

Report of the Fourth Workshop on Large Whale Entanglement Issues

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1. INTRODUCTORY ITEMS

The Workshop was held at the Center for Coastal Studies, Provincetown, MA (USA) from 5-7 June 2018. The list of participants is given as Annex A.

1.1 Opening remarks

Mattila (IWC technical advisor for human impact reduction) welcomed all attendees. Landry (Director of marine mammal entanglement response, Center for Coastal Studies -CCS) welcomed everyone to the Center and introduced the rest of the CSS team. Donovan (IWC Secretariat Head of Science) welcomed everyone on behalf of the IWC. The Global Whale Entanglement Response Network (GWERN) had grown into one of the most successful initiatives of the IWC and he thanked Mattila for all of his work. He hoped the workshop would facilitate the continued sharing of experience and development of GWERN.

1.2 Chair and Rapporteurs

Donovan was elected as Chair. Smith and Wilkin were appointed as rapporteurs. Donovan and Mattila assisted the rapporteurs in the production of the final report. Final editing was undertaken by Donovan.

1.3 Review and adopt Agenda and documents

The adopted agenda is given as Annex B and the list of documents as Annex C.

1.4 In memoriam

The Workshop paid tribute to Doug Coughran (Australia) who had recently passed away and reflected on his enormous contribution to the work of the GWERN and to whale disentanglement efforts around the world. The Workshop also remembered Joe Howlett (Canada) for his contribution to the Campobello Whale Rescue Team. A moment of silence was shared in remembrance.

2. AWARENESS AND CAPACITY BUILDING SINCE 2015

2.1 Overviews from newly trained national networks

2.1.1 Chile

PRESENTATION

Ulloa gave a presentation on the development of the large whale entanglement network in Chile. In 2013, the Permanent Commission for the South Pacific (CPPS) invited Sernapesca (the Fisheries Service of Chile) to participate in the IWC Large Whale Entanglement (LWE) Workshop in Salinas-Ecuador. In 2015, Mattila, with the support of the Cetacean Conservation Centre of Chile (CCC-Chile) and Sernapesca, delivered the first IWC-LWE workshop in Valparaíso. After the 2015 workshop, Sernapesca consolidated the LWE network in Chile by training new teams and providing the appropriate kits of tools for an efficient and safe response. In 2017, a second IWC-LWE workshop was carried out in Arica, Chile. In the meantime, advanced training was provided in Provincetown (2016) by IWC and CCS, and in 2017 by IFAW, to reinforce regional skills and response capacity. Simultaneously, IWC Large Whale Entanglement Response Training started in Chile with logistic support from the Chilean Navy. Participants included Sernapesca, artisanal fishermen and NGOs. Between 2015 and 2017, full training of eight new teams was completed and nine teams are now operational along the Chilean coastline. Each team is fully equipped with the IWC standard kits of tools. There are more teams to train, but due to budget cuts in all public institutions, this has been postponed until the situation stabilises. The same teams also provide the structure for the Chilean stranding network. Challenges to operation of the network can be grouped into three categories:

- (1) *Vague first notification* - this occurs especially when an entangled individual is seen but the reporters return to shore before reporting the event, making it very difficult to find the animal afterwards;
- (2) *Conduct of easy divers* – this occurs especially in the southern Patagonia area of Chile, where there is a group of divers that are known to be taking their own action and entering the water; and
- (3) *Action by artisanal fishermen* – this occurs when artisanal fishermen encounter an entanglement involving their own gear and, fearing prosecution, rush to cut the animal free in order to avoid being involved in damaging a protected species.

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Chilean statistics show a sustained (threefold) increase in strandings from 2014 to 2017. This motivated the creation of the first official stranding network to facilitate operational procedures along the country. In this context, a national stranding network- an operational scheme involving official and non- government institutions- was proposed to ensure the operational deployment of resources when needed anywhere in the country. This includes the LWE network. Ulloa reported that the Governments of Chile and Peru, under the IWC's Eastern South Pacific Southern Right Whale CMP, are planning, in partnership with the IWC, to deliver a combined stranding and entanglement response training that will facilitate the accomplishment of one of the most critical CMP actions. Only Sernapesca is currently authorised by law to respond to strandings and entanglements and further development of the network will expand the individuals and organisations that are authorised and trained to respond.

DISCUSSION AND CONCLUSION

The Workshop:

- (1) **thanks** Ulloa for the informative presentation on the progress being made in Chile, **commends** Chile for their efforts in developing entanglement and stranding response along such a long coastline and **welcomes** the advances being made in its network;
- (2) **recognises** the challenges in developing and maintaining the capacity to respond to rare (though critical) entanglements of small populations such as Eastern South Pacific right whales where even small numbers of entanglements may have an impact at the population level and **draws attention** to the value of responders in such regions having the opportunity to develop their experience in other parts of the world (see also discussion on apprenticeships under Item 5.4.2); and
- (3) **draws attention** to the need for a considered approach to encouraging fishers to report entanglements without the fear of prosecution.

2.1.2 Norway

PRESENTATION

Jensen reported on entanglement response by the Sea Service Unit in the Directory of Fisheries in Norway. Their operations area covers the Norwegian EEZ and most of the Barents Sea. A particular focus was on the equipment used for disentangling whales (primarily humpback and killer whales) especially those caught in purse seines (this winter fishery was often conducted at night-time and thus poor visibility. This included a new 'long hook' for helping get a rope around the tail/flukes to be able to pull the whale back from the nets in the purse seines. Whilst recognising that great care is needed from the perspective of the safety of both the crew and the whales, he noted that this method is sometimes necessary to free whales that have got close to the vessel during net recovery in order to prevent them from drowning. He provided details of recorded incidents for whales inside purse seines during the season and reported that the number of boats and whales in the narrow fjords during the last 5-6 seasons has increased - with a concomitant increased need for entanglement response.

DISCUSSION AND CONCLUSION

Discussion focussed on the approach to handling of animals and the use of tail ropes. The need for 'handling' can vary widely depending on the extent of entanglement and the type of fishery if it is active at the time of the entanglement. Jensen noted that when an animal is seriously entangled, cuts to the net in several places might be required and the tail noose might have to be used. However, on the advice of veterinarians, lifting animals significantly out of the water is to be avoided. In other cases, it was possible to return the net to the water and open the rings to release animals. Although the industry is technically prohibited from discarding 'bycatch' - under these circumstances this is permitted. Some participants noted that since this is night time fishing, infrared technology could be used to detect whales after the set was closed and before haul back.

In conclusion, the Workshop:

- (1) **thanks** Jensen and Norway for the informative presentation on a purse-seine fishery not considered by the GWERN before in the context of large whales;
- (2) **encourages** the use of night-vision technology to detect whales in the purse seines at as early stage as possible to facilitate release before the animals are brought close to the vessel; and
- (3) **encourages** the continued sharing of information on equipment development.

2.1.3 Russia

Goleva outlined entanglement response in Russia by the marine animal rescue team ‘Ocean Friends’.¹ This organisation was created in 2016 as a non-commercial, non-governmental organisation. It is based in the Far East of Russia on Sakhalin Island (made famous as a feeding ground for gray whales in the western North Pacific and for its offshore oil and gas projects). Of the seven species of large whales found in these waters, five are listed in the Russian Red Book. The Ocean Friends mission is focused on: (1) marine mammal rescue and conservation; (2) environmental awareness and educational campaigns for people in the Sakhalin region; (3) assisting scientific research on marine mammals; and (4) initiating and assisting in the development of regulatory systems for marine mammal conservation.

In 2017, Ocean Friends completed an entanglement and stranding response training workshop organized by IWC and IFAW². They are now seeking the opportunity to move to advanced training and broaden the experience levels of responders from the Sakhalin region. They also look forward to becoming an active part of international marine mammal response initiatives.

DISCUSSION AND CONCLUSION

The Workshop:

- (1) **thanks** Goleva for the informative presentation on the work of Ocean Friends on Sakhalin Island;
- (2) **welcomes** the Russian training and follow up work, noting that such training has been identified as a priority in the IUCN-IWC Western Gray Whale CMP and by the IUCN Western Gray Whale Advisory Panel;
- (3) **reiterates** (and see Item 2.1.1) the importance of entanglement response training and action for small populations or aggregations such as those gray whales that feed regularly off Sakhalin Island, and follow-up training in other regions to gain experience; and
- (4) **highlights** the importance of collecting samples (for genetic analyses) and photographs to identify individual gray whales as part of any entanglement response.

2.2 Overall overview of IWC capacity building

2.2.1 Summary of work since last meeting other than those covered under Item 2.1

PRESENTATION

Mattila presented an update on entanglement response capacity building (in addition to that discussed above) that had occurred since the 2015 meeting of the GWERN (Table 1).

Table 1

Summary of training events since 2015

Date	Country	Trainer(s)
30/06/2015	Japan, IWC-POWER scientists and crew***	Mattila
28/10/2015	Mexico (Pt Vallarta, refresh training on water only)	Mattila
10-12/11/2015	Oman	Mattila & Sharp*
18-19/11/2015	Chile (Vina del Mar)	Mattila & Rebollero
1-2/12/2015	Guadeloupe	Mattila
3-4/12/2015	Martinique	Mattila
28/6 – 1/7/2016	Nuuk, Greenland	Mattila
9-10/9/2016	Los Organos, Peru	Mattila & Beets
14-15/9/2016	Imbituba, Brazil	Mattila & Aranha
9-10/10/2016	Pattaya, Thailand	Mattila
3-4/06/2017	Yuzhno-Sakhalinsk, Russian Federation	Mattila & Sharp*
13-14/06/2017	Arica, Chile	Mattila & Ulloa
11-12/09/2017	Sortland, Norway	Mattila
12-13/09/2017	Colombia	Frisch and Beets**

*Combined stranding and entanglement response training

**First “all Spanish” training

***First training for offshore response

¹ <https://www.facebook.com/oceanfriendsteam>

² <https://mmrescue.ru/en/>

IWC training consists of two-day workshops with one day of theoretical sessions in the classroom and one day of practical sessions on land and sea. Of note were the first ‘all-Spanish’ workshop conducted by IWC trainers from the RABEN network in Mexico (held in Colombia, 2017), and the first training for possible offshore response for the crew of the IWC-POWER research cruise in the North Pacific Ocean (held in Japan in 2015). He also highlighted two training workshops that combined the IWC entanglement response training with the introductory GMAST stranding training, provided by Brian Sharp (IFAW). The first was conducted in Oman in 2015 and the second on Sakhalin Island, Russia (2017 – see Item 2.1.3). Since 2012, there have been a total of 1,100 trainees from 33 countries. Approximately half of the trainings were completely (or largely) supported by the host government, and the rest were supported by voluntary contributions to the IWC entanglement fund, and both direct and in-kind contributions from NGOs. In one case (Brazil), it was estimated that approximately 21 Provincial and local community organisations provided support.

DISCUSSION

The Workshop noted the success of the initiative over the years and the extensive body of experience that has been built up, and thanked Mattila for his tremendous work in ensuring that these training workshops took place and the other trainers who had assisted in these efforts.

The Workshop explored the strategy for developing additional training and apprenticeships. During training the recipients are evaluated, and the trainer works with the country organisers to identify suitable candidates for apprenticeships. To date, apprentices have all been undertaken at the CCS and have involved more in-depth review of case studies and additional hands-on experience, enabling recipients to strengthen the response in their own countries. Advanced training has been provided to teams, usually a year or two after their initial training, and is focused on reviewing entanglement events to which they have responded, new and/or advanced techniques, and more complicated simulated training on the water.

The Workshop also considered the need for more specialised training for particular sectors (e.g. artisanal and industrial fishing) and recalled previous discussions (IWC, 2016) on the strengths and weaknesses of holding joint programmes on entanglement response and strandings as sometimes had occurred.

In conclusion, the Workshop:

- (1) **reiterates** the importance of follow-up training and apprenticeships – there is no substitute for gaining experience in real events and reviewing such events in detail;
- (2) **agrees** that there is a need for further discussion within the GWERN (e.g. at the next Workshop) on the potential benefits of providing sectoral training including any necessary adjustments in the training curriculum; and
- (3) **reiterates** that the differences in training requirements for disentanglement response and the development of strandings networks and capabilities were sufficient that it was not appropriate for these to be routinely held together.

With respect to (3), however, it also recognised that there may be circumstances where the level of relevant experience of trainees and the available resources in country, along with simple logistics, made it practical to hold such trainings back-to-back in the same venue.

2.2.2 Future plans

With regard to future capacity building, it was noted, notwithstanding the discussion above, that a combined stranding and entanglement response training for Chile and Peru is planned for the end of October 2018. This is significant as (a) it will be the first official cooperative training conducted by the IWC’s entanglement and stranding initiatives (see Item 3.2), and (b) as it represents a bilateral activity by Peru and Chile under the CMP for Southeast Pacific right whales.

In addition, if funds allow, there are plans for a training in Costa Rica, Kenya and possibly France.

2.2.3 Consideration of priorities

The Third Workshop on Large Whale Entanglements (IWC, 2016) had identified seven considerations for evaluating training requests: (i) conservation; (ii) human safety; (iii) animal welfare; (iv) socio-economic

impacts; (v) national support; (vi) added impact and (vii) funding. Prioritisation has been based on an integrated review of all of these factors.

The present Workshop noted that the recent review on the most endangered baleen whale populations (SC/67b/HIM09rev1) presented at the 2018 Scientific Committee meeting provided a useful updated summary of information for consideration of the conservation item. It also noted that awareness of entanglements within a country can be a driver for entanglement response and that this is relevant to the consideration of ‘national support’. Opportunities to address gaps in geographical coverage of entanglement networks and/or to advance other conservation initiatives (e.g. CMPs) in the country/region is relevant to consideration of ‘added impacts’. It was recognised that whilst funders will have different priorities amongst the agreed factors to consider (e.g. some might prioritise endangered populations whilst others might prioritise welfare aspect), as far as possible, prioritisation should be independent of funding considerations.

In conclusion, the Workshop:

- (1) **reiterates** that an integration of consideration of the following key factors should be undertaken when considering priorities for training: (i) conservation; (ii) human safety; (iii) animal welfare; (iv) socio-economic impacts; (v) national support; (vi) added impact and (vii) funding;
- (2) **agrees** that requests for training from non-member countries are also welcomed, noting that the same factors apply; and
- (3) **draws** attention to the fact that a number of factors (e.g. increasing whale populations, changing whale and fishery distributions related to climate and environmental changes, increasing human populations and changing fishing practices) might result in an increased number of entanglements and thus challenge the capacity to respond – the Workshop **strongly reiterates** previous recommendations (e.g. IWC, 2012, 2013 and 2016) that preventing entanglements (see Item 3) is the ultimate solution to this issue.

3. INITIATIVES REGARDING PREVENTION SINCE 2015

In introducing this item, the Chair noted that whilst the IWC can provide expert advice on entanglement issues, it is not a fisheries management body and thus has no regulatory powers. The IWC recognises that for prevention efforts to be effective this work must be undertaken in collaboration with other bodies, including fisheries management bodies. It was agreed that the focus of discussions at this workshop should be how the GWERN can continue contribute to prevention efforts, and how it can input and collaborate with the various initiatives discussed below.

3.1 IWC and other workshops

3.1.1 IWC/NOAA prevention workshop

The IWC co-sponsored, with the USA (NOAA), a Workshop on Global Assessment of Large Whale Entanglement and Bycatch Reduction in Fishing and Aquaculture Gear (Portsmouth, New Hampshire, USA (23-27 May 2016). The primary results of the workshop were contracted (by NOAA) to be disseminated as both a peer-reviewed article, and as a background information paper for an FAO workshop on marine mammal bycatch mitigation (Item 3.1.3). Neither were available for this workshop to review, however the report of the FAO workshop, with the information paper, was expected to be made public in June, 2018³. It was noted that the FAO workshop report will include a table of mitigation measures, expected to be very similar to that produced by the IWC Scientific Committee at its 2017 meeting (IWC, 2018).

