrived.												
PR/R/5976	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia,	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Local Area	Western Australia, approximately 40 km from the Ningaloo Marine Park, approximately 53 km north-west of Australia's North West Cape and 55 km west-north-west of Exmouth.												
Comments	2/08/2015 humpback whale (10 metres) carrying heavy gear, quite large diameter line, looks typical nylon line for deep water and reported by the witness as trailing a 25 metre long yellow rope with 2 red & white buoys attached (each about the size of a volleyball), however the line actually doubled up, so it is 50 metres +, considering wraps at the peduncle joint. Confirmed by Fisheries as Commercial Gear. The whale is in very poor condition and long term prognosis is very poor. The skin is necrotic and the rope damage at the tail joint is causing a life threatening wound. The tail flukes are now pale when compared with the peduncle forward of the line wrap(s), this is an indicator that the blood supply to the tail flukes are seriously compromised and the flukes are actually dying. Note the extended pectoral fins, which is likely the most effective means of mobility. The tubicals on the rostrum are degraded, some are gone.												
PR/R/5977	2015	2016	Southern Ocean	humpback whale	AUSTRALIA	Western Australia, Flinders Bay, Augusta.	0	0	1	0	0	0	[MIS] MISCELLANEOUS GEAR
Comments	25/08/2015 Whale on south bound migration. Evaded disentanglement. Adult female humpback approx. 15 m in length was sighted at close range resting with two other animals at position in Flinders Bay near Augusta. The animal had either a fishing net or possible thin rope net entangled on and dragging from its left pectoral fin (no floats visible, he commented it was probably not craypot line). He estimated the netting was trailing approx. 8 m down the side of the animal.												

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Males: Dead	Females: Dead	Females: Unknown	Unknown: Dead	Unknown: Injured	Unknown: Unknown	Gear
PR/R/5978	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, East of Thomson Bay, Rottnest Island.	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Comments	13/10/2015 A vessel sighted a humpback whale entangled and towing blue line with floats, traveling south with a pod of other whales. Evaded disentanglement.												
PR/R/5979	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, off Port Denison	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Comments	28/05/2015 A whale with fishing boys wrapped around it, rope and floats around the tail, was sighted off the coast of Port Denison, heading North. Evaded disentanglement.												
PR/R/5980	2015	2016	Indian Ocean	humpback whale	AUSTRALIA	Western Australia, Fremantle Haul Bank Marker	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Comments	16/06/2015 Rescued, cut free, disentangled. Crew achieved total disentanglement of heavy rope at tail and body. Rope >20mm, four strand and middle core, a green thread along one strand.												
PR/R/6156	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Soldiers Beach, NSW	0	0	0	0	1	0	[NSC] SHARK CONTROL NETS
Comments	MAR20151029. Mother with entangled calf. Calf successfully disentangled by NPWS.												
PR/R/6157	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Depot Beach, NSW	0	0	0	0	1	0	[FIX] TRAPS - Traps (not specified)
Comments	MAR20150998. Mother with calf entangled with a line and buoy. Calf successfully disentangled by NPWS												
PR/R/6158	2015	2016	Pacific Ocean - Tasman Sea	southern right whale	AUSTRALIA	Offshore from Botany Bay, NSW	0	0	0	0	0	1	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150899. Initial sighting by pilot (while landing a plane) of a whale entangled with a number of ‘geometric items around it’. Whale not sighted again.												
PR/R/6159	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Byron Bay, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150873. Entangled whale originally being monitored by dive company. After they left, disentanglement teams were unable to find it.												
PR/R/6160	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Garie Beach, Royal National Park, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150869. Sighting of entangled whale. Unable to be located.												
PR/R/6161	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Gosford to Woolgoolga, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150844. Lat: -31° 4’ 6.147’, Lng: 153° 3’ 22.019’. Several sightings (Gosford, Diamond Head, Smoky Cape, Woolgoolga) of whale entangled with line and buoys.												
PR/R/6162	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Norah Head	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20151023. Whale entangled with line and buoys. MAR20151023. Whale entangled with line and buoys.												
PR/R/6163	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Port Stephens, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150843. Sub adult whale sighted by whale watch boat with floats entangled around pectoral fins.vv												
PR/R/6164	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Sawtell, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20150841. Entangled whale sighted trailing 4 white buoys.												
PR/R/6165	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Sydney to Newcastle, NSW	0	0	0	0	1	0	[MIS] MISCELLANEOUS GEAR
Comments	MAR20151019. Entangled whale trailing ropes and floats sighted in Sydney and Newcastle.												

id	Data Year	Year Submitted	Large Area	Species	Country	Local Area	Males: Dead	Females: Dead	Females: Unknown	Unknown: Dead	Unknown: Injured	Unknown: Unknown	Gear
PR/R/6193	2015	2016	Pacific Ocean - Tasman Sea	humpback whale	AUSTRALIA	Long Reef, Sydney	0	0	0	0	1	0	[FIX] TRAPS - Traps (not specified)
Comments	MAR20150830. Sub-adult whale entangled by rope and 3 floats. Accompanied by adult whale. Successfully disentangled by NPWS.												
PR/R/6446	2015	2016	Atlantic Ocean - North	humpback whale	DENMARK	West and East Greenland	2	2	0	1	5	0	[FPO] TRAPS - Pots, [FPN] TRAPS - Stationary uncovered pounds nets
Comments	• 1 humpback whale sex unknown near Nuuk (length unknown) entangled in fishing gear from pond net in front of front flippers was observed, status unknown, June 2015. • 1 humpback whale female near Fiskenæsset (8,6 meter) entangled in fishing gear from pond net was permitted euthanized, June 2015. • 1 humpback whale sex unknown near Aasiaat (length unknown) entangled in fishing gear was permitted euthanized but drowned and sank, June 2015. • 1 humpback whale sex unknown near Disko, but off shore (length unknown) entangled in fishing gear or line was observed, status unknown, June 2015. • 1 humpback whale sex unknown near Narsaq (length unknown) entangled in gear for crab fishing was observed, status unknown, July 2015. • 1 humpback whale sex unknown near Paamiut (length unknown) entangled in fishing gear was observed, status unknown, July 2015. • 1 humpback whale sex unknown near Nuuk (length unknown) entangled in heavy line from a ship was observed, status unknown, July 2015. • 1 humpback whale female near Maniitsoq (10 meter) entangled in fishing gear from pond net was permitted euthanized, September 2015. • 1 humpback whale male near Fiskenæsset (10,5 meter) entangled in fishing gear was permitted euthanized, September 2015. • 1 humpback whale male near Kulusuk (6 meter) entangled in fishing gear was permitted euthanized, October 2015.												
PR/R/6537	2015	2016	Pacific Ocean - Sea of Japan/East Sea	Common minke whale	KOREA, REPUBLIC OF		14	28	0	37	0	0	[FIX] TRAPS - Traps (not specified), [FPO] TRAPS - Pots, [GN] GILLNETS AND ENTANGLING GEAR - Gillnets (not specified)
PR/R/6538	2015	2016	Pacific Ocean - Yellow Sea	Common minke whale	KOREA, REPUBLIC OF		0	1	0	7	0	0	[FYK] TRAPS - Fyke nets, [GN] GILLNETS AND ENTANGLING GEAR - Gillnets (not specified)
PR/R/6680	2015	2016	Atlantic Ocean - North	Common minke whale	UNITED KINGDOM	Scotland, UK (various locations)	1	2	0	0	0	0	[NK] GEAR NOT KNOWN OR NOT SPECIFIED
Comments	Diagnosed as entanglement cases (two acute and one chronic) through necropsies carried out under the UK strandings scheme.												

