

Report of an IWC Workshop Developing Practical Guidance for the Handling of Cetacean Stranding Events

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CHAIR'S SUMMARY AND RECOMMENDATIONS

The Workshop was held in Kruger National Park, South Africa from 5-6 May 2016. There were 34 participants from 13 different countries. Participants included individuals from a wide range of stakeholders including national authorities from IWC member countries; veterinarians and veterinary pathologists; strandings biologists; animal welfare specialists; biologists and academics working on aspects of cetacean welfare; and experts from animal welfare organisations. This included participants who are actively involved in strandings response and animal rescue efforts. This Workshop was held back to back with the Workshop to Support the Consideration of Non-Hunting Threats to Cetacean Welfare (IWC/66/WKM&WI Rep01) which took place from 3-4 May 2016.

The primary objective of the Workshop was to assist the IWC in its efforts to build global capacity for effective cetacean stranding response and promote the IWC as a leading body for the provision of advice through the development of practical guidance for responders. It aimed to assist the IWC in taking forward relevant actions in the IWC Welfare Action plan, particularly Objective 2.4. *To work through existing strandings networks to produce specific recommendations to the Commission in relation to the welfare implications of responding to cetacean stranding events* and Action 2.4.1 *To organise a mass strandings Workshop to progress the development of shared best practice and guidance in responding to such events.*

The Workshop was informed by existing efforts to build strandings response capacity including the outputs of a Workshop To Develop An International Marine Mammal Stranding and Entanglement Response Toolkit, held in June 2014, organised by the Woods Hole Oceanographic Institution (WHOI), International Fund for Animal Welfare (IFAW), and National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS); and by the joint IWC/Society for Marine Mammalogy Workshop on Investigations of Large Mortality Events, Mass Strandings, and International Stranding Response, 11-12 December, 2015 (SC/66b/Rep09). In addition, the Workshop received a series of case studies and presentations illustrating examples of national strandings response, identifying existing strandings guidance and protocols and exploring the challenges faced by countries in developing an effective strandings response. These included submissions relating to Argentina, Spain, the Republic of Ireland, Netherlands, New Zealand, South Africa, UK and USA.

The Workshop considered in some detail aspects of the strandings response relating to: (i) prevention of strandings (for example, through herding and acoustic measures); (ii) live strandings response (veterinary assessment, refloat/rescue, relocation/release, rehabilitation and euthanasia); (iii) post-release monitoring; (iv) mass stranding considerations; (v) health and safety; (vi) handling of public and the media and cultural considerations; (vii) post-mortem investigation and tissue sampling; and (viii) carcass disposal. The Workshop used a case study (stranding of a fin whale in Baltimore Harbour, Cork, Republic of Ireland) to explore the welfare aspects of a particularly difficult situation in relation to key decisions facing responders and to help explore how public expectations and the media might be dealt with.

Finally, the Workshop discussed the potential role of the IWC in further developing guidelines and protocols for strandings and in acting as a repository for the identification and dissemination of best practice.

Conclusions and recommendations

The Workshop noted the challenges faced by some countries in responding to cetacean strandings in the absence of resources (human capacity, suitable equipment and financial support) and clear national protocols, guidelines and responsibilities. It agreed that there was a clear role for the IWC in assisting with these national efforts. The IWC should not interfere with national sovereignty but should help set a framework and provide best practice guidelines for countries to use in adaptation to their national circumstances.

The Workshop **recommended** that the IWC establish a framework to provide advice to contracting governments on critical elements to include in the establishment of a national strandings response network. It also **recommended** that the IWC promote capacity building by acting as a repository for the dissemination of best practice on strandings response, including national strandings response strategies, appropriate training materials, and euthanasia.

The Workshop **recommended** that case study examples from around the world be pulled together, with information on successes and failures, to help illustrate best practice in responding to stranding events, and that these be hosted on the IWC webpage.

The Workshop welcomed the progress made towards development of the Global Marine Animal Stranding Training tool kit (GMAST) and recognised that this is a well progressed initiative, for which the first phase will be concluded in the coming months. It thus agreed that the work of the IWC should seek to build on and utilise rather than duplicate this existing effort. As a result, the Workshop **recommended** that the IWC Scientific Committee actively engage in the phase 2 development of the GMAST by facilitating a meeting of relevant experts and providing advice to the Commission on its use within the IWC.