The last day of the Portsmouth workshop was devoted to some issues not covered under NOAA’s terms of reference for the joint work. These included discussions of the role of gear marking, ALDFG (abandoned or lost or discarded fishing gear) and disentanglement, in the prevention of large whale entanglement. It was noted that, while disentanglement itself is not prevention, many ideas for mitigation have come from examining the gear removed from whales, and that monitoring of the relative success of mitigation measures may also depend on data collected during entanglement response operations. The Portsmouth workshop noted that the collection of data that helps lead to prevention is one of the primary objectives of the IWC-GWERN consensus principles and guidelines and it had recommended that all data collection opportunities are maximised.

³ It is now available at <http://www.fao.org/3/I9993EN/i9993en.pdf>

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In a short general discussion before more detailed discussion under other sections of Item 3, the present Workshop noted the importance of maintaining momentum of prevention efforts and the potential contribution of the IWC's Bycatch Mitigation Initiative in this respect (Item 3.2.1). The Workshop was informed that full report of the Portsmouth workshop would not be published separately but that the results would be incorporated into the FAO report.

3.1.2 SMM Biennial workshops

Three workshops on various aspects of marine mammal bycatch were held at the 22nd Biennial Conference of the Society for Marine Mammalogy in Halifax, Canada (October 2017). Mattila, the IWC technical advisor for human impact reduction participated (and presented) at two of them. The report of all three workshops were combined into one (SC/GWERN/info/01). Both the IWC entanglement initiative and bycatch mitigation initiative (see Item 3.2.1) were described for workshop participants. Given that bycatch is widely accepted as the primary immediate threat to cetaceans, although the scale likely underestimated for large whales, the initiatives were welcomed and encouraged by the workshops. It was recognised that solutions to this problem are difficult for a variety of practical and political reasons, and that it will therefore take a concerted effort from both the top down (e.g. through IGOs like the IWC) and bottom up (e.g. public awareness and concern).

The workshops recognised that most of the world's fishers are artisanal and of those use gillnets. Given this, there was discussion about tools, guidance and/or training that could be disseminated to assist fishers in the release of small and large cetaceans, and therefore reduce costly damage to their nets, or to their overall fishery through regulatory action. Although a number of obstacles were identified, the idea was generally endorsed at those workshops.

The issue of providing advice to artisanal fishers is discussed further under Item 5.5.

3.1.3 FAO bycatch workshop report

The FAO Expert Workshop on means and methods for reducing marine mammal mortality in fishing and aquaculture operations was held in Rome from 20-23 March 2018. The workshop reviewed the current status of knowledge on the issue of marine mammal bycatch and evaluated the efficacy of different strategies for mitigation of bycatch and their implementation. Technical outputs will include a review of mitigation techniques across different gear types and species, with a summary table. This workshop recommended that the FAO develop technical guidelines on means and methods for prevention and reduction of marine mammal bycatch and mortality in fishing and aquaculture operations; and that FAO establish a global capacity development programme to support developing states in the application of the proposed guidelines. The report and its recommendations will be considered by the forthcoming FAO Committee on Fisheries meeting (9-13 July 2018) and will be available as a document for this meeting.

The present workshop:

- (1) **welcomes** the efforts by FAO to further develop their response to marine mammal bycatch; and
- (2) **encourages** collaboration between FAO and the IWC on future developments including review of mitigation approaches and cooperation on capacity development.

3.1.4 Ropeless workshops

Landry summarised two recent workshops convened by the US North Atlantic Right Whale Take Reduction Team (TRT) on the feasibility of ropeless and weak rope fishing gear as a means of entanglement prevention (Baumgartner *et al.*, 2018; NOAA, 2018]. These workshops focused on the potential strengths and weaknesses of these options, including potential gear conflicts, enforcement, legal impediments and unintended consequences. They were held in recognition of work based on analysing the materials removed from whales during disentanglement that indicated that any rope in the water column poses an entanglement risk and that relative rope strength can influence survival rates. The TRT will consider the reports from the workshops at upcoming meetings.

In discussion, Gulland noted that there was enthusiasm to work on ropeless technology in California but that there was no evidence thus far that existing prototypes would work on a large scale. It was also noted that some approaches defined as ropeless but were not truly ropeless (e.g. the use of sinking ground lines between traps that still uses lines but the time in the water column is very limited) might still pose risk of entanglements. It was

noted that the regulation to use sinking ground lines has been in force for some years in some areas of the USA but there is not yet an indication that it has been effective in reducing entanglement rates (although determining this is difficult).

In conclusion, the Workshop thanked Landry for his summary. It **encourages** continuing work on technologies and approaches that reduce or eliminate ropes in the water, recognising that testing the effectiveness of these remains a complex issue.

3.1.5 The Atlantic Large Whale Take Reduction Team (ALWTRT)

Morin provided a short summary of information regarding the Atlantic Large Whale Take Reduction Team (ALWTRT), one of several take reduction teams established by NOAA's National Marine Fisheries Service (NMFS) to help develop plans to mitigate the risk to marine mammals posed by fishing gear. TRTs were established as advisory teams under the Marine Mammal Protection Act. The Atlantic Large Whale Take Reduction Team was established in 1996 and is composed of fishermen, scientists, conservationists, and state and federal officials. Mitigation measures that have been introduced over the years have been weak links, seasonal closure, sinking ground lines and overall endline reduction.

The Workshop thanked Morin for this summary. With respect to 'dynamic management', it was noted that fishing gear moved just outside the closed area might in effect create a barrier outside and around the area leading to the potential for more entanglements. This potential unintended consequence requires further investigation and reinforces previous recommendations that any proposed solutions are evaluated for unexpected effects (including on other taxa).

3.2 IWC initiatives

3.2.1 IWC Bycatch Mitigation Initiative

PRESENTATION

Marguerite Tarzia, the IWC Bycatch Coordinator, introduced progress under the IWC's Bycatch Mitigation Initiative (BMI; SC/67B/HIM/12).

At IWC66 in 2016, the Commission established the BMI in recognition of bycatch as the most critical issue facing cetaceans. The BMI is made up of three interrelated components; a bycatch coordinator in the IWC Secretariat; a Standing Working Group (SWG) on Bycatch under the IWC's Conservation Committee (CC); and an Expert Panel to advise the coordinator and the SWG on bycatch issues and actively assist in the development and implementation of a workplan to tackle cetacean bycatch.

The BMI is establishing a multi-disciplinary and collaborative approach to tackle small and large cetacean bycatch, which will include a focus on bycatch occurring in both the small-scale and commercial fishing sectors. The BMI's expert panel includes cetacean ecologists, fisheries technologists, experts in fisheries management and economics, and social scientists. This broad range of disciplines will provide the BMI with the ability to provide technical advice on a variety of aspects relating to bycatch, including assessing bycatch, testing mitigation gear, identifying technical solutions and defining economic and social incentives for behavioural change.

Tarzia has carried out an assessment of what is already being done on bycatch at national and international scales; how a global organisation such as the IWC could influence on cetacean bycatch; and which of these high-level work areas could be prioritised for the IWC (SC/67B/HIM/12). The strategic assessment process identified that a combination of bottom-up and top-down work approaches are needed to effectively bring about change in how cetacean bycatch is managed, from national to international level.

From a bottom-up perspective, direct collaboration and engagement with fishing communities and national governments is necessary in order to bring about change. Pilot projects are envisaged to include trials of innovative and existing mitigation measures and incentivising and management approaches on the ground through pilot projects. This will be highly collaborative with both governments and fishing industry and other local stakeholders. The idea will be to build this experience in the BMI based on the pilot projects and then export and adapt experiences from one context to another and provide tailored technical advice in a capacity development programme.

At the international level, the IWC has the existing contacts and standing to engage with Regional Fisheries Management Organisations, the FAO and other international bodies to further the discussions on bycatch

monitoring, reporting and management. Information acquired through on the ground experience with fisheries, and technical information on solutions and approaches will be provided by the IWC as input to these fora.

Immediate next steps include (i) developing detailed actions in the workplan (to be submitted to IWC67 in September 2018) and the development of a 10-year strategic plan; and (ii) identifying potential pilot projects where mitigation measures or management approaches (including incentivising) could be trialled. This will include identifying existing projects that might be willing to collaborate with the IWC as part of the BMI.

Tarzia indicated that she welcomed the group's input on how the GWERN and the BMI can complement each other (there is some overlap in membership). Initial discussions have produced some ideas including doing some outreach on the BMI (and further investigation of potential bycatch hotspots for large and small cetaceans) during training workshops; technical input on possible preventative measures for different fisheries to avoid entanglement; suggestion of and collaboration in pilot projects for mitigation measures focused on preventing entanglement. The GWERN are encouraged to provide ideas and suggest potential pilot projects. Opportunities to undertake joint efforts, including pilot projects, with other organisations are being explored.

DISCUSSION AND CONCLUSION

In discussion, the Workshop noted the opportunity, when undertaking capacity building for entanglement response, to work with the coordinator and expert panels of the BMI to ensure provision of the most up to date advice on prevention. The significant interest of other organisations in this topic was recognised, including WWF (who are members of the IWC's Bycatch Standing Working Group and engaged in the BMI) who have recently produced a comprehensive report on bycatch mitigation measures⁴.

In conclusion, the Workshop:

- (1) **welcomes** the information provided by Tarzia on the IWC's BMI and **notes** the synergies between the BMI and GWERN;
- (2) **reiterates** the long-standing view of GWERN that prevention, not disentangling is the ultimate solution to the bycatch issue;
- (3) **encourages** regular communication between the co-ordinators of the BMI and GWERN on matters of mutual interest and in identifying areas where collaboration and joint work will be valuable;
- (4) **reiterates** the importance of the collection and analysis of data from entanglement response efforts and the sharing of the results to assist in the work to develop effective prevention and mitigation (and see Item 4).

3.2.2 IWC Strandings Initiative

PRESENTATION

Smith and Rowles reported on progress under the IWC strandings initiative. At IWC66 in 2018, the Commission endorsed recommendations of the Scientific Committee and the Whale Killing Methods and Welfare Issues working group for further development of IWC work on strandings, including establishment of a Strandings Expert Panel (SEP) and Strandings Coordinator. Karen Stockin was appointed to this role earlier this year.

The aim of the strandings initiative is to help build capacity of countries to respond to strandings events, including through the development and dissemination of advice on strandings response and investigation; the development of curricula and delivery of training; a strategy for providing assistance for emergency response and development of information infrastructure e.g. consideration of a centralised data repository.

Since its establishment, the SEP has responded to requests for advice with respect to emergencies in Russia and Yemen, supported a request for funding from Argentina to support post mortem analysis following the mass strandings of common dolphins in March 2018 and is involved in development of the aforementioned joint strandings and entanglement training under the auspices of the CMP for the Eastern South Pacific southern right whale.

The strong links between strandings response and entanglement were highlighted, including the contribution of strandings investigation to understanding of how entanglements (and other human impacts e.g. ship strikes)

⁴ http://wwf.panda.org/wwf_news/?328099/A-seachange-needed-in-fisheries-to-give-dolphins-whales-and-porpoises-a-chance.

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occur, and to information on gear types. In the USA and elsewhere, entanglement response teams can practise techniques on carcasses and sedated animals. There is also the potential for joint training exercises. It was also noted that information provided by entanglement responders can help verify progression of wounds from entanglement as the cause of mortality.

Future work could include follow up on the 2013 IWC euthanasia workshop (insert published reference) if the SEP identified the need for further guidance. Non IWC-member countries can be involved in this initiative.

DISCUSSION AND CONCLUSION

In conclusion, the Workshop:

(1) **welcomes** the information provided by Rowles and Smith on the IWC's Strandings Initiative and **notes** the synergies between it and GWERN;

(3) **encourages** regular communication between the co-ordinators of the two initiatives on matters of mutual interest and in identifying areas where collaboration and joint work will be valuable, including complementary, joint capacity building where appropriate. Such areas include (a) the joint examination of photographic material from strandings to help to identify causes of anthropogenic mortality including entanglement and (b) the identification of fishing gear types (and see Item 4).

3.2.3 IWC Conservation Management Plans (including entanglement response and prevention)

Donovan and Kato reported on the potential to address entanglement through IWC Conservation Management Plans (CMPs). CMPs are a tool to develop plans to address conservation concerns, especially where species are transboundary and to identify and progress necessary actions. Four CMPs have so far been agreed by the Commission: one for gray whales in the Western North Pacific; two separate CMPs for populations of southern right whales along the eastern and western coasts of South America; and one for the Franciscana dolphin on the Atlantic coast of South America. Where entanglement is a problem for a species relevant actions (for example, training) can be established in the CMP and the expectation is that range states take ownership of this.

It was noted that the upcoming combined (strandings and entanglement) training for Chile and Peru will be conducted under the auspices of the Eastern South Pacific Southern Right Whale CMP and that entanglement is also a priority in the CMP for the Western South Atlantic Southern Right Whale, under which the potential for regional training is being explored. The potential for cooperation with other organisations through CMPs was noted (for example, with CMS with respect to the potential CMP for the Arabian Sea Humpback Whale and the existing co-operation with IUCN for the western gray whale CMP). As noted under Item 2.1.3, the Sakhalin Island training was one of the actions contained in the western gray whale CMP.

3.2.4 Co-operation across boundaries - Fourth International Conference on Marine Mammal Protected Areas (ICMMPA4) workshop

PRESENTATION

An IWC-convened workshop to discuss cooperation between Mexico, USA and Canada with regard to trans-boundary (e.g. highly mobile or migratory) entangled whales was held in conjunction with the Fourth International Conference on Marine Mammal Protected Areas (Puerto Vallarta, November 2016). The workshop was also combined with a meeting of the national entanglement response network of Mexico (RABEN). A large part of the workshop was dedicated to reviewing the current situation - learning about the networks in all regions from Northern Alaska, along the Pacific Coast of North America, to the southernmost team in Oaxaca, Mexico. In addition, several known 'trans-boundary events' were discussed.

The workshop also discussed actions that would facilitate smooth cooperation between the three countries, for these types of events. The discussions were framed as the development of the 'components of a potential MoU' between the countries (Annex D). They include actions such as: pre- and post- season meetings or calls, cross-certification (if possible) or pre-authorisation for boats to operate in each other's waters during a response event, equipment or personnel to cross borders, and post event follow up to identify the origin of the entanglement. The workshop members were technical experts and not managers *per se*, and the focus was on the activities that could be facilitated by an MoU (or similar) agreement. However, several existing agreements were identified as possible overarching agreements for this type of cooperation. They included the Memorandum of Cooperation for Western Grey Whales, facilitated by the IWC and IUCN, and signed by Mexico, USA, Russia, Japan and Korea, and the North American Agreement on Environmental Cooperation (under NAFTA).

DISCUSSION AND CONCLUSION

Frisch summarised progress since the workshop including sharing of information on entanglement cases across the three countries and cooperation to confirm the origin of gear. She emphasised that some challenges remain including lack of response capacity in areas of Mexico bordering with the USA.

There was discussion concerning the value of the MOU approach for other countries cooperating on a regional basis, including through CMPs. Similar approaches (e.g. the Memorandum of Cooperation for western gray whales) may help stimulate action by participating countries and institutions. This approach could provide a valuable tool (provided that it did not place prohibitive administrative burdens on countries) to help establish cross-certification and licensing (where possible) for transboundary response and especially help prepare ahead of time for the transboundary movement of people and equipment.

Noting experience in Mexico, it was observed that measures on retrieval, storage and return of gear could be a useful component of an MOU. A shared photo catalogue of different gear types could be a useful aid to gear identification.