It was **recommended** that the list of FAO codes available in National Progress reports be expanded to include aquaculture facilities. Recent expansion of such facilities creates a potential risk to large whales. Entanglement risk from Fish Aggregating Devices (FADs) also needs to be considered. It was agreed that there were some categories in the FAO codes that could not pose a risk to whales and these could be eliminated from entanglement reporting systems to make data entry simpler.

6.3.2 Consideration of a global database

For some years, the IWC has been considering developing a global entanglement database that could be hosted by the IWC. The overarching goals of the database would be to identify the species involved, gear type, configuration and origin, whether the entangling materials were in active use or debris, and the geographic region and timing of the entanglement. The ultimate goal would be to use this information to inform mitigation initiatives by the Commission, relevant partner inter-governmental organisations, regional fishery councils or member nations. A global IWC database would supplement rather than duplicate national databases. Some countries without national databases have requested centralised data collection through IWC for the disentanglement networks.

A small group involving IWC Secretariat, members of the Committee and researchers with experience in developing bycatch and entanglement databases met to discuss potential options for the IWC to facilitate a global entanglement database in May 2016. The report of that meeting is Appendix X. Based on these discussions and noting the difficulties encountered by others in trying to develop global databases the Working Group **agreed** that answering specific questions about bycaught species (especially large whale numbers, fisheries and regions) with any degree of confidence would likely be impossible using historic information. A step by step process is most likely to succeed towards collection of useful information about large whale entanglement through the establishment of an international database. As a first priority the Woking Group **recommended** the development of a database for the IWC's Global Whale Entanglement Response Network (GWERN). This could provide a resource for many of the new network members who do not currently have existing data handling capabilities, and it could be designed in such a way that networks with existing databases could export their relevant data.

It was **agreed** that the initial objectives of the database would be:

(i) To aid existing or newly formed entanglement response networks to collect relevant data, and to act as an archive for those data.

(ii) To gather information and allow analyses that would be helpful to advancing entanglement prevention.

The database would be constructed in a modular fashion beginning with the data currently recommended for collection in GWERN's consensus field data form (Annex D, IWC/66/WK-WI-Rep01). If, as anticipated this initial database is successful, then the database could be expanded in the future to include other modules and sources of data (outlined in Appendix X). Hence the initial structure needs to be carefully designed to allow for future expansion.

The working group recognised various proposals within the Committee for the IWC to host a number of different databases (e.g. entanglement, stranding, aquatic bushmeat), and that many of these might be similar in structure, or might even be linked together in some cases.

7. APPROACHES FOR THE ASSESSMENT OF THE BYCATCH ISSUE IN SMALL CETACEANS.

SC66b/SM01 and SC66b/SM02 describe the utilisation of small cetacean as aquatic bushmeat (defined in CMS (2016) as the products derived from aquatic megafauna (including cetaceans) that are used for food and non-food purposes, including traditional uses) in West Africa and Latin America, respectively. Information was retrieved from over 150 published and unpublished online materials in English, Spanish and French. The authors noted that these reports are not exhaustive but provide a general idea of the current state, and extent, of aquatic bushmeat in the areas and indicate some countries where the activity has increased substantively in recent years. Most of the 12 Latin American and 18 West African countries use, or have used, aquatic bushmeat derived from small cetaceans, encompassing at least 34 species. These reports show that in some cases, while the practice began by using bycaught animals they now include directed catches. For example, estimates obtained from landings in local markets suggest that in Ghana there is an increasing trend of annual landings. In the 1990's less than 100 animals were landed, while the latest report estimates that over 1000 annual landings, which occur especially in 3 ports (Apam, Dixcove and Apim), encompassing at least 16 small cetacean species. There are clear cases were these direct catches have potentially expanded to unsustainable levels, as it is the case in Peru and Nigeria, where thousands of animals are intentionally caught every year. In contrast in the Gambia, the available information suggest that the exploitation of small cetaceans comes exclusively from occasional bycatch. The authors suggest that where cetaceans have a market value, data to estimate bycatch obtained from landings might result in underestimation as in some cases the animals are processed onboard and either consumed locally or sold in a black market. Additionally, even when there isn't aquatic bushmeat use, fishermen are sometimes reluctant to report bycatch because dolphin hunting is illegal. This is the case in Cameroon, where also the way the meat is processed, leaves no bony remains, thus bycatch estimates are difficult to assess.

Noting that much of the information reported came from interviews, and that these can be problematic depending on the motivation of the interviewee, the Working Group asked if any market surveys had been conducted by trained personnel, and if not, where might be key places to consider. It was noted that in many of the countries aquatic bushmeat is landed across a wide region, but that in Ghana, Peru and Chile landings can be more centralised in key ports, so these might be the best places to start. It was noted that Van Waerebeek had interviewed a number of fishermen in Western Africa, and that there are numerous studies of terrestrial bushmeat that might help any further survey design.