The Workshop **recommended** that IWC Contracting Governments should be invited to provide updates on how the recommendations of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans have been implemented at a national level.

Table 1
Table of recommendations.

| The Workshop recommended that: | Action by: |
|--|---|
| The IWC establish a framework to provide advice to contracting governments on critical elements to include in the establishment of a national strandings response network. | IWC Scientific Committee |
| The IWC promote capacity building by acting as a repository for the dissemination of best practice on strandings response, including national strandings response strategies, appropriate training materials, and euthanasia. | IWC Secretariat IWC Scientific Committee |
| Case study examples from around the world be pulled together, with information on successes and failures, to help illustrate best practice in responding to stranding events, and that these be hosted on the IWC webpage. | IWC Secretariat IWC Scientific Committee |
| The IWC Scientific Committee actively engage in the phase 2 development of the GMAST by facilitating a meeting of relevant experts and providing advice to the Commission on its use within the IWC. | IWC Scientific Committee |
| IWC Contracting Governments should be invited to provide updates on how the recommendations of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans have been implemented at a national level | IWC Working Group on Whale Killing Methods and Welfare Issues (WG WKM&WI) IWC Secretariat IWC Contracting Governments |
| The IWC Scientific Committee consider the need to develop a global strandings data portal | WG WKM&WI IWC Scientific Committee |
| Coordination between the IWC and other organisations including ASCOBANS/ACCOBAMS, the European Cetacean Society and other relevant regional processes be continued, in order to promote consistent data collection on the causes of strandings and potential welfare issues. | IWC Contracting Governments IWC Secretariat |
| IWC Contracting Governments establish clear and effective strategies for media handling and promote proactive engagement with the media and public during high profile stranding events. | IWC Contracting Governments |
| Rescue attempts should ideally be undertaken by appropriately trained individuals. In addition, those involved in rescues are encouraged to give careful consideration to appropriate insurance coverage. | IWC Contracting Governments |
| The Secretariat create a document, drawing on existing material, to be hosted on the IWC website that provides basic advice to the general public on health, safety, and animal welfare during live stranding events and during the handling of dead cetaceans. | IWC Secretariat IWC Scientific Committee |
| The IWC give consideration to the establishment of a dedicated funding stream to help improve cetacean stranding response globally. | IWC Contracting Governments |

The Workshop emphasised the importance of data collection and information gathering from strandings as vital to the understanding of the health and welfare of marine mammal populations and their environment. It can also (especially if associated with post-release monitoring) feed back directly to inform and improve strandings response. The workshop agreed that even the most basic observation and data can be useful, and that a level of data collection can be conducted by volunteers and in the absence of sophisticated facilities and technology. Similarly, necropsies can be undertaken with fairly low cost equipment.

The Workshop noted the importance of data sharing between strandings networks and countries and the potential for the IWC to assist in this regard, including through the development of a global strandings data portal. It noted the efforts of other organisations in developing protocols and guidelines for information gathering and necropsy.

As a result of these discussions the Workshop **recommended** that the IWC Scientific Committee consider the need to develop a global strandings data portal. The Workshop noted the continued good progress in developing standardised necropsy protocols/guidelines and **recommended** continued coordination between the IWC and other organisations including ASCOBANS/ACCOBAMS, the European Cetacean Society and other relevant regional processes, in order to promote consistent data collection on the causes of strandings and potential welfare issues.

The Workshop noted the high levels of public interest in strandings events reported by countries and social media and the importance of actively engaging the public and media including to safeguard public safety and to minimise stress and suffering of the animal. It emphasised the value of clearly briefing the media on decisions that are made and that this can help engender public acceptance in difficult circumstances (for example where euthanasia would be ideal but is not feasible). The Workshop **recommended** that IWC Contracting Governments establish clear and effective strategies for media handling and promote proactive engagement with the media and public during high profile stranding events.