In conclusion, the Workshop:

- (1) **draws attention** to the potential transboundary nature of entanglement response efforts;
- (2) **encourages** the development of strategies to facilitate this in advance (e.g. through Memoranda of Co-operation or Understanding) rather than waiting for an urgent situation;
- (3) **encourages** that when developing advance strategies, at least the following issues are considered
 - (a) communication amongst networks
 - (b) sharing/moving equipment
 - (c) joint training (including apprenticeships and mentoring)
 - (d) co-operation during a transboundary event including joint communication strategies;
 - (e) sharing materials (and possibly tissue samples) after an event, including measures for retrieval, storage⁵ and return of gear;
 - (f) co-operation on identification of gear including a shared photo-catalogue of gear types
 - (g) co-operation on funding.

3.3 Other prevention initiatives

3.3.1 NOAA-MMPA import rules

PRESENTATION

Spradlin gave an introduction to the MMPA import rules [SC/J18/GWERN/INFO/09; SC/J18/GWERN/INFO/09 and SC/J18/GWERN/INFO/10]. The United States Marine Mammal Protection Act (MMPA) requires the USA to ban imports of commercial fish or fish products caught in commercial fisheries that kill or seriously injure marine mammals in 'excess of U.S. standards'. NOAA Fisheries' Office of International Affairs and Sea Food Inspection developed regulations to implement this provision, which were published as a final rule on January 1, 2017. In order to comply with comparable standards, harvesting nations must implement regulatory programmes that:

- (1) prohibit the intentional killing or serious injury of marine mammals in all fisheries; and
- (2) assess marine mammal stocks, estimates bycatch, calculates bycatch limits, and reduces total bycatch below the bycatch limit for fisheries that have interactions with marine mammals and export fish and fish products to the U.S. ("Export Fisheries"); or
- (3) implement alternative measures for those fisheries

⁵ Gear should be stored and maintained in such a way that useful information (e.g. on breaking strength) can be obtained from it

There is currently a 5-year exemption in effect to allow foreign nations time to develop regulatory programs comparable in effectiveness to US programmes. During the exemption period, NOAA is identifying fisheries that have interactions with marine mammals and export fish and fish products to the US and will consult with nations with such fisheries to gather information about their marine mammal bycatch. At the end of the 5-year exemption period, each nation must apply for a comparability finding for its fisheries. The US will review the application to determine if the harvesting nation has met the conditions for a regulatory programme determined as comparable in effectiveness to the US' regulatory programme. If the harvesting nation has met these conditions, a comparability finding will be granted. Comparability findings will last for four years. Contingent on funding, and by request, NOAA will work with harvesting nations to implement capacity building projects to assist nations in achieving a comparability finding.

DISCUSSION AND CONCLUSION

Cottrell reported that Canadian fisheries organisations are seeking further clarity on the comparability standard and what this is being compared against, including for cases where fisheries have higher standards than in the USA. He also enquired about expectations with regards to marine mammal abundance data. Spradlin reported that proposed comparisons would be against the USA Categories 1, 2 and 3 fisheries (what does this mean – give a reference?) but this is being further explored. Regarding abundance estimates, there are options for scaling depending on what countries can do. It might be that a country does not have robust abundance data but can still demonstrate attempts to respond when a spike in mortality or entanglements is observed.

The Workshop noted the interest generated by the MMPA import rule and its potential impacts worldwide. It highlighted challenges for countries with poor infrastructure, law, monitoring or a scientific basis in responding to its requirements and noted some concerns on unintended consequences (e.g. if fishermen are discouraged from reporting entanglements this could impact disentanglement efforts).

In conclusion, the Workshop:

- (1) **welcomes** the provision of information on the new US MMPA import rules;
- (2) **recommends** that, when developing responses and strategies, authorities carefully consider whether these may have unexpected adverse impacts on work relating to entanglement response and the development of prevention measures – in this context this particularly relates to adversely affecting reporting of entanglement events.

3.3.2 The Canadian Department of Fisheries and Oceans (DFO) actions in the Gulf of St Lawrence

PRESENTATION

Gilchrist provided an overview of Canada's fisheries mitigation measures to reduce the risk of entanglement for the endangered North Atlantic right whale. In response to the unprecedented North Atlantic right whale mortality event of 2017, DFO implemented a number of fisheries mitigation measures to reduce the risk of entanglement. Fishing gear management measures were implemented in the Gulf of St. Lawrence snow crab fishery, including measures to reduce the amount of floating rope on the surface of the water, gear marking and mandatory reporting of all lost gear. Further, spatial temporal fisheries management protocols were implemented in the Gulf of St. Lawrence for the 2018 season. A static fisheries closure and a protocol for the dynamic management of fisheries in the presence of North Atlantic right whales for non-tended fixed gear were implemented on 28 April 2018. These management measures have been implemented as a preventative approach to address whale entanglement in Canadian waters.

DISCUSSION AND CONCLUSION

Discussion highlighted the gaps in response capacity in this region. The nearest trained Canadian groups are in Campobello and Newfoundland, but the distances are great: there are no trained responders in the southern Gulf of St. Lawrence itself. Thus, existing groups may be able to respond in the Gulf if a whale is anchored or has a telemetry buoy but for free swimming whales, response is problematic.

It was noted that those fishing communities with more awareness of the drivers (MMPA import rule, loss of MSC certification for the snow crab fishery) behind the measures accepted the need for change, with some industry players are taking the lead to explore gear innovations and long-term solutions for compliance with the US market. However, it was also noted that there is still anger and concern amongst harvesters who are resistant to the measures and there have been socio-economic impacts with the closure of on-shore processing plants. The concern has transferred to other regions (Bay of Fundy) resulting in a greater reluctance to report entanglements.

In conclusion, the Workshop:

- (1) **draws attention to** the concern over the status of North Atlantic right whales and previous IWC Scientific Committee recommendations that anthropogenic mortality be reduced to zero;
- (2) **thanks** DFO the provision of the information on the measures being taken to reduce entanglement in fishing gear;
- (3) **recognised** the benefits of the telemetry buoy system with a time-release - if a buoy can be attached and the animal tracked, then experienced responders can be deployed to assist less experienced personnel; and
- (4) **recommends** the importance of developing an appropriate level of expert entanglement response capacity in this region to allow more rapid response, especially to entanglement events of this endangered population.

3.4 Contribution of GWERN to prevention

The Workshop:

- (1) **reiterates** the important role well-conducted entanglement response can play in helping to develop effective prevention measures;
- (2) **reiterates** its strong commitment to gather and share information and materials that can help lead to prevention including:
 - (a) data on species, gear type and origin;
 - (b) retrieval of gear (to e.g. allow an analysis of rope breaking strength;
 - (c) identification of high risk areas (e.g. through cooperative gear tracking such as that conducted through the Mexico, USA and Canadian Tripartite agreement); and
 - (d) information from interviews and workshops with the fishing sectors.

4. DOCUMENTATION AND DATA COLLECTION

4.1 Improvements in assessment and documentation of events

This item allowed the Workshop to receive an update on existing and new means to document entanglement events and to determine gear type and configuration, whale species, health and stress and other factors.

4.1.1 East coast gear analysis and protocols

PRESENTATION

Morin gave a presentation on US East coast gear analysis and protocols. Gear recovery and analysis is an important component of the U.S. east coast network to help understand the types of fisheries involved and evaluate whether mitigation measures are working. The regional teams make every effort to retain as much gear as possible for analysis. If the fisher can be identified from the gear, an interview is conducted to learn more about how, where and when they fish. The gear may be returned to the fisher, if requested, after the physical characteristics of the gear are thoroughly documented. If a fisher is not able to be identified, the gear is retained - NOAA Fisheries on the U.S. east coast maintains a secure warehouse to store recovered gear. The gear is then documented, analysed using a forensic approach and archived by a NOAA gear team that has expertise in various types of fisheries and gear. Non-government experts are often invited and participate in the analysis, although the final conclusion is developed by NOAA. Personal identification marks are masked when the gear is to be viewed by non-NOAA personnel.

DISCUSSION AND CONCLUSION

In response to questions about the incidence of ALDFG, Morin commented that it had generally been impossible to determine without doubt whether gear was in active use at the time of entanglement. Most gear collected had been fairly clean, implying that it was deployed in active fishing. Although some gear appeared to be derelict he noted that this was not common along the east coast of the USA.

There was also a short discussion on the use of weak links in set gill nets -anecdotal information had suggested that this might be helping reduce severity of some entanglements on the East Coast but it was noted that this evidence was preliminary and not published.

In conclusion, the Workshop:

- (1) **thanks** Morin for the information on the gear collection and storage protocols and subsequent analyses for the US East Coast, noting the great value of this resource;
- (2) **draws attention** to the importance collecting, analysing and storing information and material on gear type (as witnessed by recent investigations on gear strength using archived collections), **recommends** that this be done to the extent possible given regional resources and **highlights** the need
 - (a) for a good documentation and labelling system
 - (b) to carefully photograph gear before during and after entanglement response
 - (c) to retain samples of gear, even if all the gear could not be collected;
- (3) **welcomes** the provision of the interview forms, photo documentation guide and documentation used on the US east coast to workshop participants to provide advice on (2) above; and
- (4) **draws attention** to the importance of publishing evidence on the effectiveness or otherwise of prevention measures as soon as possible - in this context it **urges** NOAA to arrange for the prompt publication of the available information on the efficacy of weak links in set gear nets.

4.2.2 Analysis of biogeochemical markers from baleen samples

PRESENTATION

S. Sharp presented Lysiak *et al.*, 2018, a study characterising the duration and severity of fishing gear entanglement on a North Atlantic Right Whale using stable isotopes, steroid and thyroid hormones in baleen.

The authors measured a suite of biogeochemical markers in baleen from an adult (12 year-old) female that died from a well-documented chronic entanglement in 2005. The following were measured in a longitudinally sampled baleen plate: (1) cortisol, corticosterone (adrenal glucocorticoid hormones that indicate hypothalamic-pituitary axis activation/stress response); (2) oestradiol, progesterone (female gonadal steroids, which are indicators of pregnancy and potentially oestrous); (3) thyroid hormones triiodothyronine (T3) and thyroxine (T4), which are regulators of metabolic rate; and stable isotopes ¹³C and ¹⁵N, which are well-established trophic markers of seasonal diet and foraging location in large whales. From the analysis, the authors were able to document an eight- year profile of foraging and migration behaviour, stress response and reproduction. Specifically, a 23-month progesterone peak was associated with the single known (observed) calving event in 2002. Elevated N15, T3 and T4 indicated that the animal had potentially experienced increased energy expenditure, significant lipid catabolism and thermal stress approximately 3 months (starting in June) before initial sighting with fishing gear in September 2004. All hormones except cortisol were elevated above the baseline by September 2004, when the entanglement was first observed. The paper emphasised the synergy between stranding response (and data and sample collection) and disentanglement response efforts. In this case, the baleen acted as an archive of physiological indicators on the order of years that can be used to understand the impacts of anthropogenic activity on threatened whale populations.

DISCUSSION AND CONCLUSION

In response to a question as to whether similar investigations could be conducted using samples from live animals (e.g. faeces, blow or biopsy), it was noted that there were no known individual longitudinal studies for such a range of hormone studies in tissues of living right whales over a long-time period (8 years). Kellar *et al.* (2015) had reported on a stress hormone (cortisol) in blubber from bottlenose dolphins. Robbins reported on the validation of a pregnancy diagnosis from hormones from a blubber biopsy. Rolland *et al.* (2012; 2017) have examined stress hormones in North Atlantic right whale faeces and the data set arising from the baleen study was compared to those - it was found that the concentrations of cortisol were much lower in baleen than in faeces, which could be due to factors such as turnover and uptake rates and the compounds being measured. There are also some studies using skin (e.g. Bechshoft *et al.*, 2015) to examine stress hormones. The Workshop noted North Atlantic Right Whale researchers (e.g. Rolland) would be good contacts for providing information on protocols for faecal sample studies.

A major difference in the use of the different tissues for hormone analysis was the time-scale: faecal samples provide ‘snapshot’ (hours-days), blubber provides an intermediate period (days-weeks) whilst baleen provides a much longer- time-series (years). With respect to entanglement, this has the potential to bring valuable on factors leading to mortality, and to feed-back information on prognosis, informing future decisions on whether to intervene or not.

The great potential value of this new technique was recognised but for proper interpretation, particularly for stress hormones, the importance of obtaining baseline control values was highlighted. The challenges in doing this were recognised and approaches to look at baleen from animals with known histories (reproduction and entanglement related) are being examined.

Rowles reported on several current projects, including prognostication of reproduction and survival for delphinids (captive and wild). Several factors are being explored, including inflammation which appears to be an important indicator for reproductive success. These studies should help inform future sampling. By 2020 foundational information from these studies should be available and can be analysed for applicability to other species.

In conclusion, the Workshop:

- (1) **recognises** the great value of new techniques using baleen plates to provide time series of data on reproductive and stress hormone levels for individual whales;
- (2) **encourages** studies to establish the necessary baseline control values to assist in interpretation of results by *inter alia* examining results from baleen analyses in conjunction with independent information on reproduction and entanglement events of the same animals; and
- (3) **recommends** that wherever possible, at least one baleen plate be collected from stranded animals ((especially, but not exclusively, animals both with signs of recent or past entanglement events) for hormone and related analyses.

4.2 Determining gear/debris type and origin

4.2.1 FAO gear marking guidance

The FAO Technical Consultation on the marking of fishing gear (Rome, Italy, 5-9 February 2018) was tasked with finalising the development of draft guidelines for the marking of fishing gear which had been developed in a previous expert workshop. The primary goal of the proposed gear making guidelines is to track the origin of ALDFG. The IWC attended the meeting and noted that the materials removed from entangled whales are often just remnants of the original entanglement, and that marking that would allow the determination of the source of ALDFG would probably also assist with the determination of the origin of materials removed from whales. However, just as oceanic currents can carry ALDFG a great distance from its point of origin, so whales can drag entangling materials for thousands of kilometres. Thus, it is important that marking schemes are not just be nationally catalogued, but coordinated, or at least shared, among countries. The report (not available at the time of the present workshop) will be submitted to the FAO Committee on Fisheries (Rome, 9-13 July 2018)⁶.

The Workshop **welcomes** the development of the FAO guidelines on marking of fishing gear and its potential contribution to determine sources of entanglement and **looks forward** to receiving the final report and ultimately the implementation of gear marking schemes.

4.3 Review of IWC global entanglement database

At the last meeting of the GWERN (IWC, 2016), the value of gathering standardised and consistent data during entanglement responses was reiterated. This will significantly advance two of the primary goals of the entanglement response principles and objectives: (1) improved data collection; and 2) making progress towards entanglement prevention. In addition, a set of overarching objectives and conditions were agreed, and it was recommended that the IWC fund the development of a global entanglement database in 2016/2017.

The IWC did provide funds to advance the development of the database, and this item provided an update on the work so far and the next steps.

⁶ The report is now available: <http://www.fao.org/3/CA0196EN/ca0196en.pdf>

SC/J18/GWERN/04 and SC/J18/GWERN/05 summarised the work on and discussion of the database since the last meeting. Although the original idea was for a database similar to IWC ship strikes database, experience with this had informed the decision to focus primarily on the needs of GWERN members.

Lyman provided a presentation on the value of a database as a tool that can help compile information towards reducing large whale entanglement threat and provided an overview of the IWC efforts thus far in helping develop a simple, broad-based global model. To illustrate some of the challenges and attributes in designing and fabricating a global database, he used a simple database he had developed for NOAA's Hawaiian Islands Humpback Whale National Marine Sanctuary. Attributes included: ease of use; simple, modular, friendly user front-end interface; the ability to import and export data; web-based and mobile access; and other means to make the database available to a broad-based audience. Like other databases, an IWC-hosted database would focus on the animal and/or the case (i.e. ap articular entanglement); account for multiple efforts, changes in animal condition, and other temporal changes; and allow for the merging and unmerging between cases as information allowed. A step-wise strategy was presented with just those fields agreed upon in past meetings that would address basic questions of 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. Designing a well-structured backend would allow the database to evolve and grow over time with the needs of a broad-based user group. Challenges outlined included incorporation of associated imagery, need for different languages, and the flattening of layered data. Like any database, he concluded that its value will depend on the amount of effort put into its design and the commitment of networks to use it.