SC/66B/SM03 presents revised estimates of harbour porpoise (*Phocoena phocoena*) bycatches in two Norwegian coastal gillnet fisheries. In 2013 the Committee considered an estimate of bycatches of harbour porpoises in two coastal gillnet fisheries (for cod and monkfish) in Norway for the period 2006-2006. The average annual bycatch was estimated about 6900 for this period (Bjørge et al. 2013). GAMs were used to calculate the bycatch rate based on data from a monitored segment (about 18 vessels) out of the fleet of about 6000 small vessels operating in the coastal zone, and landings statistics from the Directorate of Fisheries, to extrapolate to entire gillnet fisheries for cod and monkfish. Data collection has continued from the monitored segment of the fleet and estimates of bycatch of harbour porpoise for the entire period 2006-2014 are now available. The Directorate again provided landings statistics for cod and monkfish. In this process it became apparent that the landing statistics first provided for the period 2006-2008 were incorrect. It turned out that the statistics first provided by the Directorate of Fisheries for 2006-2008 contained landings of cod and monkfish taken with all gear types utilised by the coastal fleet of commercial fishing vessels. This included hand jigs, long lines, purse seine, Danish seine and demersal trawl. These are gear types with no or very low bycatches of harbour porpoises and applying the bycatch rate generated from gillnet fisheries for cod and monkfish to entire landings from all gear types severely overestimated the bycatch. Using the same model and correct landings statistics the revised estimate is 3541 (CV 0.10) porpoises annually for 2006-2008.The bycatch for the entire period 2006-2014 was estimated by two methods: model-based approaches and ratio-based approaches. The best model based yielded an annual bycatch estimate of 2946 (CV 0.11) whereas the stratified ratio-based bycatch estimates ranged from 2317 (CV 0.15) to 3375 (CV 0.16) porpoises. These suggest an annual bycatch of around 3,000 harbour porpoises in Norwegian coastal gillnet fisheries.

In response to the concern that this level of bycatch is unsustainable, Bjørge noted that mitigation methods are being explored. He also noted that while there are other fisheries that use gillnet gear, the two net types evaluated in this study are the main types used in Norwegian coastal waters. A preliminary pinger experiment was unsuccessful because the devices used did not survive the conditions of the fishery. Once suitable pingers have been identified it is the hope that

they can be made mandatory for this fishery. The data show harbour porpoise bycatch down to depths of 400m which was deeper than this species was thought to dive but recent telemetry studies from Greenland have also shown dives to this depth. The SCANS-III survey (see SC/66b/SM/22) is expected to provide an abundance estimate for some Norwegian waters but the fjords, where porpoises are also found and a significant portion of these fisheries takes place, remain unsurveyed.

Slooten provided an analysis of reported bycatch of Hector's and Maui dolphin, in national progress reports to the IWC and the Department of Conservation incident database (SC/66b/SM15). The authors noted that these reports account for < 15% of actual (estimated total) bycatch. Estimates of total bycatch in inshore gillnet fisheries are based on an observer programme off Banks Peninsula on the east coast of New Zealand's South Island, during 1997-1998 with an observer coverage of 39-46%. Baird and Bradford (2000) who analysed these observer data recommended increasing observer coverage to 56-83% in order to obtain an estimate of bycatch with a CV of 30% or better. In subsequent years, observer coverage has been lower, rather than higher than the 1997-98 observer programme. In most years and most areas observer coverage nationwide has been < 1% in gillnet and inshore trawl fisheries. Bycatch in gillnet fisheries in New Zealand was estimated at 110-150 Hector's and Maui dolphins during 2000-2006 (Davies et al. 2008). No estimates are available for bycatch of Hector's and Maui dolphins in trawl fisheries.

Slooten concluded that there is a need for observer programmes on gillnet and trawling vessels off the west and south coast of the South Island, with sufficient observer coverage to obtain catch rate estimates with a CV of 30% or better. Dolphin densities in these areas are sufficiently high to expect statistically robust estimates of bycatch if observer coverage is at least 50%. This could include monitoring via on-board video cameras if careful attention is paid to potential sources of bias. These include fishermen turning cameras off, backing their nets down in order to increase the rate of drop out, reporting dead dolphins as 'released alive' and failing to report Hector's dolphin bycatch even when the vessel is carrying a camera (McElderry 2007; MPI 2013). Human observers will remain essential in order to carry out random checks, estimate the drop out rate and the proportion and condition of dolphins released alive. The population density of Maui dolphins off the North Island west coast is too low for robust estimates of bycatch to be attainable. Finally, Slooten noted her view that for Maui dolphins the urgent priority is to implement effective protection measures, rather than to engage in further research.

Peltier et al. (2016) describes an attempt to estimate total by-catch of common dolphins (*Delphinus delphis*) in the Bay of Biscay and western English Channel from the analysis of long-term stranding data sets. The aim of this work was to compare bycatch estimates of common dolphins provided by observer programmes in France and UK national reports and those inferred from stranding data, through two approaches. Bycatch was estimated from stranding data, by correcting numbers according to likely carcass drift and buoyancy. The results highlighted the southern Bay of Biscay and, to a lesser degree, the western Channel as areas with high levels of common dolphin by-catch. Estimates from strandings suggested levels, ranging from 3650 [2250–7000] to 4700 [3850–5750] dolphins year^{-1}, depending on methodological choices. These estimates are about one order of magnitude higher than figures produced by the compulsory observer programmes. The main advantages of stranding data is the large spatial and temporal scales encompassed and its potential to document the cumulative effect of all fisheries irrespective of fishing gear, target species and vessel size. These results suggest the need to continually re-assess the sustainability of such removals, to conduct comparative analyses with the findings from the by-catch monitoring programme, and to consider how this approach might be applicable to other study areas.

It was noted that these results underlined the potential importance of long term stranding monitoring programs and that the consideration of these data should be included in future assessments of this species in this region. Others raised questions on the robustness of the modelling results, and in particular whether an adequate number of simulations and trials had been conducted such that the results are robust enough to use for management advice. This was of particular concern because of the comparison of multiple estimates in constructing the model.

Ridoux referred to the source paper and noted that there had been assessment of the impact of changing a variety of the factors in the model. Different sensitivity models were used to examine the sensitivity of the results to individual parameters but large difference were not found. The Working Group **agreed** to encourage further development and consideration of these methods.

A mark-recapture approach was used to estimate past bycatch of the endangered franciscana dolphin (*Pontoporia blainvillei*) from time series of stranded carcasses in southern Brazil (Prado *et al.* 2103). The authors estimated the probability of a franciscana incidentally killed by the coastal gillnet fisheries to wash ashore and used this as a correction factor to back-calculate fishing related mortality from a dataset of carcasses collected between 1979 and 1998 using drift data from 145 franciscana carcasses which were tagged and returned to the sea. They found that only a fraction of the total bycatch ends up ashore. Generalised Linear Models were used to model the probability of a tagged franciscana reaching the shore as a function of the covariates wave period, wind direction and intensity, distance from coast and the target species of the fishery. The target species of the fishery had a significant effect on the stranding probability. The corrected estimate of franciscana mortality was approximately 10 times higher than previous estimates based solely on stranding data. This novel mark-recapture approach provides a useful correction factor to reduce the bias in incidental mortality estimates derived from stranding data.