The Workshop stressed that there were potentially significant health and safety issues involved in responding to stranded cetaceans. These included risk of wounding (for example from unexpected movements of large animals) and the transfer

of zoonotic disease. Where appropriate, those involved in strandings response should abide by their national health and safety legislation. The Workshop **recommended** that rescue attempts should ideally be undertaken by appropriately trained individuals and encouraged those involved in rescues to give careful consideration to appropriate insurance coverage.

The Workshop further highlighted potential threats to public safety during stranding events (e.g. from inappropriate public behaviour and from handling of dead carcasses). It discussed the need for a balanced approach to ensuring public safety, whilst recognising public interest and limitations in resources available (e.g. for policing of sites). The Workshop **recommended** that, drawing on existing material, the Secretariat create a document to be hosted on the IWC website that provides basic advice to the general public on health, safety, and animal welfare during live stranding events and during the handling of dead cetaceans.

The Workshop emphasised that additional resources would be required to fulfil the role of the IWC as the lead body facilitating the dissemination of strandings advice and for capacity building. The Workshop **recommended** that the IWC give consideration to the establishment of a dedicated funding stream to help improve cetacean stranding response globally. The Workshop further **recommended** that the Secretariat provide cost estimates for taking forward the relevant actions in the IWC Welfare Action Plan and the recommendations of this Workshop.

1. INTRODUCTION

The Workshop was held from 4-5 May 2016 at Skukuza Rest Camp, Kruger National Park, South Africa. Nigel Gooding, Chair of the intersessional correspondence group on welfare, was appointed Chair. The list of participants is given as Annex A and the agenda as Annex B. This Workshop was held back-to-back with the Workshop to Support the Consideration of Non-Hunting Threats to Cetacean Welfare, which took place from 3-4 May (IWC/66/WKM&WI Rep01).

Participants included individuals from a wide range of stakeholders including national authorities from IWC member countries; veterinarians and veterinary pathologists; strandings biologists; animal welfare specialists; biologists and academics working on aspects of cetacean welfare; and experts from animal welfare organisations. This included participants who are actively involved in strandings response and animal rescue efforts. There were 34 participants from 13 different countries.

2. MEETING OPENING

2.1 Opening remarks

Gooding welcomed participants. He noted that this Workshop followed on from previous work undertaken by the IWC and others including the joint IWC/Society for Marine Mammalogy Workshop on Investigations of Large Mortality Events, Mass Strandings, and International Stranding Response, which took place from 11-12 December 2015 (SC/66b/Rep09) and the Workshop To Develop An International Marine Mammal Stranding and Entanglement Response Toolkit, organised by the Woods Hole Oceanographic Institution (WHOI), the International Fund for Animal Welfare (IFAW), and National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS), held in June 2014. He expressed the hope that this Workshop would lead to more coordination of existing initiatives and to the IWC leading a global strandings response.

2.2 Appointment of rapporteurs

Smith, Brockington and Deaville were appointed as rapporteurs.

2.3 Available documents

Gooding drew attention to a number of key documents including the Report of the WHOI, IFAW and NOAA Workshop To Develop An International Marine Mammal Stranding and Entanglement Response Toolkit (IWC/M16/CW/ForInfo02); the Proceedings of the first ECS Workshop on cetacean pathology: dissection techniques and tissue sampling (IWC/M16/CW/ForInfo09); and the Report of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans, 11-13 September 2013 (IWC, 2016). A set of additional information documents was also available. The list of documents is given at Annex C.

3. WORKSHOP AIMS, AND OBJECTIVES

3.1 Overview

Gooding outlined the primary objective of the Workshop: to assist the IWC in its efforts to build global capacity for effective cetacean stranding response and promote the IWC as a leading body for the provision of advice through the development of practical guidance for responders.

Key principles were established by the Workshop: (1) the term 'cetaceans' was taken to refer to both large and small cetaceans; (2) the Workshop would be concerned only with wild cetaceans; (3) the Workshop would focus on the potential range of options in relation to stranded cetacean response; (4) 'strandings' were defined as 'when an animal swims, is left by a receding tide or is otherwise deposited onto land (e.g. beach, mudflats, rocks, sandbanks) dead or alive'¹; (5) the Workshop would consider welfare in relation to decision-making around stranding response, but would also consider the strandings response process as a whole, including elements that may not be related to welfare, such as response through investigations of dead strandings at necropsy; and (6) the Workshop would consider and discuss current options for strandings response, with examples and case studies from national stranding networks.