A number of issues were raised in discussion. These included:

- (a) recognition in many parts of the world, responders could, at least at present, collect only basic information;
- (b) emphasis should be on collecting good quality data not open to misinterpretation and not to overburden responders with complex data requests;
- (c) regional collaborations should be considered;
- (d) database development should allow for maximum functionality that might be needed in the overall structure, but with a 'flexible front end' approach that allowed users to easily focus on only the information they can collect – this may well correspond to the fields used in the responder's own data collection template.

In conclusion, **The Workshop:**

- (1) **reiterates** the importance of the safe collection and provision of data from each entanglement response effort, noting the objectives developed at the 2015 Workshop (IWC, 2017);
- (2) **reiterates** the overarching objectives and conditions previously agreed for a global database and **commends** the work undertaken since;
- (3) **stresses** the importance of developing a 'front end' data entry system that is customisable for the needs of the various groups, whilst recognising that the full database should incorporate to the extent possible the maximum number of fields that are considered likely to be required in the future;
- (4) **recommends** that the database continue to be developed and funded and that the developers work in collaboration with the individual networks via the co-ordinator to ensure that it is of practical value to each, thereby ensuring that maximum use is made of it to further improve entanglement response and to assist in the ultimate goal of prevention.

5. SAFETY

5.1 Review of accident in Canada

The Chair set out objective for these discussions, which was to explore whether there were any changes needed to the current IWC guidelines and principles in light of the accident in Canada that had resulted in the tragic death of one responder, Jo Howlett of the Campobello Whale Rescue Team.

5.1.1 Information provided by Canada

PRESENTATION

Gilchrist gave a presentation on the event in Canada, inviting his colleagues to also make comments. He was not able to speak about the event itself but outlined the Canadian response in terms of review of DFO's Marine Mammal Response Program and entanglement response protocols. The Government of Canada undertook recently several operational and policy reviews to enhance safety for responders of entangled large whales. These reviews included reports on Fisheries and Oceans Canada (DFO)'s Marine Mammal Response Program entanglement response protocols and enhancing the policy suite and management measures to reflect disentanglement best practices across marine mammal species. The management measures that resulted from these reviews included the development of an entanglement response protocol for large whales in Atlantic Canada and mandatory safety protocols, including approved helmets for fisheries officers and anyone working on DFO vessels, which enabled the lifting of the ban for North Atlantic right whale disentanglements in Canadian waters that had been instigated after the accident. Furthermore, the Government of Canada has committed funding support to increase and stabilise Canada's capacity to respond to disentanglement incidents for the future.

In addition to the above efforts, he noted that it had been important to engage first nations, including from a reporting perspective, since these communities are often in remote locations. Some members of these communities have been trained in satellite tagging, which has thus increased ability of trained responders to find the animals.

DISCUSSION AND CONCLUSION

In discussion, Gilchrist confirmed that the funding would be split up by region, and prioritised based on the needs of the response teams. He noted the need to continue to review priorities and ensure sustainability of response operations. Participants noted that there are challenges associated with such a rapid injection of funding - there was a tremendous amount of communication, operational and logistics work to be undertaken.

Participants also commented on the need for continued outreach to local fishing communities regarding the entanglement prevention measures, given that some in the Gulf of St Lawrence had expressed concern (see Item 3.3). It was noted that whilst the entanglement response established in Newfoundland had originally been set up as an assistance programme for fishers (for removal of gear) which incentivised them to report entanglements, as awareness has grown of what is happening in the Gulf, this is changing and there is a risk that reporting will decline.

The Workshop noted that at the broader level, in many countries there is an inherent conflict between conservation and fisheries. This is dealt with in different ways by different countries and has resulted in different motivation for nations to develop entanglement response capacity (including animal welfare, human safety, providing assistance to fisheries for gear recovery etc.) as discussed in the report of the first workshop held in Hawaii in 2010 (IWC, 2012).

With respect to the issue of reporting of entanglements by fishers, the Workshop:

- (1) **draws attention to** the need for continued outreach to fishing communities explaining the motivation for conservation measures;
- (2) **draws attention to** the need to incentivise reporting of entanglements by fishers especially when interactions between whales and fishing gear are banned; and
- (3) **expresses deep concerns** related to human safety and to whale welfare in cases where unauthorised fishermen attempt to release whales themselves.

The Workshop also noted the role of others including the research community and the whale watching industry, in reporting entanglements.

Recognising the existing deficit in entanglement response capacity and the time that would be required to address this, some concern was expressed that current DFO restrictions might limit Canada's ability to get help from outside experts. Gilchrist confirmed that whilst the initial focus was on authorised Canadian responders, Canada recognised the value of taking advantage of international assistance.

Recalling the discussions under Item 3.2.4 and especially the present situation in the Gulf of St Lawrence, the Workshop **stresses** the value of transboundary response to entanglement and **encourages** Canada to continue to collaborate with other countries in this respect, including the use (where necessary) of external expertise.

In discussion of the response of Canada given above, it was also noted that the protocols and licensing system operating in Canada to authorise response teams (including the ability to implement a stand-down/pause following an incident) represented good practice. Many parts of the world do not have this level of policy development or formal support from governments. Aranha reported that a regulatory approach was being explored in Brazil, recognising that having a regulation governing entanglement responders would allow for the ability to ensure high standards. Iñiguez reported that in Argentina, the province of Chubut has created and established the Red de Fauna Costera⁷, a multidisciplinary team coordinated by the government of the province, with the responsibility for whale disentanglement. Different nodes were established along the coast of the province. Edwards reported that in Western Australia, a Wildlife Officer delegates authorisation for entanglement response but always by a trained state government employee. In eastern states of Australia, the situation varies with both state government and non-governmental organisations undertaking disentanglement operations, all under the direction of the relevant state government authority.

A recommendation on licensing is given under Item 5.1.3. Finally, the Workshop **thanks** Canada for attending the Workshop and providing valuable information that will assist in discussions under Item 5.4.

5.1.2 Lessons learned and national changes implemented in the USA

Rowles gave a presentation on actions implemented by the US entanglement response network following the fatality in Canada.

Wilkin presented an executive summary of a workshop held May 24-25, 2018, in Silver Spring, Maryland, USA, where expert large whale entanglement responders gathered to discuss ‘close-call’ or ‘near-miss’ cases. Close-calls were defined as entanglement responses that could have resulted in serious injury or death of response personnel, but which did not. Participants presented overviews of cases that they had worked on spanning twenty years, detailing the situation and its risks, and operational changes that were made in response to the events. Participants evaluated common risk factors that led to the reported close-calls and discussed potential mitigation factors. Five commonalities were identified: pressure on the responders (from external or internal sources), mental and physical fatigue, lack of experience and inadequate training, equipment failure, and animal behaviour. Environmental and logistical factors were also identified that can heighten the risks from the other commonalities. Mitigation factors for each risk factor were discussed and will be shared with responders and incorporated in training materials.

The full report, including details for the case studies presented will be published some time during the summer. Wilkin noted that the near miss involved several species; it was suggested that North Atlantic right whales were a higher risk species, but the near misses presented also included responses to humpback and gray whales, and recent entanglements of blue whales were noted.

The Workshop **thanks** the USA for providing this information that proved valuable in the review of the present IWC Principles and Guidelines under Item 5.4.

5.1.3 Overall comments

The Workshop **commends** the governments of the USA and Canada for pausing entanglement response operations after the accident, despite any negative feedback that might have been received from some quarters. It **recognises** that for responders, it was extremely valuable not only in the short term but also for the longer term, as it provided an opportune period to review safety and other operational protocols. The Workshop recalls that New Zealand had instigated a similar response to a previous human fatality.

5.2 Review of accidents/close call from other countries relevant to guidance

This item provided an opportunity for participants to share circumstances relevant to accidents and/or close calls (species, individual, human and/or whale actions, ‘warning signs’ etc.) they have experienced.

⁷ <https://sites.google.com/site/redfcc/vision-mision>

5.2.1 *South Africa and Australia*

Meyer, on behalf of several colleagues in South Africa and Australia, presented information on four ‘close calls’ involving Southern right whales. These incidents included unpredictable behaviour during a protective net entanglement, resulting in a tail strike on a KwaZulu Natal Sharks Board response vessel which resulted in considerable damage to the vessel and concussion to one of three entanglement response team members. In a second incident a concrete octopus mooring block was wrapped around the caudal peduncle and tail which was flung from side to side during bouts of tail slapping, demonstrating the power and danger presented by this species. Two additional cases involved animals showing right whale body postures (the ‘S’ and ‘U’ shaped postures) that can result in violent responses. These behavioural postures often indicate retaliatory tail thrashing or other physical threats including vessel charges or breaches. Two suggested protocol changes included (i) the appointment of an additional person onboard the response vessel as the ‘safety officer’ whose sole task was to monitor movements providing sufficient warning for safe retreats and (ii) the use of a ‘haul back line’ in certain circumstances. The latter included training protocol changes to incorporate this procedure.

Meyer noted that southern right whales, unlike humpback whales, will often perform a side slash of the flukes, striking at any potential ‘threat’ within the danger area from the flukes to the flippers. Aerial video footage showed a southern right whale startled by a school of dolphins displaying a warning tail strike followed by a 180° change of direction to face the threat. Tail strikes are often unexpected and are of concern to disentanglement vessels. This footage seemed to indicate that the strike would often lead with an initial partial tail movement in the opposite direction before following with a full slash in the direction of the threat. This suggested that there might be a potential warning sign prior to the tail strike. Meyer concluded with the listing of nine safety considerations for disentanglement teams when interacting with right whales.

The Workshop **thanks** Meyer and colleagues for providing this information that proved valuable in the review of the present IWC Principles and Guidelines under Item 5.4. It was also noted that keggings buoys were not generally effective at stopping or slowing down a southern right whale but noted that they may help track animals underwater and possibly keep them at the surface. Responders in New Zealand have had success using floating control lines to allow them to detect if a whale is turning back towards responders when swimming underwater (if the floating line starts to bunch or come towards the responders, the protocol is to back off immediately).

5.2.2 *Newfoundland, Canada*

Ledwell gave a presentation on the release of large whales from heavy gear entanglements in pound traps in Newfoundland, with emphasis on cases where whales exhibited extreme avoidance measures.

Disentanglement operations in Newfoundland and Labrador are undertaken by ‘Whale Release and Strandings’⁸ whose objective is to efficiently release large whales, assist fishers to retrieve gear, communicate with the local communities about the operations and marine animals, and contribute to the scientific knowledge base. During the planning operations phase of disentanglement, the safety of the team is a priority as well as full removal of all gear from the animal and retrieval of gear to the fishers. Its protocols are guided by the interest to collaborate with regional communities, include fishers and conduct the release operations to maintain the calmness of the animals. Understanding gear types, entanglement configurations, species and the culture of the region can assist release workers to conduct disentanglements successfully. The training programme for the Newfoundland and Labrador region has for around four decades comprised a mentorship style programme to learn the practical skill sets and essential knowledge for safe and effective disentanglement of large whales.

Ledwell explained the methods used in dealing with the great quantities of gear that humpback whales can become entangled in in the region and the procedures involved in taking the gear off the animals. He also outlined some of the potential dangers when dealing with both unpredictable and predictable large wild animals heavily ensnarled in fishing pound traps and pots.

In discussion, it was noted that it is generally not advised to use motors during an entanglement response. Ledwell confirmed they would not use the motor unless absolutely necessary but noted that this depends on extent of mobility of the animal, which even for anchored animals can be quite extensive. Pull back ropes are used to ensure the boat can move quickly away from the whale. Lyman noted that his team also implements a haul back system for some responses although they may also use the engine in reverse - if they need to move

⁸ <https://newfoundlandlabradorwhales.net/>

away the line can quickly be released and the boat will back away from the whale, without needing a change in throttle.

In conclusion, the Workshop:

- (1) **recognises** that there are circumstances during individual response events that may require deviations from 'standard' protocols; and
- (2) **agrees** that decisions to do so should be undertaken with care and identified in post event write-ups. Ideally this information should be shared with GWERN to assist in the global learning process and evolution of guidelines and training.

5.2.3 Discussion of 'danger zones' in the light of close calls

Discussion focussed on the question of the designation of a 'danger zone'. It was agreed that designating the danger zone comes with experience, but that generally it is anywhere within reach of the animal (e.g. see Fig.1). The primary strategy is to be behind the whale, assuming that it is moving forward, but this is dependent on the situation, as some animals can be approached from the side. Assessment of danger zones should be based on understanding of the behaviour of the animal and knowing where it can reach with its tail or other potentially dangerous body parts such as pectoral fins). The danger zone will be dependent on the behaviour of the individual animal (i.e. it will be case specific) and can only be assessed by spending time with the animal in order to determine the most appropriate safe working area. Some species (e.g. right whales) are very flexible and the danger zone can change quickly as the whales roll and pivot. Circumstances can also change rapidly, e.g. if cutting a line results in pain for the whale it may respond, and thus the response teams need to be constantly aware of potential warning signs⁹. The designated danger zones may also include areas where the whale might go (in front) as well as behind the animal relating to trailing gear.



Fig. 1. Schematic showing example danger zones

⁹ E.g. reference was made to indications that if a right whale lifts its head out of the water there is an increased potential for dangerous behaviour and thus it is sensible to back away.

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It is always acceptable to stand down operations at any time the team feel that it may be operating outside safe practices; all involved should support the field teams in that decision. In making such a decision, responders must put aside non-safety related pressures e.g. worrying that a fishery will close down or that a whale will die.

An additional safety-related matter to consider is responder fatigue and when this becomes problematic i.e. affects judgement and performance and thus lead to a pause or cessation of the operation. 'Acceptable' levels of fatigue will vary from person to person, and can be difficult to recognise, particularly mental fatigue. Multiple responses over days can also increase fatigue. Good tools and applied protocols can reduce physical fatigue if used properly.

There was some discussion about whether right whales could be considered in a higher risk category (to responders) than other species. Whilst there did appear to be more incidences of dangerous/extreme reactions with right whales, such reactions did occur with other species; all wild animals have the capacity to be unpredictable and dangerous.

There was also discussion of whether the level of energy and unpredictability of whale behaviour is related to how recently it has become entangled e.g. are recently entangled animals more dangerous than ones that have become habituated to the attached gear? It was noted that the KwaZulu-Natal Shark Board may delay responding to a recently entangled whale to give the animal some time to adjust and become tired. However, whilst there are instances of very recently entangled whales showing 'extreme' responses, there can also be instances of such behaviour from whales that have been entangled for longer periods. In summary, responders should remain alert and observant in all circumstances.

In conclusion, the Workshop **recognises** the complexity as well as the importance of agreeing on 'danger zones' for each entanglement event and maintaining the option to stand down as circumstances demand. It **draws attention to** the importance of excellent communication during entanglement response amongst all crew members and other parties (e.g. teams on shore) involved and the need to operate within the capabilities of the personnel and the environmental conditions.

It **agrees** that:

- (1) whilst it is most appropriate that the person with most experience is ultimately responsible for designating the danger zone, the whole team should agree over the course of action – thus if any team member has reservations these must be discussed;
- (2) the situation should be kept under review throughout an event – the danger zones may change over time and responses to contact with the whale should be tested and reviewed at each stage;
- (3) where possible, one team member should be designated to observe the whale during the event to give as much warning as possible when warning signs from the whale are observed (and see the discussion under Item 5.2.1 with respect to keggings buoys and floating control lines to assist in tracking whales under water);
- (4) the helmsman position is very important, as they must get the team into the exact position to carry out a specific action and be able to retreat from that position quickly – it is thus preferable that they have experience in operating a small vessel around whales and are familiar with the manoeuvrability and sea handling capabilities of the vessel; and
- (5) with respect to a decision to 'stand down', whilst there should be discussion within vessel between all the responders, nothing supersedes the responsibility and authority of the master of the vessel for safety of the vessel and crew - in making such a decision, responders must put aside non-safety related pressures e.g. worrying that a fishery will close down or that a whale will die;
- (6) in addition to whale behaviour and environmental conditions, fatigue is an important safety factor to consider in the context of 'standing down' – it is a team responsibility to identify fatigue that requires a combination of self- assessment and monitoring of each other.