In discussion some concerns were raised about the applicability of the hind-cast method to fisheries that have been variable over the years. It was suggested that the method may be more applicable to estimate recent bycatch but the historical time series may be biased by changes in the fishery. It was also noted that there are other fisheries that operate close to shore in the region that were not taken into account in bycatch or carcass recovery estimates.

In discussion of this and the study by Peltier et al. (2016) it was agreed that there is a need for further evaluation of methods using strandings to estimate bycatch, with a case by case exploration of all possible sources of bias. The Working Group encouraged further development and consideration of these methods and noted the value of long-term stranding schemes and their potential to assist where observer coverage is low or non-existent. The Committee had previously concluded that independent observer programs were the best way to estimate bycatch. It was **agreed** that studies such as these on monitoring bycatch through stranding data should complement observer programs and not be seen as potential replacements. The approaches together provide a means of ground-truthing each other. There were different views expressed about the effectiveness of the observer monitoring requirements under EC Regulation 812/2004. Although the required schemes are not ideal they are the only requirements within the EU dealing directly with cetacean bycatch.

Following these discussions, some general issues were identified regarding estimating bycatch where further consideration would be valuable with particular relevance to estimating bycatch of small cetaceans. The Working Group encouraged papers on the following topics at future meetings;

(a) Consideration of observer programmes to estimate bycatch including the use of new technologies such as video monitoring and required coverage.
(b) Consideration of the role of fisheries data collection schemes in bycatch data collection (e.g. the Data Collection Framework established by the European Commission).
(c) Use of strandings data for quantitative estimation of bycatch including evaluation of different modelling approaches.

Park noted that high levels of bycatch of finless porpoise have been identified in the Yellow Sea, and that more than 80% of this is attributed to the dominant stow net fishery in the area (Kim *et al* 2013). The fishery currently uses an excluder device for jelly fish in the summer months, the use of which also correlates with much lower finless porpoise bycatch. Since March, 2016 the Cetacean Research Institute, Republic of Korea, has been working with fishers to run trials of several variations of the excluder device, in order to confirm their efficacy for preventing finless porpoise bycatch. Depending on the outcome of the trials, the Ministry of Oceans and Fisheries may require the installation of a successful design. The working group welcomed this study and encouraged further development and looked forward to hearing relevant results at IWC SC/67a.

7.1 General issues related to cetacean bycatch and entanglement

SC/66b/HIM04 identified a need to increase the rate of progress in reducing the scale and impacts of cetacean bycatch on both individuals and populations in a wide range of fisheries globally. The authors suggested development of a global framework in addition to the establishment of effective regional agreements that help to advocate and enforce regional and national implementation of bycatch monitoring and mitigation. Recommendations were made to i) develop a joint task force under the leadership of UNEP or the FAO or some other competent international body (e.g. IWC or CMS); ii) develop a global database on cetacean bycatch; iii) organise a global symposium/conference dedicated to cetacean bycatch resolution, and development of a resulting FAO-mandated International Plan of Action; and, iv) the establishment of more well-managed protected areas developed specifically for cetaceans that include monitoring and fisheries management. It was suggested that the IWC could provide technical advice to such an initiative and, more generally, should now further elaborate its role in this pressing conservation matter through its Scientific and Conservation Committees.

The Working Group welcomed the information and in discussion it was suggested that the issue of bycatch is serious and extensive and the IWC cannot fully address it alone. There is a need for greater collaboration with individual nations and other IGOs including FAO, CMS, CCAMLR, ACCOBAMS and ASCOBANS. Recent international work to mitigate the bycatch of other species (e.g. seabirds, sharks, turtles) might provide useful models of cooperation. It was suggested that the IWC SC should seek collaboration with other experts who have complementary knowledge (e.g. fisheries managers, fishing gear engineers).

It was **agreed** to establish an intersessional correspondence group to consider the potential development of a Conservation Management Plan on bycatch and entanglement. This group will take into account relevant ongoing work in the Scientific Committee and also that ongoing in other relevant international bodies. This will assist in the development of an outline CMP to be considered by the Commission as requested at the joint meeting of the Scientific Committee and Conservation Committee in 2015. Simmonds agreed to convene the group of Currey, Double, Leaper, Mattila, Panigada, Ritter, Slooten, and Wimmer.

8. SHIP STRIKES

8.1 Progress on the global database

The IWC provides funds for two part time data coordinators for the IWC ship strike database. The activities carried out in the past 12 months are described in SC/66b/HIM02. These include a variety of outreach actions including follow-up

with potential data providers. Increasing the user friendliness and technical functioning of the database were a major component of the work. This includes an improved review process for the Data Review Group and bulk upload facilities. As of 30 May 2016, the database held a total of 1151 incidents. 51 new reports have been submitted since May 2015 including some near miss events. A number of entries were realised by the data co-ordinators, but an increasing number also stemmed from the public, including scientists working in the field. Contacts with the ACCOBAMS and the Pelagos Sanctuary Executive Secretariats as well as ASCOBANS and other international organisations have been maintained to discuss possible synergies in assessing and mitigating ship strikes. A Power Point presentation on ship strikes and the role of the IWC and the IWC info banner were presented at three international conferences and two expert workshops.

In response to a question about providing details of those who report strikes to the database, it was explained that the IWC does not have permission from the submitter to share their personal information with anyone outside the IWC secretariat. Current anonymity is due to rulings under UK and EU privacy legislation about sharing personally identifiable information, particularly with those outside the EU. The Secretariat is seeking clarification as to whether or how these rules apply. In the meantime, the data coordinators can communicate with the reporting individuals directly via the portal.

Panigada noted that the entry and review of new data since 2010 was the highest priority, but was proving more difficult than anticipated. Panigada and Ritter indicated that in the past about half their time had been on outreach and half on data management. With an anticipated decrease in time spent conducting outreach, there is scope to increase the time allocated to data issues.