3.2 Relationship to Welfare Action Plan

The Workshop aimed to assist the IWC in taking forward relevant actions in the IWC Welfare Action Plan, particularly Objective 2.4. *To work through existing strandings networks to produce specific recommendations to the Commission in relation to the welfare implications of responding to cetacean stranding events* and Action 2.4.1 *To organise a mass strandings Workshop to progress the development of shared best practice and guidance in responding to such events.*

¹This definition was drawn from the UK strandings programme, e.g. Deaville and Jepson (2011). The Workshop recognised that other definitions exist.

4. NATIONAL PERSPECTIVES ON STRANDINGS

4.1 Strandings response in the United Kingdom (UK)

Rob Deaville gave an introductory scene setting presentation, with information on the background to and history of UK strandings response. Live stranding response in the UK is entirely voluntary, with coordination through the Marine Animal Rescue Coalition (MARC), an umbrella grouping of UK based organisations involved in live stranding response. The primary organisation that responds to live strandings is British Divers Marine Life Rescue (BDMLR), a charitable body with a network of over 3,500 marine mammal medics around the UK. There are two outcomes to live stranding events in the UK- either an attempt to refloat the animal takes place if the attendant veterinarian deems this to be appropriate, or it may be euthanised (or die at the stranding location) if it is judged to be compromised or an inappropriate candidate for rescue. Between five to ten percent of the 600 strandings recorded around the UK each year are live stranded animals. The Cetacean Strandings Investigation Programme, a network of institutions co-funded by Defra and the Devolved Governments of Scotland and Wales, coordinates investigation of dead strandings in the UK. It is contracted to carry out 100 necropsies per year, to determine causes of death and gain a greater understanding of threats faced in UK waters. Deaville also presented the case history of a northern bottlenose whale that entered the river Thames in January 2006, leading to a large-scale rescue attempt.

4.1.1 Discussion on UK strandings response

In response to a question on how policy change is achieved within the Marine Animal Rescue Coalition (MARC), given that this is such a large network, Deaville confirmed that adoption of common procedures was voluntary but usually works well. There are some issues on which policy differs, including euthanasia of large whales. When asked about the role of the UK government in strandings response he confirmed that the UK government fund the Cetacean Strandings Investigation Programme but do not play an active role in live strandings response. There had, however, been recent coordination between MARC and the government in order to ensure that strandings response is aligned with UK law. In response to a question on captive rehabilitation, Deaville confirmed that the UK does not have any cetacean rehabilitation facilities. MARC had reviewed how many animals (from documented strandings cases) would potentially have been able to be brought in to some kind of facility and numbers were fairly low. So this was not being pursued at the moment.

4.2 Building a strandings response in Ireland

Paul Kiernan reported on the status of strandings response in the Republic of Ireland. He noted that cetaceans are important mammalian species native to Ireland. To date, 24 of the 86 cetacean species described world-wide (28%) have been recorded in the waters around Ireland. There is growing awareness among Ireland's scientific and public communities of the importance of cetacean welfare. This is particularly evident during high profile events such as cetacean strandings. There is currently no formal cetacean strandings response network in Ireland. Failures in the response to recent single and mass-strandings events have been identified by the Irish Whale and Dolphin Group (IWDG). These failures highlight the need for a properly structured and resourced cetacean strandings response network in Ireland. To this end, the IWDG have developed a cetacean strandings response protocol based on international best practice in cetacean welfare. The IWDG are actively exploring opportunities for support at national and international level to use this strandings protocol to train and build a cetacean strandings response network in Ireland. Kiernan suggested that the IWC could have a very helpful role in assisting its member countries in the development of national cetacean welfare policies and action plans such as cetacean strandings response protocols.

Finally, Kiernan stressed the importance of: (i) IWC member countries identifying a competent national authority with responsibility for cetacean welfare; and (ii) that these competent authorities should assist in the development and endorsement of cetacean welfare policies and action plans that are specific to national needs. The IWC might play a very useful role in assisting the competent authorities through guiding policy development and enabling specialised training and emergency response assistance where required. Kiernan further identified the potential benefits to member countries of regular, systematic reporting to the IWC on the progress of cetacean welfare action plans, including strandings response, in order to improve efficacy and animal welfare standards for cetaceans nationally and internationally.