With respect to fatigue, the Workshop also **agrees** that the issue should be highlighted within the training workshop and it encourages trainers to consult with medical colleagues on standard signs of physical and mental fatigue (developing a list of typical signs could be one topic for a future workshop).

Several examples were shared in the context of pressures on the response team. In conclusion, the Workshop **agrees** that:

- (a) situations where only a single expert is deployed to work with an unfamiliar and inexperienced local team should be avoided - ideally at least two expert responders are required;
- (b) it is best practice for support teams to handle the logistical considerations (e.g. arranging a support boat or medical assistance) as much as possible to also minimise the pressure (and work load) of the expert responders.

5.2.4 Overall comments

The Workshop noted the issues raised under Items 5.1. and 5.2. Safety issues have always been highlighted as the overarching factor of entanglement response efforts and the IWC Principles and Guidelines. In addition, there was some discussion of the affiliation of response teams that can comprise government employees, volunteers or a combination, and the insurance and liability requirements. The need to consider insurance and liability is included in the training curriculum.

The Workshop noted that are great advantages in this context of at least some government involvement in terms of licensing and oversight. It notes that the value of governmental involvement and oversight is part of the IWC training workshops. In conclusion, the Workshop **recommends** that governments:

- (1) **ensure** that they are aware of entanglement response efforts in their countries;
- (2) **explore** means of oversight of entanglement response operations, including the development of appropriate protocols, guidelines and licensing systems in the context of local need.

Recognising that arranging for insurance is the responsibility of responders, networks and governments, the Workshop also **recommends** that the issue continues to be highlighted during the training workshops and taken seriously by all concerned.

Finally, the Workshop **stresses** the importance of ongoing sharing of experiences regarding near misses, serious human injury or fatality and **recommends** that networks and governments report back to the GWERN promptly on such events so that lessons can be learnt.

5.3 New tools and procedures relevant to safety

5.3.1 Sedation

PRESENTATION

S. Sharpe provided an overview of research into sedation of whales at sea. Sedation of entangled whales at sea has been used in the past in the US as a tool to assist with difficult disentanglements. Potential benefits include: facilitation of directed approaches to entangled whales; reduced need for physical restraint to maintain control of the whale; improved responder safety; improved whale safety; provision of analgesia; decreased time needed to be spent in close proximity to the whale; and ultimately increased likelihood of disentanglement success. Concerns and challenges of sedation include human and whale safety; the immediate nature of response (and varying local capacity regarding trained personnel, drugs and equipment); weight estimation and dosing; and post-sedation monitoring. In the US, there have been three cases of entangled whales (all North Atlantic right whales) where sedation attempts were made (Eg #1102 in 2001, Eg #3311 in 2009, and Eg 3911 in 2011) to facilitate disentanglement. A ballistic system (made by Paxarms, Inc.) was specifically developed for this purpose and the sedative combination employed was Butorphanol and Midazolam at a dose of 0.1mg/kg each. In the last case (#3911), this sedative combination was found to decrease the whale's boat avoidance and allow (previously impossible) directed approaches to the head of the animal, which enabled disentanglement.

In an effort to further this work, IFAW has received a two-year grant to work closely with the Center for Coastal Studies to perform a pilot study to further test the efficacy and refine protocols for sedation of entangled large whales in the Gulf of Maine. The target sample size is four per year, and the Gulf of Maine was selected as the study area to increase the number of cases by including humpback whales. The primary target cases for use of sedation operationally is an animal with a head or mouth wrap that is free-swimming, but this experimental work may not be restricted to only these cases in order to have an appropriate sample size.

As part of the project, case selection criteria will be developed based on a review of 10 years of CCS entanglement cases to better determine which cases could most benefit from the application of sedation. An economic analysis of the viability of establishing and maintaining sedation as a tool for disentanglement is being

conducted. An Advisory Panel of experts has been created to help guide this iterative process. UAV (unmanned aerial vehicle) support will be used to help evaluate entanglements and obtain photogrammetry data to improve weight estimates for sedative dosing. Both sedation and UAV operations will occur from a separate veterinary vessel operated by IFAW that will support CCS's disentanglement operations without interfering in them. This project's first field operational season will occur in summer 2018. The eventual goal of this project is to share the protocols and equipment developed with other network partners across the US and around the world.

DISCUSSION

A number of issues were raised with respect to safety (human and cetacean), practicality and the applicability of sedation techniques outside the USA.

It was noted that the operational protocol when working with Eg#1102 in 2001 was to avoid too many passes so as not to get the whale excited before darting. Whilst recent work with hormone analysis has revealed that animals may have experienced elevated stress for some time before a response event, S. Sharp commented that even if the whales are experiencing chronic stress from the entanglement, there would still be benefit to reducing acute stress with sedatives.

With respect to the issue of secondary toxicity, if the whale remains alive following sedation, the drugs should be metabolised within days to weeks. However, if the animal dies, it is a concern that there could be residues in some tissues. The issue of potential chemicals for sedation and euthanasia and secondary toxicity issues was discussed at the 2013 IWC workshop on euthanasia (IWC, 2014).

From an operational perspective, it was noted that teams must maintain alertness after sedation attempts, as the animal may still react dangerously¹⁰. The anticipated effect of the sedation is that the animal will maintain its ability to breathe but will pay less attention to external stimuli and therefore permit close approaches by the response boat, particularly to the head and pectoral flippers. The example was presented that a North Atlantic right whale that demonstrated avoidance measures prior to sedation, swam straight after sedation allowing the response team to approach.

S. Sharp noted that, although the needle is not barbed and is designed to back out on its own or be pulled out via the tether, in some cases the needle may remain in the whale's body. If it remains in the whale, the primary concern is shearing between the muscle and the blubber layer, so the best body position for the needles (based upon necropsy measurements) is near the dorsal midline and as cranial as possible. Some concern was also expressed that cases may occur where the needle does not penetrate far enough and the sedatives would be injected into the blubber. The main impact of this would be that the dose would be less than needed for effectiveness within the expected time i.e. the whale would experience a slower release of sedatives into the bloodstream over a longer time period.

In addition to human safety concerns over the use of highly concentrated sedatives in a small boat some participants commented that (1) the drugs (and the very high concentrations) being proposed may not be available in all countries (discussions with local veterinary experts will be required); and (2) whilst the concentrations proposed in the US may be able to be delivered in a single dose, multiple darts may still be required to administer multiple medications (e.g., antibiotics or reversal agents) with associated potential risks.

In conclusion, whilst recognising the practical difficulties, the Workshop **welcomes** the study by S.Sharpe and looks forward to receiving information as it emerges.

5.3.2 Safety training, cutting grapple and medical

Lyman provided an overview on safety trainings and how these can reduce risk and help address 'what if?' and 'close call' scenarios associated with large whale entanglement response. The scope of such trainings can run from basic to more advanced depending upon mission objectives/need and experience/capacity of responders and trainers. The presentation focussed on more advanced training for established teams, where personnel roles have

¹⁰ The Workshop agreed that although common practice, it was inappropriate to use terms such as 'aggressive' or 'defensive' that diagnose (perhaps incorrectly) a whale's behaviour – it therefore uses the term 'dangerous' throughout this report in the context of dangerous to the safety of the response team and encourages others to do the same.

been identified and refined and people focus on their strengths. First level trainings are quite general with everyone trying all skills. Trainings involve classroom and hands-on components and evolve over time with need and experience.

The evolution of hands-on components of training include: more attention to individual roles; greater repetition; greater use of ICS¹¹, more realistic scenarios through the use of models (e.g. of the tail flukes), and greater scenario-based training that incorporate potential scenarios such as medical emergencies and responders getting caught in gear. The use of any tool requires the user to be familiar with its appropriate use and testing, hence the importance and value of associated training. Role-specific training examples included the use of sUAS (small Unmanned Aircraft Systems) platforms to allow assessment without humans physically approaching the animal, timed-release clips with telemetry and keggings buoys to reduce longer-term impacts associated with tethered buoys and use of pole-mounted cameras and streaming goggles to reduce proximity through use of longer pole systems. The goggles have narrow lenses that can still be seen around or through, so that there is still situational awareness. Scenario what-if training examples included the use of a cutting grapple thrown from a support vessel as a means to detach an approach vessel or worse yet, a person inadvertently caught in gear entangling an animal, and medical emergency, such as a person suffering physical trauma (e.g. neck and back injuries) from being hit by an animal. While there is no obligation for anyone to respond, if one does, there are obligations that should be met.

The Workshop **thanks** Lyman for his presentation and in conclusion, **recommends** that entanglement response teams regularly undertake emergency and rescue drills based on potential scenarios they may encounter during entanglement response operations.

5.3.3 GAR assessments

Lyman provided an overview on the use of Green Amber Red (GAR) risk assessments in large whale entanglement response. This uses checklists and a tool to help quantify and assess risks. While operational risk assessment is emphasised to help mitigate risks to responders, risks associated with large whale entanglement threat resides around both the animal (i.e. evaluating impact and threat) and with authorised response efforts (i.e. operational). The two are intertwined. Any risk assessment should take precedence to any actions taken and be reviewed as a continuous process performed throughout any response (and see discussion under Item 5.2.3). Debrief or after-action reports, another means of evaluating and mitigating risk, represent case studies that contribute to future GAR risk assessment use. A typical marine GAR considers supervision, team qualifications, fitness, planning, environmental conditions and mission complexity; all relevant for large whale entanglement response. However, GARs can be tailored to one's particular mission. Like any tool it needs to be used appropriately with knowledge of how the tool works and it should involve all members of the team. It was stated that even though large whale entanglement responses don't happen often, the unique nature of the response and the risks involved, dictates the need to be prepared and manage associated risks.

In discussion, a question was raised for networks with relatively little experience and whether that results in a high value for risk which cannot be mitigated. Lyman reiterated that a main utility was as a reminder of the different safety aspects of the response that should be considered and discussed by the team members. It can be a useful preparedness and training tool with the focus on those aspects that are under the control of the team (e.g., experience with boat handling, familiarity with tools). However, he cautioned that even if most issues are 'green', even one 'red' issue (i.e. assessed as high risk) can and should prevent the team from deploying or should result in tailoring of the response.

The Workshop **thanks** Lyman for his presentation and in conclusion, **recommends** that entanglement response teams undertake risk assessment using tools such as that given in Annex F.

5.3.4 Other

Ledwell demonstrated several tools used in Newfoundland. Because the region has to deal with large whales entangled in heavy ropes from snow crab and whelk pot gear (9/16 in.) involving multiple wraps in deep offshore waters, dedicated cutting tools have been developed by the programme to deal with this situation. He presented a cutting grapnel with four tines, a flying knife and a regular fixed knife, all with replaceable blades.

¹¹ The Incident Command System (ICS) is a standard approach to the command, control, and coordination of emergency response providing a common hierarchy within which responders from different agencies can be effective.

The Workshop expressed admiration for the tools presented and Ledwell agreed to respond to requests for information about how to procure them.

At a more general level it was noted that the present approach for purchasing tools is somewhat piecemeal. Few, if any groups have a large pot of capital to purchase extra tools to have on the shelf for spares or for new teams. In many cases there is a reliance on the greater network to share. Under specific circumstances (e.g. after training), the trainers may leave drawings of the basic tools to allow tools to be locally made.

Recognising the need for all teams to be properly equipped with safe, tested tools, the Workshop:

- (1) **agrees** that the general spirit of GWERN has been to share information and for information on new tool developments to be open source, and that this should continue;
- (2) **reiterates** (e.g. see IWC, 2016) that new or modified tools should be tested prior to use on a response (there is anecdotal evidence that in some cases even small changes have resulted in poorer performance);
- (3) **stresses** that tools should only be made available with the training, or be provided to trained and authorised responders;
- (4) **requests** CCS to continue to compile and archive tool information on their website and to add new developments; and
- (5) **draws attention to** the value in advance investment in tools to ensure sufficient supplies to deploy for entanglement response when needed.

There was also some discussion of other types of equipment: protective headgear and spare air tanks. A variety of types of helmets are being used. Some desirable attributes identified were: a range of vision, good fit (some have inflatable interiors to customize fit); integrated communications; and a weak link on the chin strap to allow it to breakaway if gear was caught on it. Helmets with a full visor face shield are used with the face shield down in limited situations, mostly when a pole is being used.

The option that small portable air tanks are carried by each individual in case they are pulled underwater was considered but it was noted that the added bulk may render this infeasible. In Western Australia, they have trialled the use of a small pony bottle¹² for the bow responder to look in the water, in place of a snorkel. They have found that it was more successful (especially in rough seas) and reduced the fatigue of the responders.

5.4 Implications, if any, for IWC Principles, Guidelines and Training

The Chair recalled that a primary aim of discussions under Item 5, and especially under Items 5.1 and 5.2, was to review whether there was a need to modify (a) the IWC training programme and (b) the IWC principles and guidelines (as opposed to countries own protocols). The Workshop undertook a thorough review of these.

5.4.1 Review description of training

Mattila summarised the current strategy and curriculum for the IWC capacity building (IWC, 2013) that appeared to be working well. Limited evaluations of the training courses have been undertaken with very positive feedback, but little constructive criticism that would help improve the course. There has been no longer term official follow-up testing of what was retained by the participants.

There is a three-part strategy:

- (1) engagement with the country that has asked for more information on the issue of entanglement and of capacity building - there is now a summary that can be circulated in a number of languages that could be reviewed after this meeting to check that sufficient emphasis on risk involved and safety;
- (2) detailed discussions with the primary contact on details of potential training, including criteria that would be used to identify trainees; and

¹² a small diving cylinder which is fitted with an independent regulator – often carried by a scuba diver as an extension to the scuba set.

- (3) training (see outline of two-day training given in annex G of IWC, 2013) – again, this should be reviewed after this meeting to check that sufficient emphasis on risk involved and safety.

Referring to safety training, Mattila stated that fundamental principles are run through in both the classroom and the boat-based training. Whilst there are common mistakes that people make that can be pointed out (e.g. collecting gear inside the boat), it can be a challenge to get people to understand their real importance where there is no real risk during training.

It was noted that simulation programmes being developed in Australia were discussed at the 2011 workshop (IWC, 2013) and are noted as a potentially valuable training tool in IWC (2013, p. 435). The present workshop was informed that although significant development had been undertaken, funding became an issue and it was never completed. The concept is still there, and it is completely interactive and allows responders to address changing conditions. It could still be further developed if funding was identified.

The Workshop **reiterates** its previous **strong encouragement** (IWC, 2013, p. 424) that this simulation training program for entanglement response be completed, recognising the funding issues involved.

5.4.2 Repeat training and apprenticeships

In response to a question on the appropriate frequency of repeat training, Mattila stated that he recommends at least one training per year before the peak season to make sure all the tools are in working order and that responders are refreshed in their use; responsibility lies with the individual countries.

Experiences of some individual countries were shared. Western Australia holds a 3-day introductory course including deployment of telemetry equipment, and each person is required to do a one-day refresher annually. The state of Victoria offers a nationally accredited course on request and other Australian states undertake annual refresher training, usually over one day. In New Zealand, there are three days of training offered each year; if responders can only participate in one training day, they are assigned to the support vessel.

The second Workshop (IWC, 2013) had stressed the value of apprenticeships and participants at the present workshop stressed that these can be a very valuable way of responders getting more hands-on experience (especially if they are from regions where total numbers of entanglements are small) and deepening their knowledge. However, it was noted that funding was limited.