The Ship Strike Data Review Group (DRG) will continue to classify cases following the categories approved during SC65a in 2013. To further improve the data review process, two recommendations were made. Firstly, that the ship strike data coordinators preview all records, in order to eliminate data deficient and obvious cases, prior to sending them to the DRG, and secondly, that the DRG seek more members with expertise in veterinary diagnosis, biology and practical experience investigating ship strikes at sea and strandings. The Working Group identified potential members (e.g. Moore, Gulland, Jepsen, Marcondes, Kaufman, Mazzariol, Fernandez, Van der Hoop and Weinrich) and K.Long indicated that the USA would suggest some members from its internal ship strike review teams. In further discussion, it was also agreed that, while bulk data uploaded from Australia would need to be reviewed (e.g. by the data coordinators and DRG), the data provided by the USA and possibly others, would be considered sufficiently reviewed by their established internal review process. In addition, it was agreed that, with regard to existing records, review would begin with current records and work backwards through time, and that the data coordinators would cross-reference records with those in National Progress Reports for consistency. With regard to new, incoming reports, it was noted that over all regions, the database is currently receiving reports at a rate of 10's rather than 100'ws per year.

The 2014 joint IWC/UNEP-SPAW workshop on ship strikes (Panama, Paper IWC/65/CCRep01) had recommended that the countries of the Wider Caribbean Region and Pacific coast of South America, through Commission of the South Pacific, conduct outreach to improve reporting of ship strikes to the IWC database. Reports have not apparently increased from those areas and hence it was suggested that, if the IWC enters into a proposed MOU with UNEP-SPAW in the region, that it might be helpful to add specific actions (e.g. outreach and reporting) to encourage the reporting of ship strikes from the region.

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

Collation of Australian vessel strike reports from historical data sources and an exploratory analysis are described in SC/66b/HIM05. This updated search uncovered 65 new and previously unreported records, which increased Australian records to approximately 17% of worldwide historical reports. This does not necessarily reflect the actual proportion of global vessel strikes that have occurred in Australia, as strike data have inherent reporting biases and unknown geographic coverage. However, the additional data collected in this study does challenge the notion that historically Australia has had low numbers of vessel strikes relative to the rest of the world. Interestingly, the exploratory analysis showed a distinct absence of reports from large vessel in modern data compared to historical records.

The group agreed with the authors' caveats about interpreting historical data that comes from a wide variety of sources. As one example it was noted that many collisions involving sailing yachts are attributed to whales even if a whale is not seen but some of these reports may actually involve large debris, or even other large fauna (e.g. large sharks and ocean sunfish). In discussion, it was noted that determinations of 'harmed' or 'not harmed' can be extremely variable and even misleading, due to both what is or is not actually seen. Given the subjectivity involved in making a determination, these reports must be viewed cautiously. Possible explanations for the change in reported length of vessels involved in collisions were discussed. It was suggested that the proportion of reports of vessel strikes from stranded animals where the vessel is not known, has increased in modern times. Crews on large modern vessels are also unlikely to be aware of collisions. The group commended the authors and noted that their considerable effort had uncovered significant new data, and it was **recommended** that this type of effort be carried out in other areas where it might produce similarly productive results.

SC/66b/HIM10 examines co-occurrence of shipping with Arabian Sea humpback whale habitat including recent satellite telemetry studies and habitat density mapping which have provided greater resolution on habitat use. Historic whaling data suggest that several species may co-occur with current high densities of shipping. The review suggests a need for risk assessment work on humpback whale and ship co-occurrence in Oman, in addition to undertaking a wider spatial

assessment of the region to at least determine priority areas for study. A preliminary review highlights co-occurrence of high-density shipping and critical Arabian Sea humpback whale habitat in Oman, suggesting the need for a more detailed risk assessment in specified locations. There is a paucity of data on other species in the NWIO. However, prompting suggestion for a wider spatial assessment of the region to at least determine priority areas for study. Given overlapping habitat use between species in certain areas, a multi-species approach to reviewing mitigation options is recommended. The study also considered some mitigation measures, including preliminary calculations of impacts on shipping schedules and fuel consumption. Results suggest that cost savings to shipping companies might apply and therefore that mitigation might be a realistic expectation.

Previously reported (SC/66a/SH23) work at Port of Duqm is ongoing in Oman and addresses practical measures to reduce the risk of ship strikes, including consideration of approach channel alignment, vessel speed reduction and an active ship-to-port whale detection, reporting and response system (Baldwin *et al*., 2015). The possibility of expanding this work to incorporate other ports in the region, which may then act as hubs of information and mitigation, is under investigation.

The Working Group welcomed the work presented in SC/66b/HIM10, as it attempted to extrapolate to a large area with significant ship traffic. It was noted that vessel density expressed in terms of distance travelled per unit area per unit time (e.g. units of $km^{-1}year^{-1}$) are likely a better indicator of risk compared to numbers of vessels per unit area. This approach has been used in other studies (e.g Priyadarshana *et al*., 2015; SC/66b/HIM06). It was noted that slower steaming speeds, often implemented to save costs, also reduce ship strike risk with the added benefit of likely reduced ship noise (Leaper et al., 2014). Baldwin noted that SC/66b/SH09 reports on data collected on ship noise in the area. He further noted that the Port of Duqm has issued guidelines which request ships to slow down to 10 knots as they enter the approach to the port from 30nm offshore. It was suggested that a study evaluating compliance with this request would be valuable.

8.3 Evaluating what can be learnt from 'near miss' events and how to define these

The Committee has previously discussed how consideration of 'near miss' events (close encounters between whales and vessels that do not involve physical contact) might help understand ship strike risk. However, there has been no general definition for such near misses. SC/66b/HIM03 discusses the advantages of having a clear definition, including comparability between studies trying to assess collision risk in different areas and with different vessel types and cetacean species. A large number of variables affect the occurrence of near misses (e.g. vessel speed and size, safety considerations, species, age class and behaviour of the animal. The authors suggested making a distinction between cases where either the vessel or the whale made an avoidance manoeuvre which was assumed to have averted a collision ('near miss') from situations where no such reaction has taken place ('near collision'). They suggested a 'near miss' be defined according to the closest point of approach (CPA) between the vessel and the whale expressed as a proportion of the vessel length (possibly using a value of 1.5) and a 'near collision' be defined if the CPA was less than a fixed distance (possibly 50 or 80m).

SC/66b/HIM08 also attempted to standardise the definition and documentation of 'near miss' events. The minimum distance between vessel and whale were used to define a single category of 'near miss'. The authors make specific recommendations regarding controllable and uncontrollable variables that should be recorded and suggested that defining and documenting near misses in a repeatable, standardised manner could allow more accurate assessment of collision risk between vessels and cetacean species worldwide.