4.2.1 Discussion on building a strandings response in the Republic of Ireland

The Workshop expressed its gratitude to Kiernan for such a powerful presentation that illustrated the challenges faced by a country or organisation trying to establish a national strandings response. It was noted that these challenges would also be very relevant to developing countries. This led to a discussion on how the IWC could assist countries developing their strandings response. The Workshop **agreed** that the IWC should not interfere with national sovereignty but should help set a framework and provide best practice guidelines for countries to use in adaption to their national circumstances. There was some discussion on the appropriateness of certification. Mattila noted that, for its entanglement training programme, the IWC had avoided being a certification body (instead providing facilitation and communication and allowing governments to determine what level of certification is required) but did provide certificates to individuals on completion of training.

The Workshop discussed the lack (reported in some cases) of government commitment to a strandings response. It noted that development of IWC policy and best practice could help those working in individual countries to communicate the need for and increase government engagement. It was acknowledged that it is often the public and media attention surrounding stranding events that prompts governments to act. In the case of Ireland, Kiernan pointed out that it is not

clear which government department has responsibility for cetacean welfare including strandings response: The Department of the Environment, Community and Local Government through the National Parks and Wildlife Service has responsibility for the conservation of wildlife; The Department of Agriculture, Food and the Marine is responsible for welfare in agriculture and fishing but not wildlife. There is a clear need for member countries to identify a competent national authority with responsibility for cetacean welfare.

There was some discussion on the use of volunteers. It was suggested that this would ideally be managed by a national coordinator, who could ensure training of members and regular engagement of volunteer groups to help sustain their commitment. Participants agreed on the need to keep volunteers engaged between live strandings, noting that engaging them with the 'dead animal response' - either in an observation-based investigation or in necropsy can help. The Workshop further agreed that information from necropsies can feed back vital information in to the assessment and decision making process for live strandings.

This, and subsequent discussions led to the Workshop making recommendations on the role of the IWC in capacity development for strandings response, which can be found in Item 16.1.

4.3 Netherlands national stranding presentation

Sabine Ketele and Lonneke IJsseldijk gave a joint presentation on the national strandings response in the Netherlands. They reported that the first stranding record in the Netherlands dates from 1,255, but since the 20th century reliable stranding records have been documented (<http://www.walvisstrandingen.nl>). Now, more than 9,000 reports are available mostly relating to harbour porpoises. In the Netherlands, these species are protected under several international agreements (e.g. ASCOBANS) and legislation and therefore dedicated postmortem investigations have been conducted since 2008 to investigate causes of death, and in particular human induced mortalities. At this moment, no funding is available for research on species other than harbor porpoises, as other species are rarely found stranded in the Netherlands. However, some large stranding events have occurred in the past few years. In December 2012 a live humpback whale stranded on a sandbar close to the island Texel and died after five days. The events that followed made it apparent that there was a need for clarity on the responsibilities and the distribution of tasks in case of a stranding. Guidelines were established after Workshops with relevant experts on how to handle live stranded large cetaceans and who has what responsibilities. The framework will be implemented during strandings and after each use the guidelines will be evaluated and adapted if necessary. This was done recently following the live stranding of five sperm whales in January 2016 which all died within 12 hours of stranding. The protocol was used and found to be effective. However, it needs to be updated in order to include guidelines on postmortem research and carcass disposal. This work is currently ongoing.

4.3.1 Discussion on the Netherlands national strandings presentation

Discussion reflected on the case of a stranded killer whale in the Netherlands in which the animal was taken into captivity and subsequently (due to outgrowing the facility in which it was housed) transported to Tenerife. When asked to comment on the likelihood of animals being taken into captivity during subsequent strandings events, the presenters suggested that this was likely to depend to some extent on the public and political reaction. The Workshop noted that different countries approached the issue of captive animals quite differently and that captive animal welfare was beyond the scope of this Workshop.