In conclusion, the Workshop **stresses** that it is essential that follow-up training occurs after the initial trainings. The Workshop:

- (1) **recommends** that, at a minimum, teams should conduct an inspection of the tools and a refresher training once a year, ideally just prior to the primary whale/entanglement season;
- (2) **reiterates** the importance of ‘leadership’ apprenticeships (see IWC, 2013, p.435) and **recommends** that efforts are made by governments requesting training to raise funds for these; and
- (3) **encourages** the IWC to establish a funding stream within the IWC entanglement fund in memory of Doug Coughran as a tribute to his immense contribution to entanglement response and in recognition of his getting his start during an apprenticeship supported by a Churchill Fellowship.

5.4.3 Discussion on euthanasia

It was noted that euthanasia is covered in the training document, but there is no guidance on how to conduct euthanasia at sea. The workshop recalled that the impetus for the IWC workshop in 2010 (IWC, 2012) was a discussion of how to euthanise moribund entangled whales at sea. The topic was also discussed at the 2013 Workshop on euthanasia protocols to optimise welfare concerns for stranded cetaceans (IWC, 2014), which explored whether there had been any additional techniques or approaches developed for euthanasia at sea and discussed the potential new use of the penthrate grenade. Outputs from these workshops included a decision tree and list of options - there could be value in reviewing this advice but there is not time or sufficient expertise at the present Workshop.

There was a brief discussion on whether there was a need for conducting at-sea euthanasia. Some reported that they had experienced cases where the animal should have been euthanised, but it was not always clear and there was no ‘best’ way to determine whether euthanasia is the most appropriate course of action. In other cases,

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participants did not have methods at their disposal that was guaranteed to have immediate results and/or safe for responders to use. Others did not have any allowance for euthanasia in their entanglement policies and protocols. It was noted that Norway is planning a course for inspectors on how to euthanise whales if necessary using a large calibre gun.

The Workshop **recalls** previous work on euthanasia at sea (e.g. IWC, 2012; 2014) and **agrees** that there should be a further review of this work and associated guidance in the future if new information is identified or further guidance required.

5.4.2. Review Principles and Guidelines

The Workshop referred to the extensive discussions on safety under Item 5 and thanked all participants for their contributions. In this light the Workshop undertook a thorough review of the Principles and Guidelines contained in IWC (2013, pp. 431-3).

In conclusion, the Workshop **agrees** that although no major changes are required to the existing Principles and Guidelines, in a few places the emphasis could be strengthened and wording clarified. This was done and the Workshop **recommends** to the Commission the revised Principles and Guidelines given in Annex F.

The Workshop also **recommends** that the GWERN develop a standard incident interview process and report, including for accidents and for near-misses, for consideration at the next Workshop.

5.4.3 IWC 'Disclaimer'

The Workshop reviewed a draft disclaimer (SC/J18/GWERN/01) been developed in consultation with lawyers to cover all IWC activities where advice is given in relation to animal handling developed. It noted that events where human safety is compromised can also compromise future activities and agreed that this should be added to the final disclaimer as given as Table 2.

Table 2

IWC liability disclaimer

Whales are large and powerful wild animals and any activity involving human interaction with a whale is potentially dangerous. Human safety is paramount. Events where human safety is compromised can also compromise future activities.

The IWC works with national governments to offer general advice, including guidance and good practice protocols, on a range of activities which involve interaction with cetaceans. This advice is often the result of consultation with the world's leading authorities on specific issues or activities. These activities include, but are not confined to, entanglement and stranding response, satellite tagging, and hunting practices for aboriginal subsistence whaling.

Whilst personal safety is paramount in all IWC advice, it can never be guaranteed. Accordingly:

- (a) any person relying on that advice does so in the full knowledge of the risks to their personal safety and life (and, where applicable, to the personal safety and life of others) posed by engaging in any interaction with a whale;
 - (b) individuals accept and take full legal responsibility for their own acts or omissions when engaging in any interaction with a whale; and
 - (c) (in so far as permissible by the applicable law) the IWC accepts no liability for death, injury, loss or damage sustained during interactions, or intended interactions, with cetaceans including, in particular, any liability for any consequential costs or losses, special costs or losses, exemplary or punitive damages, costs or losses or any damages, costs or losses attributable to lost profits or opportunities.
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In conclusion, the Workshop **endorses** the IWC liability disclaimer given in Table 2 and **encourages** the IWC Secretariat to give consideration (including advice on format) as to how this document can be signed at trainings.

5.5 Advice to the thousands of untrained fishers (especially artisanal fishers)

Mattila gave a presentation on responding to cetacean entanglements in artisanal gillnet fisheries. At the last meeting (IWC, 2016), there was some discussions as to what advice might be appropriate to give to fishers who have a whale in their gear, but no trained responders in their country/region to call upon. Human safety was stressed as most important, along with the need for documentation and reporting to the proper authorities. Since

that discussion, there has been increasing awareness that large whale entanglement is a significant problem, logistically and financially, for many artisanal fishers, with numerous requests for advice.

Mattila presented a condensed version of a presentation given to a workshop held at the 22nd Biennial of the Society for Marine Mammalogy (held in Halifax, Nova Scotia in 2017). It included summaries of ‘common sense’ instructions developed by Ledwell. In addition, some simple, inexpensive tools were suggested. Two examples were also presented of brochures that have been prepared with fishers in Mexico and Alaska.

There was considerable discussion of the complexities of this issue. Clearly, it is a serious issue in many parts of the world and it is likely that at least some and perhaps many fishers will respond when a whale is entangled in their gear – in such circumstances there is a need for some guidance. However, providing specific advice on disentanglement itself goes against the fundamental principle that given the dangers to humans and whales, only trained experts should respond to entangled whales. It was agreed that the first option should always be to call in expert responders, recognising that much artisanal fishery effort is in remote areas where there may be no expert teams, and that the scale of the problem could overwhelm remote experts such as the GWERN. Some suggested that advice could be focused on what fishers should *not* do - including the advice on minimal or no interaction with the whale- to preserve human safety.

It was clear that this issue of the provision of advice to untrained fishers could not be solved at the present Workshop. The Workshop therefore **agrees** that a small working group should work intersessionally on the issue, taking into account the interventions made. The Terms of Reference for group are given in Annex G and the membership of the group is Mattila (convenor), Bachman, Frisch, Goleva, Landry, Jensen and Tarzia.

6. OTHER ISSUES

6.1 Animal Welfare

6.1.1 *Report of the IWC workshop in South Africa and the welfare ‘framework’*

Simmonds gave a presentation on a draft IWC ‘Cetacean Welfare Assessment Tool’ (SC/J18/GWERN/INFO/02) being developed in the context of the IWC’s Welfare Action Plan and in a joint project between the Royal Veterinary College (RVC) in London and Humane Society International, supported by the UK Department for Environment, Food and Rural Affairs (Defra). The project is led by Professor Christine Nicol of the RVC and the approach is based on a modified application of the ‘five domains model’ (Beausoleil and Mellor, 2015 and Mellor et al., 2015) using a carefully structured expert evaluation. This has been progressed through two workshops and various stages and, most recently, two hypothetical case studies have been explored, one related to marine debris and the other to whale-watching. Trial assessments were presented at the recent meeting of the IWC Scientific Committee and, from discussions there, collaborations are being set up to explore some real case studies in the context of whale watching. These further trials will be combined with further expert consultations used to conclude how the process will work and a report on the development of the Tool will be presented to the Commission at its September meeting. Simmonds emphasised that the aim was to develop a science-based approach to welfare assessments for wild cetaceans and that, once the protocols have been fully developed, they might be applied to the evaluation of a range of issues including comparing different welfare responses.

GWERN was originally formed under the IWC’s Working Group on Whale Killing Methods and Welfare Issues (WKM&WI) in recognition of the threats to cetacean welfare posed by entanglement. Several participants commented that it was difficult to see an immediate application of this tool in the context of entanglement response, whilst recognising that the aspiration is to move towards a tool able to inform decision-making in an objective way.

In conclusion, the Workshop **thanks** Simmonds for this information and **agrees** to consider the IWC ‘Cetacean Welfare Assessment Tool’ again at a future workshop when it has been further developed.

6.2. Entanglement response in international waters

6.2.1. *POWER cruise and offshore vessels*

Mattila and Matsuoka expanded upon the 2015 training conducted for the crew and scientists of the IWC-POWER cruise. This was the first training for the crew of a vessel planning to operate on the high seas, in largely international waters. It is obvious that any response that far from shore, can only be undertaken with

careful forethought and only with the consent of the Captain. The POWER cruises have observed two entangled whales (i.e. a sei whale calf and a Bryde's whale calf) between 2010 and 2017 during almost 20,000 n.miles of search effort when there were sightings of 1,868 large whales, including 256 sei whales and 137 Bryde's whales.

Since the 2015 training, the IWC Secretariat has received two requests for training from private entities that would be operating in international waters. The current protocol for training requests is that they come through the relevant national government – for offshore situations the policy is for the requesting entity do so through the most relevant government (e.g. home base of the organisation, or flag of the vessel).

The Workshop **recognises** the value of extending training to those operating in international waters but **draws attention to** the significant practical and safety concerns including: very limited use of small vessels; need to modify methods and equipment (e.g. longer poles; use of cutting darts etc.) for use from large, less manoeuvrable vessels. It **agrees** that a request from the flag state of the vessel in question for training is the most favourable option and **suggests** that response might need to be prioritised towards highly endangered species.

6.2.2 FADs

Mattila noted that there is a significant fisheries effort in international waters, and that some of the gear used is a risk for entanglement. In particular, the increasing numbers of FADs (Fish Aggregating Devices) are of concern (and see Item 6.2.2), as whales are reported to interact with them (e.g. sei whales in the Indian Ocean). It has been estimated that the number of FADs has increased by around 30% between 2011 and 2013. The 2013 number was conservatively estimated to be over 100,000 excluding the thousands of artisanal FADs used coastally.

Rinaldi gave a presentation on the experience with FADs in Guadeloupe. Various bodies and organisations, including the IWC, encourage: (1) the reporting of every case of cetacean entanglement in order to better understand the extent of the problem, its ways of actions and effects on populations; and (2) the development of mitigation actions such as preventing rope and net discard at sea, developing entanglement-proof devices and developing safe methodologies for disentangling large animals. Maternal groups of sperm whales are known off the Caribbean side of several islands of the West Indies coming and going from island to island. In Guadeloupe, these groups have been subject to continuous monitoring and photo-identification by *Association Evasion Tropicale* (AET) since 1998.

From 1998-2009, the Guadeloupe Stranding Network, coordinated by AET, reported only one case of entanglement of a pantropical spotted dolphin. Since 2010, 11 entanglement cases have been reported, including 3 humpback whales, 5 sperm whales, 1 bottlenose dolphin and 1 Cuvier's beaked whale. Most were recorded during AET's monitoring fieldwork, with approximately the same amount of time spent in effort each year suggesting that entanglements have become more frequent in this area. It was usually impossible to determine the cause of the entanglement but it was assumed to be local FADs or other local fishing materials. Sperm whales, especially young ones, are observed occasionally interacting with FADs. In 2016, an entanglement in a FAD was positively identified with the case of a badly entangled juvenile female sperm whale.

FAD is the main type of fishing used in the Caribbean. Estimates show that there are up to 250 FADs in Guadeloupe waters. About 200 sperm whales are found in family groups in these waters. The growing number of entanglements of cetaceans reported in Guadeloupe waters, suggest the need to urge Caribbean communities to develop mitigation actions such as preventing rope and net lost or discarded at sea and specifically devising entanglement-proof devices. Rinaldi identified the need, for the Guadeloupe archipelago and other Caribbean countries, to: (1) ask fishermen and other sea users to report all entanglement cases; (2) survey FADs and fishing traps around each island; (3) survey and identify ghost nets and other fishing materials encountered at sea; (4) study ways FADs are designed and methods used by fishermen in each island and (5) discuss the entanglement concern and ways to prevent entanglements with fishery departments and fishing communities.

Ledwell and Lyman reported experience of working with FADs in the Pacific. Here, a wide variety of material was used in FADs, with fishermen seeking stronger material (e.g. cables) that will not be cut by sharks or by boats. In some cases, FAD development had been supported by international development aid (e.g. some FADs in Guadeloupe had been supplied by the EU). An increase in the use of FADs around the Hawaiian Islands was noted.

In conclusion, the Workshop **expresses concern** at the rapid development of FADs in many parts of the world and the links with entanglement of cetaceans. It therefore:

- (1) **draws attention to** the potential unintended impacts from development aid response - FADs that are less likely to be lost will also make it harder for whales to break free;
- (2) **agrees** that the level of interaction of animals with FADs (particularly young animals) could increase risk of entanglements (and potentially of ingestion of debris);
- (3) **encourages** the further investigation and collection of data on FADs and entanglements, especially in waters where FAD use is increasing (e.g. the Caribbean and Pacific), noting that addressing the issue whilst FAD use is still nascent/expanding; and
- (4) **recommends** that FADs be an item on the proposed IWC workshop on marine debris.

7. ADMINISTRATIVE AND COMMUNICATION ISSUES

7.1 Consideration of draft Terms of Reference (ToR) for Expert Panel

Mattila recalled that the Expert Panel has been operating since 2011 to respond to requests for expert assistance and advice. He noted other IWC Expert Panels have more detailed TOR and suggested something similar could be developed for the Entanglement Expert Panel. This could facilitate consideration of items such as succession planning. Draft TOR were made as available for discussion (SC/J18/GWERN/07).

The Workshop **stresses** that the Expert Panel has worked well so far and that it is important not to over-complicate the ToR and *modus operandi* or make them over-restrictive. On this basis, the TOR were revised (see Annex H) and the Workshop **recommends** these to the Commission.

7.2 Updates on Points of Contact list

Mattila noted the importance of points of contact (POCs) within countries to disseminate information through their networks. In discussion, it was suggested that although the primary point of contact might not be a government representative, it important that they have good links into the relevant authorities and with the various experts within their country. In some cases, it might be advisable to have several points of contact for a country, for example, if it is large with very different species, gear and has or could benefit from a network structure (e.g. Australia, Canada, USA). It was further observed that Expert Workshops should continue to draw on technical expertise, although there may be occasions when it is advantageous to also have official POCs attend.

The Workshop **agrees** that the Coordinator should (a) work with the GWERN members to identify the most appropriate Points of Contact for their countries and (b) ensure that IWC Commissioners are kept informed of this process.

7.3 Procedure for handling requests for international training

IWC (2016) had agreed the procedure for prioritising requests for international training. This was reviewed again at the present workshop (and see Item 2.2.3).

The Workshop:

- (1) **endorses** the general process outlined in IWC (2016);
- (2) **suggests** consideration of some additional elements to address
 - (a) the importance of long-term funding
 - (b) the importance of liability and insurance
 - (c) a procedure to consider and prioritise requests for advanced training workshops (see Item 5.4.2)
 - (d) a procedure for considering and delivering apprenticeships (see Item 5.4.2)
 - (e) a procedure for identifying potential international entanglement response trainers; and
- (3) **requests** Mattila to review the procedure in the light of (2) above and circulate it to the GWERN for endorsement by correspondence.

8. CONCLUSIONS AND RECOMMENDATIONS

The Workshop covered a wide range of issues. The conclusions and recommendations can found highlighted in blue boxes under each agenda item.

9. OTHER BUSINESS

Simmonds introduced a new review of marine debris that had recently been submitted to the IWC Scientific Committee (Pierantonio *et al.*, 2018) and was originally produced for ACCOBAMS. The review provides an up-to-date account of scientific publications related to cetacean debris ingestion and entanglement. Simmonds commented that predictably more and more species were showing signs of interactions with plastic debris. There was also a significant increase in dedicated studies and also public interest (as shown by googletrends analysis). As reported previously, there are indications in the literature that deep diving whales may be especially vulnerable to ingestion. Simmonds also noted that much ingested debris originated in fishing operations.