It was noted that reporting 'near miss' data is currently an option in the ship strike database. It is one of the first questions, but all data collected is the same as that for an actual strike. Because there are more 'near misses' than actual strikes in most areas, it is understood that gathering these data could help expand the sample size and therefore power for certain analyses. However, given the issues and slow pace of dealing solely with strikes, the group **recommended** that addition of near misses should not currently be encouraged in the ship strike database, but noted that it should review this decision at SC/67a when it is anticipated that a five year study of near misses in Hawaii will be presented.

8.4 Progress on previous recommendations

(i) Identified high risk areas

NORTHERN INDIAN OCEAN BLUE WHALES

The Committee has previously identified an area of overlap between high densities of blue whales and the main Indian Ocean shipping route off southern Sri Lanka as posing a particularly high risk of ship strikes. In 2015 it was agreed that the most effective advice on routing options and estimates of the associated risk reduction could be achieved by combining the results of two studies (Priyadarshana *et al*., 2015) and (de Vos *et al.* 2015) which provided complementary information that could be used to evaluate the implications of different potential routing schemes.

The authors of these studies had considered their combined results and it was agreed that these were all consistent enough to support a proposal to IMO to move the shipping lanes if Sri Lanka wished to do this. Priyadarshana *et al.* (2015) had considered the case of a southward shift in the shipping lanes of 15nm. This appears to be the minimum shift that is likely to be effective, but shifting even further south would likely be beneficial if this would be accepted. There will need to be a discussion of the trade-off between reduction in risk versus increased passage distance for shipping before any specific proposals are developed.

In 2015 the Committee had recommended that Brownell, de Vos and Leaper work with the Secretariat to maintain the dialogue with the relevant Sri Lankan authorities. A number of meetings had taken place in 2016 including with the Minister of Sustainable Development and Wildlife. The Minister of Ports and Shipping had also established a committee within Sri Lanka to look further at the blue whale ship strike problem off Dondra Head and consider measures that may be taken. IWC had offered any information that might help with the consideration of the issue by that committee.

Brownell updated the group on an analysis undertaken with de Vos to review all stranding and possible ship strike records from Sri Lanka. Beyond the records reported in de Vos (2013) it had been difficult to attribute ship strike as a definite cause of death to many cases. The group encouraged the results of these further investigation to be presented at IWC SC67a

HELLENIC TRENCH, GREECE, SPERM WHALES

Ship strikes are recognised as a significant threat to the eastern sub-population of sperm whales in the Mediterranean. The Committee had previously considered an analysis of sperm whale and shipping distribution patterns in the Hellenic Trench, Greece and the potential for small changes in shipping routes to dramatically reduce risk. Last year, the Committee recommended that the Secretariat worked with interested parties (including Greece, ACCOBAMS and the shipping industry) and now move forward with Greece in order to develop a proposal for routing measures in accordance with IMO guidelines. The Secretary had written to Mr Kourouniotis the head of the Greek delegation to the IMO Maritime Safety Committee but had not yet received a reply. Panigada noted that ACCOBAMS also supports developing a ship routing proposal for this area. The group recommended that the Secretariat continue to engage on this issue with the Ministry of Mercantile Marine in Greece.

CANARY ISLANDS, SPERM WHALES

In 2015, the Committee endorsed number of suggestions for reducing risk to sperm whales around the Canary Islands from ship strikes. Ritter reported that members of the Canary Islands Working Group are conducting surveys, evaluating thermal imaging techniques for blow detection and are developing habitat use and risk models. It is hoped that results of these studies will be available next year.

(ii) Co-operation with IMO

The IWC has been working towards enhanced cooperation with IMO. This included submission of a document summarising the IWC's work on ship strikes submitted to the IMO Marine Environment Protection Committee (MEPC). The document titled 'Information on recent outcomes regarding minimising ship strikes to cetaceans' was submitted to MEPC 69 in April 2016 (MEPC 60/10/3, SC/66b/ForInfo28). The MEPC 69 meeting was attended by Ferriss (Secretariat) and Leaper (Convenor of HIM). The paper drew attention to work by the IWC on ship strikes including identification of high risk areas and potential mitigation measures and the collection of data through the IWC ship strike database. The presentation was widely welcomed with supportive comments from a number of countries, the World Shipping Council and others. Following discussion, the MEPC noted the information provided by the IWC and encouraged Member Governments to assist in making mariners and authorities aware of the ship strike issue, including reporting any incidents to the IWC Ship Strike Database in order to improve understanding of the issue and inform mitigation measures. The MEPC also noted that minor routeing changes in high risk areas could lead to substantial reduction in strikes and was possibly the best measure of reducing ship strikes. There had also been a meeting between the IWC and IMO Secretariats in January 2016. It was a very positive meeting and the IMO were supportive of further engagement to address threats from shipping of particular relevance to cetaceans.

The Working Group welcomed this positive engagement and **recommended** that the IWC Secretariat and members of the Committee continue to engage with the IMO Secretariat and relevant IMO committees to bring the work of the IWC to their attention as appropriate.

9. TIME SERIES OF NON-DELIBERATE HUMAN INDUCED MORTALITY ESTIMATES FOR USE IN ASSESSMENTS

An intersessional working group chaired by Double had made considerable progress in populating a table of 56 large whale populations and assessed the available sources data to classify (i) risk of ship strikes and entanglement and (ii) reports of ship strikes and entanglements including time series where these are available. It had been hoped to complete this table at SC/66b but there were still some key regional experts who the group wanted to approach. Given this, the group (Double, Leaper, Mattila, Ritter) agreed to continue to work intersessionally and report back to SC67a.

10. WORK PLAN AND BUDGET REQUESTS

The work plan will continue to maintain a focus on assessing and mitigating bycatch, entanglement and ship strikes. Consideration of mitigation measures will include collaboration with Commission initiatives.

The work plan will include the following.

(1) Review the information submitted by member countries in their National Progress Reports and evaluate its adequacy for the intended uses.
(2) Estimation of risks and mortality from ship strikes:

(a) continuing development and use of the international database of ship strikes; and
(b) review progress towards assessing and mitigating ship strikes in identified high risk areas.

(3) Estimation of rates of entanglement, risks of entanglement and mortality for large whales:
(a) developing a global database from disentanglement activities conducted by members of the IWC network.