4.4 USA Marine Mammal Stranding Network

Sarah Wilkin gave an overview of the structure and recent accomplishments of the United States Marine Mammal Stranding Network. Organised under Title IV of the Marine Mammal Protection Act, the Marine Mammal Health and Stranding Response Program (MMHSRP), operating with NOAA Fisheries, has the statutory mandates to collect and disseminate health and health trends data on wild marine mammal populations and to coordinate effective responses to strandings and unusual mortality events. To accomplish these dictates, the MMHSRP authorises and coordinates over 100 organisations around the US for stranding response. Basic data is collected on standardised forms and held in a National Database, while additional information (e.g. necropsy results, diagnostic analysis results, life history information) is collected and held by each individual network member. From 1990-2015, the US stranding network responded to 36,788 cetaceans, with an annual average of 1,415. Through the John H. Prescott Marine Mammal Rescue and Assistance Grant Program, the US Government has provided \$1-4M USD per year (2001-present) in competitive grants to stranding responders and affiliated scientists, for a 15-year total of \$48,500,000. However, Wilkin noted that this represents a small percentage of the cost of stranding response (including rehabilitation) in the US, and that the remainder of the funding is raised by individual network organisations. The US has implemented several standardised protocols for stranding response, including: Stranding Agreements and evaluation criteria for stranding response organisations; rehabilitation facility guidelines; and release standards for rehabilitated animals. Additionally, other protocols have been developed by NMFS or via Prescott grants to improve response. Finally, the US Stranding Network is actively engaged in improving the science of stranded animals.

4.4.1 Discussion on USA Marine Mammal Stranding Network

In response to a question on funding, Wilkin confirmed that the John H. Prescott grant programme only provided a proportion of what was needed, with a significant amount of additional funding raised through other means.

4.5 Strandings response in Argentina

Miguel Iñíguez presented the results of strandings and rescue events conducted by Fundación Cetus (Argentina) in conjunction with Whale and Dolphin Conservation (WDC) between 1992 and 2015. In total 107 stranded animals were reported (three alive/released and 104 dead) representing three species of mysticetes and 12 odontocetes. Cases discussed included the rescue of franciscana calves. An event involving a humpback whale which spent two days at the Buenos Aires harbour in August 2015 was also discussed. The animal was in poor health and had evidence of entanglement on the left side of the head.

4.5.1 Discussion of strandings response in Argentina

There was some discussion on the release of the franciscana calves and the likelihood that they would have survived. Iñíguez noted that since in the province of Río Negro it is not permitted to practice euthanasia, then it was decided to release them on welfare grounds, rather than let them die on the beach.

Simmonds noted that the stranding of the humpback whale in Buenos Aires harbour was one of what seemed to be a growing number of this type of event around the world, recalling a similar case in Monaco in which a juvenile fin whale was stranded in the harbour amongst the yachts. Iñíguez noted the concerns relating to damage to property in this case, which took place in the most expensive area of the yacht club in Buenos Aires. Dealing with the situation had required liaison with a number of focal points, coordinated by the coast guard.

4.6 Overview of strandings response in New Zealand

Mike Ogle provided an overview of strandings in New Zealand. The New Zealand Whale and Dolphin Stranding database (as of 6 April 2016) has 3,557 records of stranding events; from these stranding events the total number of cetaceans is 17,968. The earliest record is from 1840. Single strandings (including mother and calf pairs) are roughly evenly dispersed around the coastline. While mass strandings are also well dispersed around the coastline, there are four locations with a disproportionately high occurrence of mass strandings: Chatham Island, Stewart Island, Golden Bay and the north west of the North Island. Single stranding events occur relatively evenly throughout the year, while mass strandings peak in summer months. Forty-one species have been recorded, with pilot whales accounting for the most number of cetaceans. Legislative Acts authorise the Department of Conservation (DOC) as the government organisation responsible for marine mammals. The Department of Conservation works in a partnership with Maori in strandings as whales are recognised as a toanga/treasure; with obligations on DOC to do so under both the Treaty of Waitangi Act and Conservation Act. Under a Service Level Agreement with DOC, Project Jonah (an NGO) provides assistance to DOC during strandings and provides volunteer training and mobilisation.