The IWC is organising a further scientific workshop on marine debris which is likely to be held in December 2019 in association with the World Conference on Marine Mammals in Barcelona. Simmonds noted that agenda items will include consideration of FADs, the identification of best-practice protocols for post mortems and categorisation and analysis of recovered plastics; other ideas are welcomed. Finally, he commented that despite a huge increase in public interest in this issue the movement of plastics into the oceans was still predicted to increase and possibly by 2025 by an order of magnitude (Jambeck *et al.*, 2015)

Landry recalled previous GWERN discussions difficulties in distinguishing active fishing gear from marine debris and applauded the authors for their appropriate representation of this in their report.

The Workshop **re-iterates** importance of distinguishing between gear being actively fished and marine debris.

10. ADOPTION OF REPORT

The Chair thanked the participants for their enthusiasm and hard work in covering a large agenda including some sensitive topics. The report and the relationships built and/or strengthened during the discussions serves once again to illustrate the dedication and enthusiasm of responders around the world. Doug Coughran will be smiling down at us from his heaven free of entanglements. He particularly thanked: David Mattila for his untiring work in undertaking the difficult and often under-appreciated task of organising the Workshop and looking after everyone so well; Julie Creek of the Secretariat for her extreme patience in dealing with our complex travel requirements; the Center for Coastal Studies and Richard Delaney for hosting the Workshop; and the rapporteurs, Sarah Smith and Sarah Wilkin. The participants thanked the Chair for chairing the meeting with efficiency, fairness and good humour. The report was adopted by email on 26 August 2018.

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Annex A

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Annex B

Agenda

1. INTRODUCTORY ITEMS

- 1.1 Opening remarks
- 1.2 Chair and Rapporteurs
- 1.3 Review and adopt Agenda and documents
- 1.4 In memoriam

2. AWARENESS AND CAPACITY BUILDING SINCE 2015

- 2.1 Overviews from newly trained national networks
 - 2.1.1 Chile
 - 2.1.2 Norway
 - 2.1.3 Russia
- 2.2 Overall overview of IWC capacity building
 - 2.2.1 Summary of work since last meeting other than those covered under Item 2.1
 - 2.2.2 Future plans

3. INITIATIVES REGARDING PREVENTION SINCE 2015

- 3.1 IWC and other workshops
 - 3.1.1 IWC/NOAA prevention workshop
 - 3.1.2 SMM Biennial workshops
 - 3.1.3 FAO bycatch workshop report
 - 3.1.4 Ropeless workshops
 - 3.1.5 The Atlantic Large Whale Take Reduction Team (ALWTRT)
- 3.2 IWC initiatives
 - 3.2.1 IWC Bycatch Mitigation Initiative
 - 3.2.2 IWC Strandings Initiative
 - 3.2.3 IWC Conservation Management Plans (including entanglement response and prevention)
 - 3.2.4 Co-operation across boundaries - Fourth International Conference on Marine Mammal Protected Areas (ICMMPA4) workshop
- 3.3 Other prevention initiatives
 - 3.3.1 NOAA-MMPA import rules
 - 3.3.2 The Canadian Department of Fisheries and Oceans (DFO) actions in the Gulf of St Lawrence
- 3.4 Contribution of GWERN to prevention

4. DOCUMENTATION AND DATA COLLECTION

- 4.1 Improvements in assessment and documentation of events
 - 4.1.1 East coast gear analysis and protocols
 - 4.2.2 Analysis of biogeochemical markers from baleen samples
- 4.2 Determining gear/debris type and origin
 - 4.2.1 FAO gear marking guidance
- 4.3 Review of IWC global entanglement database

5. SAFETY

- 5.1 Review of accident in Canada
 - 5.1.1 Information provided by Canada
 - 5.1.2 Lessons learned and national changes implemented in the USA
 - 5.1.3 Overall comments
- 5.2 Review of accidents/close call from other countries relevant to guidance
 - 5.2.1 South Africa
 - 5.2.2 Newfoundland, Canada
 - 5.2.3 Discussion of 'danger zones' in the light of close calls
 - 5.2.4 Overall comments

REPORT OF THE 4TH IWC WORKSHOP ON LARGE WHALE ENTANGLEMENT ISSUES

5.3 New tools and procedures relevant to safety

5.3.1 Sedation

5.3.2 Safety training, cutting grapple and medical

5.3.3 GAR assessments

5.3.4 Other

5.4 Implications, if any, for IWC Principles, Guidelines and Training

5.4.1 Review description of training

5.4.2 Repeat training and apprenticeships

5.4.2. Review Principles and Guidelines

5.4.3 IWC 'Disclaimer'

5.5 Advice to the thousands of untrained fishers (especially artisanal fishers)

6. OTHER ISSUES

6.1 Animal Welfare

6.1.1 Report of the IWC workshop in South Africa and the welfare 'framework'

6.2. Entanglement response in international waters

6.2.1. POWER cruise and offshore vessels

6.2.2 FADs

7. ADMINISTRATIVE AND COMMUNICATION ISSUES

7.1 Consideration of draft Terms of Reference (ToR) for Expert Panel

7.2 Updates on Points of Contact list

7.3 Procedure for handling requests for international training

8. CONCLUSIONS AND RECOMMENDATIONS

9. OTHER BUSINESS

10. ADOPTION OF REPORT

Annex C**List of Documents**

Authors	Title
GWERN	
01 IWC Secretariat	IWC liability disclaimer
02 IWC Secretariat	Entanglement response international networking in North America
03 C. Rinaldi and R. Rinaldi	Report of disentanglement of a sperm whale (<i>Physeter macrocephalus</i>) downwind coast of Guadeloupe, French Caribbean
04 D. Mattila	Report of progress on the entanglement database
05 D. Mattila, B. Miller and E. Lyman	Report of the intersessional meeting to advance a Global Entanglement Database
06 E. Lyman	Review of IWC global entanglement database (PowerPoint)
07 D. Mattila	Draft Terms of Reference and modus operandi for the Expert Panel on large whale entanglement

Annex D

Potential general components for a transboundary Memorandum of Understanding or Co-operation amongst States

1. FACILITATE COMMUNICATION

1.1 Annual pre-season meetings

- (1) Annual meetings of National coordinators (and key Regional Coordinators)
- (2) Meetings of coordinators (and possibly key responders) on both sides of a border (physical or virtual)
- (3) Sharing of relevant phone trees and contact lists
 - (a) POC for responses
 - (b) Relevant CG or Navy contacts if cross-authorization exists

1.2 Effective sharing of information about “on-going” cases

- (1) Share Network web site membership
- (2) Send periodic alerts on potentially transboundary cases (e.g. email lists, texts...etc.)

2. CO-TRAINING AND STAFF EXCHANGES

2.1 Consider potential secondments

2.2. Co-trainings with border teams

- (1) Standardise components of training, understanding variation for species or regions
- (2) Adhere to international protocols (i.e. IWC consensus “best practices”)
- (3) Use relevant aspects of IWC consensus curriculum (with changes for the level of the trainees and the region)

2.3 Apprenticeships

- (1) CCS apprenticeships where appropriate (see attached description)
- (2) Identify other potential apprenticeship locations (e.g. Monterey, Newfoundland....etc.)

3. SHARE EQUIPMENT (SEASONALLY OR JOINT STOCKPILE)

3.1 Possible shared tool stockpile for replacement

3.2 Telemetry buoys

3.3 Unique or specialised tools

4. FACILITATE COOPERATION DURING EVENTS

4.1 Getting properly trained responders to event (no matter which side of the border they come from)

Facilitate (emergency) exchange across borders, as needed

4.2 Facilitate operations that cross borders

- (1) Pre-clearance of vessels (and people)
- (2) Proper “notification” protocols

4.3 Sharing equipment across a border (quickly for a specific ongoing event)

5. COOPERATION FOR EFFECTIVE “FOLLOW UP”

5.1 Sharing “gear” expertise

- (1) Identify gear experts for each country/region
- (2) Use this MoU, and others, to identify gear experts and/or PoC for countries outside of the Trilateral “network” (e.g. Central America, Russia, Japan, Korea)
- (3) Engage fishers in the process of post event (or post season) follow up on gear determination

5.2 Coordinate effective and standardised follow up on released whales (ID, health, outcome....etc)

- (1) National nodes for data
- (2) Identify key labs for cooperation (Photo ID, Genetics, health assessment....etc.)

5.3 Convene periodic post-season follow up meetings

- (1) Lessons learned from events, in order to improve safety and effectiveness protocols
- (2) Share information on released whales
- (3) Invite fishers to discuss gear retrieved

5.4 Cooperation for sustainable readiness

- (1) Leverage funds
- (2) Leverage agreements for “in kind” support (e.g. Navies, Coast Guards, Research facilities....etc)

5.5 Cooperation for consistent and correct messaging to public and media

5.6 Cooperation on prevention

Communicate for identifying modified gear

Annex E

Example of a Risk Assessment Tool

OPERATIONAL DISENTANGLEMENT RISK ASSESSMENT

Item	Score (Max 5)	Comments
Weather conditions	1	
Responder experience level	1	
Complexity of operation	1	
Animal behaviour	4	
Disentanglement gear condition	4	
Operating area	2	
Resources available	2	
Boat and crew fitness	2	
TOTAL RISK (out of 40)	17*	

WHALE RISK ASSESSMENT

Item	Score	Comments
Age class of animal	2 (max 5)	
Number of lines	2 (max 5)	
Number of wraps	2 (max 5)	
Lines cutting in	4 (max 5)	
Additional weighting of gear	0 (max 5)	
Degree of cyamid coverage	1 (max 5)	
Body parts involved	1 (max 10)	
TOTAL RISK (out of 40)	12*	

* Green = 0-14 (go low risk); Amber = 15-28 (use extra caution); Red = 29-40 (stop, high risk)

Example instructions and scores

Weather conditions	Scoring	Responder experience level	Scoring
Sea state 0	1	Level 5 responder	1
Sea state 1	2	Level 4 responder	2
Sea state 2	3	Level 3 responder	3
Sea state 3	4	Level 2 responder	4
Sea state 4+	5	Level 1 responder	5
Complexity of operation		Animal behaviour	
Whale risk score 6-12	1	Anchored animal	1
Whale risk score 13-19	2	Free swimming (FS), approachable	2
Whale risk score 20-26	3	FS, short time at surface	3
Whale risk score 27-33	4	FS, evasive, terminating surfacing, short time at surface	4
Whale risk score 33-40	5	FS, evasive, short time at surface, others animals present	5
Operating area		Disentanglement gear condition	
Within 5-10 n.miles of shore	1	All gear needed is present (AGN), working, as new	1
Within 11-15 n.miles of shore	2	AGN, working, moderate condition	2
Within 16-20 n.miles of shore	3	AGN, working, bad condition	3
Within 21-25 n.miles of shore	4	Minor gear missing, majority working	4
Within 26-30 n.miles of shore	5	Moderate gear working, majority functioning	5
Greater than 30 n.miles		Majority gear missing, non-functioning	
Resources available		Boat and crew fitness	
Aircraft, additional vessel, mother ship	1	Crew well rested, boat great shape	1
Additional vessel, mothership	2	Crew well rested, boat good shape	2
Small additional vessel	3	Crew rested, boat fair shape	3
Only aircraft	4	Crew tired, boat good shape	4
No additional resources	5	Crew exhausted, boat poor shape	5
Age class of animal		Lines observed cutting into animal	
Mature adult (>20 years old)	1	No injuries noted or minimal injury to epidermis	1
Adult (9-20 years old)	2	Injury to cut through into superficial blubber	2
Juvenile (1-9 years old)	3	Injury cut through into deep blubber	3
Calf (<1 year old)	4	Injury cut through into muscle	4
New born (new born)	5	Injury cut through beyond muscle or into rostrum	5
No. lines observed on animal		Associated gear observed on animal	
One	1	Line	1
Two	2	Line and float	2
Three	3	Line and multiple floats	3
Four	4	One pot trap or similar gear	4
>4	5	>1 pot trap or similar gear	5

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Number of wraps observed on animal	Scoring	Degree of cyanid coverage observed on animal	Scoring
None	1	None	1
One	2	1-15%	2
Two	3	16-30%	3
Three or more	4	31-50%	4
At least one complete body wrap	5	>50%	5
Body parts observed to be involved (maximum score is 10)			
Mouth/rostrum	1	Thorax, ventral	1
Blowholes	1	Abdomen, dorsal	1
Flipper, left	1	Abdomen, ventral	1
Flipper, right	1	Peduncle	1
Thorax, dorsal	1	Flukes	1

Anticipated weather conditions and forecast	Is the forecast and expected weather conditions conducive to conducting a disentanglemt operation? Is there enough daylight remaining to initiate a disentanglemt operation, or is there adequate time to deploy a tag and regroup when conditions are better? What effects will changing weather conditions have on operations? Can adjustments be made quickly or operations terminated in the event that the weather deteriorates? Can any added equipment or drag to the animal safely be removed prior to leaving the animal at the end of the day?
Responder experience level	Do the responders have the proper training, experience and authorization to conduct the disentanglemt mission? How familiar are the crew with the entanglement configuration? How familiar are the responders with the operating platform? Do the responders have the equipment and experience to properly assess and obtain biopsy samples (also see Resources Available)? Do the responders feel comfortable in attempting to conduct a disentanglemt operation, is this true for everyone on board the responding vessel?
Complexity of operation	The value is taken from the Whale Risk Assessment Component. It focuses on: What is the nature and configuration of the entanglement? Are the flippers involved? Is the mouth involved? Are there significant injuries associated with the entanglement that would limit any additional drag being applied to the animal? Is there any trailing line behind the animal, enough to motor up to and acquire? Has the animal been the focus of a disentanglemt previously that might influence its current behaviour? Is the animal's behaviour uncooperative to attempt a disentanglemt (also see Animal Behaviour)? How much daylight is left for operations?
Animal behaviour	How approachable is the animal? Is the animal traveling, if so, how fast and what is the surfacing times, is it adequate to make any attempts? Has the animal been the focus of a disentanglemt previously that might influence its current behaviour? Is there more than just the entangled animal? Is it a mother/calf? Are the animals in a SAG?
Disentanglement equipment available	Are the appropriate disentanglemt tools available? Are there specialty tools needed to properly address the entanglement? Is there telemetry available to deploy to buy additional time to get the appropriate tools required? Are there multiple tools available in the event that a tool is lost overboard? Are there multiple cutting tools available depending upon severity of line constriction on animal?
Operating area	How far from shore is the animal (government small boat policies)? What resources will be available in a remote area where coast guard or medical services will not be easily accessible? Will boat traffic, floating debris or tidal/current changes have an impact on the operations?
Resources available	Are the appropriate resources available onboard the responding vessel (i.e. cutting and attachment tools, telemetry tag and buoy, additional floatation, documentation equipment, etc)? Are there any additional resources readily available if needed (e.g. coast guard vessel near-by, additional research vessels in vicinity, aircraft support, etc)? Do the responders have biopsy equipment? Is there a satellite phone available if VHF communication equipment doesn't work? Has a float plan been filed?
Boat and crew fitness	Is the boat in good working order? Has it undergone all needed recent preventative maintenance? Are all of the communication equipment onboard functioning properly? Is the crew well rested or were they required to drive long distances to get there? Has the overall mission compromised health or added stress? Do any of the response crew have medical conditions that might prevent them from safely participating in the mission?

Annex F

Principles and Guidelines for Large Whale Entanglement Response Efforts

DEDICATION

These Principles and Guidelines, originally developed in 2011 (IWC, 2013) are dedicated to the memory of Tom Smith from Kaikoura, New Zealand. A kind and generous man, Tom was a fisherman and conservationist who tragically died during an attempt to disentangle a humpback whale while he was in the water. Particularly as a result of this, and other human injuries recorded worldwide, an important motivation for these guidelines and principles is to try to prevent similar tragedies and to honour his family.