(4) Estimation of rates of bycatch, risks of, and mortality for small cetaceans:
(a) consideration of observer programmes to estimate bycatch including the use of new technologies such as video monitoring and required coverage;
(b) consideration of the role of fisheries data collection schemes in bycatch data collection (e.g. the Data Collection Framework established by the European Commission); and
(c) use of strandings data for quantitative estimation of bycatch including evaluation of different modelling approaches.

(5) Review progress bycatch and entanglement mitigation:
(a) review progress on mitigation measures for preventing large whale entanglement including developing a summary table of measures; and
(b) review the report of the intersessional group working on the potential development of a CMP on bycatch and entanglement.

(6) Identify sources of information that will inform time series on entanglement and ship strike affecting large whale populations.

Table 7
Summary of the work plan for non-deliberate human-induced mortality of cetaceans (HIM)

Item	Intersessional 2016/17	2017 Annual Meeting (SC/67a)	Intersessional 2017/18	2018 Annual meeting
7.1.2		Estimation of rates of entanglement, risks of entanglement and mortality for large whales		Estimation of rates of entanglement, risks of entanglement and mortality for large whales
7.1.2 , 7.1.4	Committee working group on streamlining data entry within National Progress reports	Review the information submitted by member countries in their National Progress Reports and evaluate its adequacy for the intended uses		
7.1.3		Review progress on mitigation measures for preventing large whale entanglement including developing a summary table of measures.		Review progress on mitigation measures for preventing large whale entanglement
7.1.7	Correspondence group to consider the potential development of a Conservation Management Plan on bycatch and entanglement	Review the report of the intersessional group		
7.1.5	Develop a global database from disentanglement activities conducted by members of the IWC network	Review progress on database		
7.2.1	Ongoing data entry into Ship Strike Database and validation of records by Data Review Group	Continuing development and use of the international database of ship strikes	Ongoing data entry into Ship Strike Database and validation of records by Data Review Group	Continuing development and use of the international database of ship strikes
7.2.2	Secretariat to maintain the dialogue with the relevant Sri Lankan authorities Secretariat continue to engage on the issue of sperm whale ship strikes in the Hellenic Trench, with the Ministry of Mercantile Marine in Greece	Review progress towards assessing and mitigating ship strikes in identified high risk areas		Review progress towards assessing and mitigating ship strikes in identified high risk areas
7.2.3	IWC Secretariat and members of the Committee continue to engage with the IMO Secretariat and relevant IMO committees			
7.3		Estimation of rates of bycatch, risks of, and mortality for small cetaceans. (a) Consideration of observer programmes to estimate bycatch including the use of new technologies such as video monitoring and required coverage (b) Consideration of the role of fisheries data collection schemes in bycatch data collection (e.g. the Data Collection Framework established by the European Commission) (c) Use of strandings data for quantitative estimation of bycatch including evaluation of different modelling approaches		Estimation of rates of bycatch, risks of, and mortality for small cetaceans.
7.4	Correspondence group to identify sources of information that will inform time series on entanglement and ship strike affecting large whale populations	Review summary table		

Table 3.
Summary of budget requests for the 2017-2018 period. For explanation and details of each project see text.

SC/66b RP no.	Title	Relevance to which sub-committee(s)?	2017 (£)	2018 (£)
	Design and construction of an initial global entanglement database	HIM	8000	
	Ship strike database coordinators	HIM	10000	10000
Total request				**28000**

11. ADOPTION OF THE REPORT

The report was adopted at 16:35 15/06/2016

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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 (HIM01-09, SH04, SM 01, SM 02, SM 03, SM 09, SM 15, BRG 04, E 13, FI 19, FI 28, FI 49)
6. Entanglement
   - 6.1. Progress on including information in National Progress Reports
   - 6.2. Collaboration with Commission initiatives on entanglement, including consideration of mitigation measures
     - (i) Outcomes of the workshop co-sponsored by IWC on Global Assessment of Large Whale Entanglement and Bycatch Reduction in Fishing and Aquaculture Gear
     - (ii) Evaluation of mitigation measures (HIM 06, HIM 07, HIM 09)
   - 6.3. Estimation of rates of entanglement, risks of entanglement and mortality (HIM 01, SH 04, BRG 04, E 13)
   - 6.4. Proposal for entanglement database (HIM 04)
7. Approaches for the assessment of the bycatch issue in small cetaceans. Joint session with SM (SM 03, SM 09, SM 15, ForInfo 19, ForInfo 49)
8. Ship strikes
   - 8.1 Progress on the global database (HIM 02)
   - 8.2 Estimating rates of ship strikes, risk of ship strikes and mortality (HIM 05)
   - 8.3 Evaluating what can be learnt from 'near miss' events and how to define these (HIM 03, HIM 08).
   - 8.4 Progress on previous recommendations
     - (i) Identified high risk areas
     - (ii) Co-operation with IMO (ForInfo 28)
     - (iii) Other
9. Time series of non-deliberate human induced mortality estimates for use in assessments (Double WP)
10. Work plan and budget requests
11. Adoption of the report

Appendix 2

REPORT OF SMALL GROUP DISCUSSION OF POTENTIAL IWC FACILITATED GLOBAL ENTANGLEMENT DATABASE

May 27, 2016, Portsmouth, MA, USA

Donovan (Chair), Mattila (Rapporteur), Leaper, Lyman, McClellan-Press, Morin, Smith, Sohn

Donovan welcomed the group and thanked them for taking time out to attend the one day meeting. He reminded them that the meeting was proposed at the most recent IWC workshop on entanglement held in Provincetown, MA, US in 2015 (IWC/66/WK-WI-Rep01), because during that workshop there was not enough time to discuss in full the complexities of entanglement data, or the various potential options for the IWC to facilitate a way forward (e.g. toward better global data on cetacean bycatch and entanglement). In preparation for this working meeting, the group reviewed the following:

- Relevant background materials and text from the Provincetown 2015 workshop on entanglement databases
- A list of current bycatch/entanglement data fields in National Progress Reports
- A list of current data fields from the consensus field form developed in Provincetown, 2011 (Annex D)

The Group began by reviewing, in more detail than previously possible, several existing entanglement databases.