4.6.1 Discussion of New Zealand strandings overview

In response to a question on how volunteers were organised, Ogle confirmed that these were dealt with under the provisions of the Health and Safety Act. Volunteers are given a safety briefing before setting out. Different situations are subject to varying levels of control. DOC staff would be on the beach providing advice and guidance to volunteers as necessary.

Ogle was also asked to elaborate on how communications with the public and media were dealt with, and whether the (comparative) regularity of these events in New Zealand had made it easier to communicate realistic outcomes to the public. Ogle confirmed that this depended on which staff were present at a site. Decisions on euthanasia involved Iwi (Maori) and Project Jonah staff and media representatives would always be informed. An incident management structure was in place which included media liaison. He noted that in accessible areas there were usually cameras present, so the teams give regular updates on what they are trying to achieve. Further discussion on liaison with the media can be found in Item 11.

5. EXISTING STRANDINGS CAPACITY DEVELOPMENT INITIATIVES

5.1 The Global Marine Animal Stranding Training (GMAST) Toolkit

Katie Moore presented on the status of an ongoing collaborative project initiated by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) to develop an international stranding response training system called the Global Marine Animal Stranding Training (GMAST) toolkit. With NMFS, the Woods Hole Oceanographic Institution (WHOI), the International Fund for Animal Welfare (IFAW) and the Marine Mammal Center coordinating the development of an international stranding response toolkit. Upon request, NMFS has historically provided, or facilitated the training of stranding responders internationally, but these efforts have lacked cohesive vision and strategy. Although some success has been achieved, the lasting impact of these trainings has been limited due to lack of continued follow through and ongoing development over the long term. Further, the protocols presented have not been consistent across trainings.

To address these challenges, the GMAST team is in the final development stages of a comprehensive, international marine mammal stranding and entanglement response training program to promote consistent messaging and sustainable impact. In essence, the finished product will be a complete guide to establishing and sustaining a marine mammal stranding network. All training materials will be designed with a 'train the trainer' approach in mind. This program will include:

- consistent protocols and messaging;

- training plan to ensure long-term investment; and
- monitoring and evaluation plans to measure impact.

The development of phase one of the GMAST toolkit has included a scoping meeting and Workshop with invited participants from stranding related disciplines around the world. Phase one included the development of training materials for basic stranding response trainings for cetaceans and pinnipeds and creation of a website as the main repository for the resources. The result incorporates proven protocols from around the world and the advice and review of current experts in stranding response and related fields. Phase two and beyond will involve additional international collaboration to establish minimum standards and best practices for intermediate and advanced stranding response training materials.

5.1.1 Discussion on GMAST

The Workshop **welcomed** this very useful and well progressed initiative. It **agreed** that there should not be duplication of effort and, as such, there would be value (rather than developing something separately) for the IWC to recognise, review and potentially endorse GMAST as a resource. With this in mind, Moore confirmed that GMAST stakeholders were open to further development and to drawing in additional expertise and resources from other parties (including material and lessons from other strandings and necropsy protocols). Following discussion on the best way to bring this initiative to the attention of the IWC, a small group of participants (Moore, Wilken, Simmonds and Mattila) were asked to discuss this further and propose a way forward. The subsequent recommendations of the Workshop can be found in Item 16.2.

5.2 IWC Workshop on Investigations of Large Mortality Events, Mass Strandings, and International Stranding Response

Wilkin presented the report of the IWC Workshop on Investigations of Large Mortality Events, Mass Strandings, and International Stranding Response, December 2015, San Francisco (SC/66b/Rep09). The Workshop had many goals to facilitate collaboration and coordination in response to and investigation of cetacean strandings, including identifying potential roles of the IWC. The Workshop progressed with overview presentations of many case studies, grouped into categories of: developing baselines, pathologic investigations, and recurring events. Each presenter was given the opportunity to share opinions on which tools were integral to the success of their programs, as well as challenges that the programs faced, and these opinions were compiled. A preliminary template of fundamental data to collect to describe cetacean events was compiled. The discussion by participants also identified anthropogenic factors that may contribute to mass stranding events and recommended sections for inclusion in a best practices document (that was not fully developed during the Workshop). Potential roles of the IWC and general draft Workshop recommendations were also highlighted (SC/66b/Rep09 Section 8).