DISCLAIMER

While these Principles and Guidelines have been developed to try to maximise safe and successful operations, disentanglement operations are complex and can be unpredictable; following these guidelines does not necessarily guarantee personal safety, an animal's successful release, or operation in accordance with national rules and regulations (permits and/or letters of authorisation). All responsibility is upon the operator to undertake safe activities using their best judgment. the IWC and the authors of this document are not liable for any actions taken as a result of these Guidelines and Principles.

This is a living document, intended to be dynamic and evolving as new information and experience is gained. It is **not** an instruction manual.

OBJECTIVE

This document provides principles and guidelines for trained persons to safely and effectively respond to reports of entangled live whales at sea. The objective of an entanglement response is to remove all detrimental entangling gear safely from the whale and learn as much from the entanglement as possible to ultimately prevent entanglements from occurring. It is stressed that there is no obligation to initiate a response if it is deemed dangerous and is important to retain the option of standing down at any time during a response.

Approaching any entangled whale is dangerous. Actions by well-meaning untrained persons can worsen an entanglement, through a lack of subject knowledge and experience. For example, removing easily accessible trailing gear from entangled whales may leave the most critical components on a whale, making future, organised disentanglements more difficult or even impossible, potentially resulting in severe harm or death to the animal.

Regional entanglement response scenarios and complexities may require different techniques and strategies.

GOALS OF ENTANGLEMENT RESPONSE

- (a) Human safety.
- (b) Animal welfare.
- (c) Contribution to the conservation of large whale populations, recognising that prevention is the ultimate goal.
- (d) Data collection to assist with identifying key fisheries and whale populations and thus better specification of actual entanglement problems within a region to assist with mitigation and prevention.
- (e) Awareness of issues at all levels to improve reporting and appropriate measures to address issues (a)-(d).

1. GENERAL SAFETY

- (a) Whales can be dangerous and entangled whales are stressed. An apparently calm animal may quickly change behaviour and even apparently benign outside stimuli could impact the whale. Monitor their behaviour and act with caution at all times.
- (b) **At no time should an individual enter the water.** It is extremely dangerous and not necessary given the proper disentanglement training, tools and techniques. Almost two thousand successful disentanglements have occurred using boat-based techniques.
- (c) Do not put the whale's rescue above human safety at any time.
- (d) Only trained and authorised operators should participate in disentanglement activities. The person driving the whale rescue (and support) vessel should wherever possible be familiar with the vessel and operating around whales.

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- (e) Actions must be thoroughly thought through and planned, with full briefing to all **participants** and **team members**. All **participants** must be clear on aims, objectives, operational procedures risks and roles.
- (f) Do not secure a line from the whale to the vessel. Handling of lines attached to entangled whales poses significant risk of entanglement with the vessel and responders and severe injury from lines under load. Only the absolute minimum amount of line should be brought onboard a vessel (e.g. a bight) to minimise risk to the vessel and personnel getting caught in the gear.
- (f) In addition to focusing on the disentanglement itself, pay careful attention to the overall environment, including the personnel.
- (g) Actions must not be pressured by weather, time of day, onlookers, media, or a perceived need to act.
- (h) When in any doubt about safety or the success of the operation, stand down. If possible attach a satellite telemetry device for tracking and/or try again on another day with better support, conditions, and/or resources.

2. PERSONNEL

- (a) Human safety is the number one priority. Whilst human safety is the primary responsibility of everyone, whenever possible an individual should be assigned to monitor (and communicate) all aspects of safety, including the behaviour of the animal(s) and personnel.
- (b) Appropriately equipped, trained, experienced and authorised personnel should be used for the roles required and actions/efforts must be based on the qualifications of personnel on hand. Responders should: (i) research the regional requirements of injury liability and secure adequate coverage and (ii) identify the nearest medical resources.
- (c) Roles must be assigned to team members based on their experience, training, and overall qualifications.
- (d) Personnel should be monitored and monitor each other (e.g. for fatigue, dehydration, emotional state) at all times to maintain safety (and see (a) above).
- (e) Team members must be encouraged to speak up if they are not comfortable with a particular action or the general situation. Leaders must respect any concerns raised and not instruct personnel to take a role or action that they are not comfortable with.

3. PERSONNEL EQUIPMENT

- (a) All cutting gear and other equipment must be well-maintained, regularly checked and only used by trained personnel; new tools must be properly tested before use in an event.
- (b) Personnel working near or with entangling gear must carry emergency safety knives on their persons at all times. Teams should develop contingency plans for possible risk scenarios (e.g. person over board) and resulting complications.
- (c) Gloves must be used when handling lines or netting under load (e.g. attached to whale).
- (d) Helmets must be worn by personnel operating near the whale and/or using poles.
- (e) Appropriate attire and personal floatation/protection must be worn at all times. examples include pFDs, wetsuits, drysuits, worksuits that are snag-free (without straps, D-rings, and clips that can act as snag points for lines/gear).
- (f) Good communication amongst all involved in the response is essential: proper communication tools should be available (e.g. waterproof VHF handheld, cellular phones, appropriate in-helmet comms, satellite phones).
- (g) Sufficient water and food must be carried.

4. PLATFORMS

Response efforts are generally conducted from two vessels, a primary approach response vessel and a support/safety vessel. Consideration should also be given to the need for an onshore 'base' that monitors the response and has contingency plans to facilitate an emergency response if needed. Vessels must be suitable for

the roles they play and the conditions under which the response will occur. New or unfamiliar (to the team) vessels should be checked for potential snag points and operational constraints.

Primary response vessel (PRV)

- (a) This vessel is the main operational platform to assess, perform the entanglement removal and monitor the situation. It is essential that only disentangling staff and essential equipment be carried.
- (b) It should be maintained by a helmsman, a specialist crew member at the bow and a third specialist crew person to ensure trailing lines are clear of the engine leg and to assist the crew at the bow.
- (c) Its deck must be kept clear and free of loose objects and any other materials or equipment which may potentially interfere with the safe deployment of running lines during the operation.

Support/safety vessel

A support vessel is needed for safety reasons, to carry necessary personnel and equipment and to maintain adequate redundancy in communication systems (i.e. 'two is one, and one is none'). This includes human first aid and qualified staff to deal with possible emergencies, including an evacuation procedure.

5. ASSESSMENT

The following factors are used to determine whether an animal is a response candidate.

Animal and entanglement conditions

- (a) **Size.**
- (b) Species.
- (c) Temperament.
- (d) Behaviour.
- (e) Health condition: body profile, cyamid coverage, general skin condition and colouration.
- (f) nature of injuries.
- (g) Company of other cohorts (pod members, calves) and the presence of sharks or other predators.
- (h) Mobility (anchored, small circles, big circles, free swimming).
- (i) Type and nature of gear (rope, line, pot, netting, chain, etc.).
- (j) Body part(s) affected and not affected.
- (k) Configuration and condition of gear.

Environmental conditions

- (a) **Weather conditions and forecast.**
- (b) Sea state.
- (c) Navigational constraints (e.g. rocks, ice, depth).
- (d) Time of day (e.g. remaining daylight).
- (e) Remoteness of location.
- (f) Availability of resources.

Other conditions

- (a) Visibility of event.
- (b) media or public presence.
- (c) Surrounding vessel traffic.
- (d) military operations.
- (e) High recreational use areas.

6. SAFETY CONCERNS ON APPROACHING AN ENTANGLED WHALE

In addition to the general safety considerations given in section (1), the following must be taken into account when approaching an entangled whale

- (a) Time spent in the danger zone (area immediately in front of and beside animal that is in range of tail flukes and/or flippers) must be avoided or at least minimised.
- (b) A swimming entangled whale must never be approached in its wake, as unseen trailing gear may foul the approaching vessel's engines.
- (c) Only the minimum required equipment and personnel should be present on the PRV (store non-immediate gear on support vessel). The approach boat must be kept 'clean' in order to minimise the risk of lines getting caught on the boat or gear stowed on boat.

- (d) Sudden boat manoeuvres (e.g. gear shifting or sudden velocity changes) must be avoided as these have a higher probability of startling the whale.
- (e) Approaches should be methodical and consistent. Animals may avoid and respond unpredictably to any perceived threat. It should be assumed that an animal does not know the responders are there to help.
- (f) Whales are unpredictable. Always consider standing down for a reasonable amount of time after any major approach (including for documentation) on an entangled whale, action (e.g. attach buoy, cut or attempted cut), alteration of the entanglement configuration, or change in the behaviour of the whale, to observe the effect on the animal and gear.
- (g) Be extremely aware of the animal's behaviour and risks from the whale's reaction at times of change (i.e. while and after lines are cut) as there is more likely to be a response. This is especially true of an animal that has been recently entangled, that has been approached multiple times for complex entanglements or has just been freed (e.g. after a final cut). Always respect the animal's strength and unpredictability and never assume it understands you are there to help and is working with you.

7. ENTANGLEMENT RESPONSE PROCEDURES

Disentanglement procedures generally involve some control of the animal, cutting away gear using specialised tools, and documentation and follow-up of the event. The details of disentangling a whale involve a specialised discipline that is dangerous for both the responder and the entangled whale; as noted in the introduction this is **not** an instruction manual; specific disentanglement procedures should be addressed through a thorough and strict training programme ((see annex F, IWC 2013 on capacity building and training).

8. DOCUMENTATION AND DE-BRIEFING

Documentation gathered during disentanglements offers one of the best and only opportunities to understand the scope and extent of regional entanglement issues. Documentation may include:

- (a) photographs of operations and of the animal before, during, and after a response;
- (b) video from point-of-view cameras mounted to safety helmets;
- (c) collection and documentation of gear removed;
- (d) biological sampling (biopsy, skin in gear); and
- (e) field observations (operational log, behavioural log, etc.).

This information should be assembled into a full dis-entanglement case study and shared with regional and international entanglement response networks. This will be facilitated by an IWC disentanglement database see Item 4.3 of this report.

Every attempt should be made to build documentation/data gathering into operational procedures. Data should identify species, individual, level of injuries, disentanglement activities and state of the animal and its entanglement at the end of an operation. effort should be made to monitor post-disentanglement behaviour and survival through the use of telemetry, genetics and or photo identification of individual animals.

Follow-up of an entanglement response is an opportunity to discuss the level of preparedness, the equipment, the process, and identify any changes to procedure or equipment that could be made to improve future disentanglement attempts.

Annex G

Terms of reference and *modus operandi* for a small group to consider, and develop if warranted, entanglement advice to fishers

Entanglement and bycatch are widely acknowledged to be the greatest immediate threat to the recovery and sustainability of many cetacean populations around the World. Large whale entanglement can also be financially devastating to fishers, especially those engaged in artisanal or subsistence fisheries. This financial impact can pressure fishers to respond to entanglements in a manner that can be dangerous to them and/or the animal. It has been estimated that 95% of the World's fishers are considered artisanal. Most of these fishers operate in parts of the developing World, where there is not currently access to trained entanglement responders.

While the IWC entanglement initiative has made, and continues to make, progress toward developing teams of trained responders around the World, there is an immediate need for common sense, and appropriate advice to fishers. This advice should:

- (1) provide advice on the safe removal of cetaceans from their fishing gear;
- (2) do so without encouraging inappropriate action where trained responders exist; and
- (3) provide information and advice on the potential to prevent entanglements and bycatch in their fisheries.

The small group will:

- (1) determine if appropriate advice can be crafted, and if so develop that advice;
- (2) work with the IWC BMI initiative in this effort, either jointly or in parallel (e.g. large and small cetacean advice); and
- (3) help the IWC to identify the most effective delivery of any advice produced (e.g. FAO, RMFOs...etc)

The small group should have (or have access to), the following areas of knowledge and expertise:

- (1) experience working with fishers (esp. artisanal);
- (2) cetacean biology and/or veterinary science, specific to entanglement;
- (3) fisheries science, technology and/or management, especially artisanal fisheries; and
- (4) understanding of current tools and protocols for disentangling.

The small group will work electronically.

Initial Members from this workshop: Mattila (convenor), Bachmann, Frisch, Goleva, Jensen, Ledwell, Simmonds, Tarzia.

Annex H

Terms of reference and *modus operandi* for the Expert Panel on large whale entanglement

1. OBJECTIVE

The Expert Panel will assist in the delivery of the IWC's entanglement initiative by providing scientific and technical advice in support of its aim to address issues relating to entangled large whales. The Expert Panel will, undertake the key activities given below.

- (1) Provide input, based on their expertise, to the IWC entanglement initiative.
- (2) Provide advice on the operations of the IWC's Global Whale Entanglement Response Network (GWERN), through its convener.
- (3) When appropriate, provide advice to individual entanglement response events.
- (4) Act as the steering committee for the development of relevant workshop Terms of Reference and Agendas.

2. MEMBERSHIP

2.1 Expertise

The Expert Panel should include a range of expertise, including in:

- (1) cetacean biology and/or veterinary science, specific to entanglement;
- (2) fisheries science, technology and/or management;
- (3) thorough understanding of current tools and protocols for disentangling;
- (4) hands on experience with multiple responses to entangled large whales; and
- (5) leadership, membership and/or working affiliation with a national response network.

Expertise should be complemented by a regional balance if possible.

The Expert Panel will be allowed to complement its expertise by maintaining a roster of experts related to entanglement response from which it can draw (complementary) expertise when needed.

2.2 Selection process

Nominations for individuals with relevant expertise can come from within the GWERN, IWC Contracting members, and members of the IWC's relevant subcommittees, as well as other IGOs and NGOs with knowledge on this topic. Such individuals can be experts currently involved in the IWC and its Committees, or external candidates.

It is envisaged that the Expert Panel will be composed of 10 to 12 experts with a maximum of 20. The panel should be of a manageable size whilst securing a sufficient level of representation of expertise.

The process for agreeing the membership of the Panel is outlined in Appendix 1.

2.3 Term of service

The term of service will be four years, following which members may be reappointed according to the process set out in Appendix 1. An annual evaluation of membership will be undertaken by the entanglement Coordinator in liaison with Expert Panel, based on the availability and participation of members, and action taken to address any vacancies or gaps in expertise.

3. MODUS OPERANDI

The Entanglement Coordinator will act as the convenor of the Expert Panel. The Expert Panel and the Entanglement Coordinator formally report to the Whale Killing Methods and Welfare Issues Working Group (WKM&WI). The Expert Panel will further support the WG with its aim by responding to its requests for advice.

The Expert Panel will, with coordination from the entanglement Coordinator, liaise and collaborate with the Conservation Committee, Scientific Committee and the Bycatch SWG and BMI coordinator, as well as the Stranding coordinator, and seek input from these Committees on the relevant aspects of its work.

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The Coordinator shall communicate with the Expert Panel by email group, but if necessary shall convene Expert Panel meetings in person or via teleconference as needed. If needed, and when possible, in-person meetings will be planned in conjunction with other workshops or conferences.

The Expert Panel may establish subgroups of its members on an *ad hoc* basis, as it deems necessary to organise and progress its work. Such subgroups shall report to the Expert Panel.

Appendix 1

PROCESS FOR APPOINTMENT OF THE MEMBERSHIP OF THE EXPERT PANEL

Nominations will be sought through a Circular that will go out to Commissioners and Contracting Governments; Members of the Scientific Committee, and Accredited Observers. In addition, the Secretariat will send formal letters to other relevant IGOs and NGOs and follow this up with informal contacts.

Before making a nomination, people will be asked to discuss with the nominee that they are keen and able to commit to serving on the Panel. Panel members will be asked to commit to active engagement in Expert Panel discussions.

Nominations should be accompanied by a short supporting statement (max. 500 words) and/or a CV setting out the prospective member's expertise, abilities and willingness to serve on the Expert Panel.

Nominations will be reviewed for comments and endorsement by the expert panel, chaired by the entanglement coordinator.