McClellan-Press provided an overview of the work that she had undertaken for the Consortium for Wildlife Bycatch Reduction (www.bycatch.org), in preparation for a workshop on cetacean bycatch in gillnets held in 2011. The original intent was to search a wide variety of sources (including both peer-reviewed and grey literature, National Progress Reports to the IWC, US stock assessments and similar reports from other countries, fisheries observer reports, and stranding data). Using keywords related to bycatch, catch, gear type and species she amassed a collection of approximately 1,000 publications and reports with relevant information (including some translated from non-English originals). The time period selected for inclusion in a summary database was 1990-2010. Given the wide variety and quality of the bycatch reports, the fields in the database needed to be fairly general in order to allow comparison and were primarily limited to: date, species, gear type, target fish, mortality and/or injury. While FAO gear type descriptions were used for many reports, some gear information was non-standard or vague and needed some interpretation. Also, geographic locations were not always exact, and could even be wildly off (e.g. foreign vessel catching cetaceans in another country), and even the total numbers of bycatch in a single report might not be certain. The data are organised in an Excel spreadsheet and housed at the Bycatch Consortium. There was an attempt to update the records of large whales through 2015, for the 2016 NOAA/NEAq/IWC prevention workshop.

The group thanked McClellan-Press for her summary and commended her on the considerable effort expended in finding and summarising such a wide variety of sources of information. But it was also agreed that, as has been the experience with the IWC ship strike database, there are major difficulties and caveats involved in trying to compare data from such extremely diverse, non-standard sources.

Morin then provided a field by field explanation of the web based database developed for NOAA Fisheries' Northeast Region. It includes over 150 fields and is organised in a 'modular' fashion that allows for input on any one particular report by different teams (e.g. entanglement responders, stranding responders, gear investigators, event outcome deciders). Entries in the database are organised by the 'individual' animal. In many instances the individual animal may be a photo-identified individual from an existing long-term research catalog. But if it is not, it is identified by the type of gear and entanglement configuration. If two unique reports are later determined to be of the same individual animal, the records can be merged, or unmerged if they prove to be different individuals. The database can also flag records as 'possible same (or different) animal' and 'suspected entanglement' if there is not enough evidence to make a conclusive determination. No information is deleted when changes are made, so there is an historical record of all entries and changes.

The secure database is Oracle based, and is set up to handle (and archive) all information from an entanglement event (including associated reports), but solutions must be found for massive image and video files, as they are too big to be embedded. The current best solution appears to be to store the files in linked databases like 'Lightroom'. The NOAA Fisheries database can import (and export) data, and is designed in such a way that historical records could be entered, if desired. It can also handle a 'multiple animal entanglement' and it can lump animals into one event. It also has an 'atomic' search function which can search all fields for any values. The database was designed to be able to handle a maximum number of fields but they are grouped (and color-coded) by broad categories for ease of data entry.

Lyman provided an overview of the database that he designed for 'distressed' animal events (e.g. entanglement and ship strike) in Hawaii and Alaska. It is constructed in 'FileMaker Pro' and there are many similarities in approach and data fields with the NOAA Fisheries NE database, as Lyman assisted in early design discussions with NOAA Fisheries about their database. As with that database, records are organised by the individual animal. This approach allows for one entanglement to be reported many times (under one case), and it can have numerous 'events' (e.g. changes in the entanglement, attempted interventions, various outcomes etc.). One of the current advantages of the FileMaker Pro

platform is that Lyman has been able to relatively easily develop user interfaces for data entry on the web and/or as apps on an iPad or Android mobile device. This facilitates data entry in the field while the event is ongoing, with the added benefit of recording GPS data in real time. The database also uses 'Lightroom' for storing associated large images or video. Lyman noted that FileMaker Pro is easier to work with than Microsoft Access and is less expensive and time consuming/specialised than Oracle. Morin and Smith mentioned that they were investigating field entry apps for their database, but agreed that Oracle is more costly to develop.

In discussion the group noted that both Mexico's response network (RABEN) and Lyman's database use 'Wordpress', and it was noted that this feature might be easily adapted by non-English speakers, to design data entry interfaces in their own language.

Sohn provided an overview of the South Korean entanglement database. It is primarily based on the information collected in the marine police 'certificate of death' that must be filled out by the fisher and attending police officer, when a whale is bycaught. This includes basic information such as: species, gear, location, entanglement description, disposition of DNA sample.etc. This information is gathered by the marine police at the dock, and the physical forms are archived by the police. CRI transcribes the data into an Excel spreadsheet for analyses.

The group agreed that, given the serious difficulties and limitations outlined by McClellan-Press, who devoted two years as a student to compiling the sources and information in the Bycatch Consortium database, answering specific questions about bycaught species (especially large whale numbers, fisheries and regions) with any degree of confidence would likely be impossible using historic information. Given the errors and difficulties that each country faces while obtaining and vetting new entanglement information (especially that from the untrained public), the group agreed that a global, public web entry database, would be very unlikely to produce useable data in the short term.

Therefore, the group recommended that, for the IWC to facilitate the collection of useful information about large whale entanglement through the establishment of an international database, doing so through a step by step process was most likely to succeed. As a first priority the group recommends the development of a database for the IWC's Global Whale Entanglement Response Network (GWERN). This could provide a resource for many of the new network members who do not currently have existing data handling capabilities, and it should be designed in such a way that networks with existing databases could export their relevant data.

As such, the group agreed that the initial objectives of the database would be:

1. To aid existing or newly formed entanglement response networks to collect relevant data, and to act as an archive for those data.
2. To gather information that would be helpful to advancing entanglement prevention (e.g. recognising the importance of these data to prevention initiatives).

The group agreed that the database could be constructed in a modular fashion, likely beginning with the data currently recommended for collection in GWERN's consensus field data form (IWC/66/WK-WI-Rep01). The group reviewed the data fields in the form and recommended that a few new and relevant fields be added (in red, Annex A). The module should be designed with field entry using GPS linked mobile devices in mind, and should be organised around the 'individual animal' approach used in the existing network databases. Associated database tools should be able to help identify possible duplicate entries, and be able to handle uncertainty in linking possible duplicates.

When this module is developed, tested and used, then other 'modules' to the database could be added, such as the following:

- Initial report information (e.g. what information did the network responders collect from the initial observer?).
- Follow up information (e.g. what was the outcome for the whale, and what information did a 'forensic' examination of the gear removed provide?).
- Links to the responding network's web site, along with related network documents (e.g. de-briefs, reports…etc.) and associated media coverage.
- Related stranding and/or necropsy data.

If, as anticipated by the group, building this initial database is successful, then the database could be expanded in the future to include other modules and sources of data. Hence the initial structure needs to be careful designed to allow for future expansion.