6. STRANDINGS ASSESSMENT (SINGLE STRANDING EVENTS)

6.1 Assessment of strandings events through data recording and information gathering

Andrew Brownlow presented on the assessment of strandings events through data recording and information gathering using the example from the Scottish Marine Animal Stranding Scheme (SMASS). As part of ongoing review of surveillance methods, SMASS had been asked to address specific questions about improving the data collected from animals not suitable for collection and necropsy. It was considered likely that a useful increase in strandings surveillance and data recovery could be achieved by improving public awareness of, and engagement with marine strandings surveillance schemes. An initiative was therefore developed to recruit and train a network of strandings volunteers in the safe and accurate measurement and sampling of dead stranded marine animals. Potential volunteer candidates were identified via existing social media channels and invited to attend a one-day training and assessment course. This course included a cetacean necropsy, where volunteers were taught what samples to take and shown how SMASS pathologists conduct a full necropsy examination. There was no expectation for the volunteers to attempt examinations at this level of detail as a veterinary pathologist, but aimed to show how even basic sampling and data collection could be of great benefit. Health and safety documentation was supplied to the attendees via email beforehand; they were expected to have read this material prior to attending the course and were asked to sign a document confirming this prior to entering the post-mortem room. During the necropsy demonstration, each potential volunteer was given the opportunity to take samples and measurements from the carcase, as they would be asked to do attend a stranding on a beach. Each potential volunteer was assessed on their abilities and only issued a kit if deemed competent. Involving members of the public in the tissue sampling of wild animals presents a number of potential risks, and hence the health and safety considerations to sampling are strongly emphasised in both the lecture, demonstration and support documentation. To date no health and safety issues have been encountered with trained volunteers, however an unsolicited sample sent by an untrained member of the public leaked in the post. This did highlight the need to make sure samples are correctly packaged. All the volunteers have bio bottles to enable the safe transportation of samples. In concluding, Brownlow reported that by the end of May 2016 SMASS had a total of 120 trained stranding volunteers.

6.1.1 Discussion on the assessment of strandings events

During discussion, the Workshop noted the importance of information gathering and data collection from strandings as vital to the understanding of the health and welfare of marine mammal populations and their environment. However, participants also reported difficulties in obtaining funding for data recording and information gathering related to

strandings. Johnson elaborated on his experience of fundraising and the benefit of presenting activities as a costed project, or as a costed 'service' to be provided to a potential beneficiary. This approach can help engage a range of donors including both governments and philanthropists.

Recommendations on data gathering can be found in Item 16.4.

7. LIVE STRANDING RESPONSE AND OPTIONS

7.1 Measures to prevent strandings and mass strandings (deterrents and herding)

Brian Sharp gave a presentation on prevention measures, with a focus on deterrents and herding. He stated that cetacean mass stranding prevention should be considered in situations where strandings appear imminent or likely, as in shallow water habitat close to shore, and are reported in a timely manner. Factoring into the consideration should be knowledge of that particular cetacean species, historical frequency of strandings in that area, current environmental factors such as tides and weather, and the bathymetry characteristics of the area. Mass stranding prevention can be accomplished through two main methods: deterrents and herding. These methods can be used independently or jointly in an event. Deterrents seek to exclude animals from areas by discouraging them from entering into an area through either acoustic or physical means. Acoustic means vary from the most basic, such as slapping the water with hands or paddles, to the use of targeted acoustical deterrents, such as commercially available pingers used in fisheries. Physical deterrents can also be useful in some situations. These methods include, but are not limited to, nets and bubble nets. Mass stranding prevention can also be attempted through herding from small boats. In many cases this method is most effective if the animals are in relatively shallow water. As the water depth increases the difficulty in herding will likely increase. For social small cetacean species the herding philosophy typically follows the same guidelines as those used for terrestrial livestock, i.e. keep the group together then move the group. Deterrent and herding strategies, techniques and equipment should also be considered as tools that can be useful in situations where cetaceans have been refloated or relocated and released in order to guide animals out of dangerous areas. In any situation where deterrents or herding techniques are utilised the situation needs to be constantly monitored and regularly assessed to determine if the actions are producing the desired effects and to monitor the impact on the animals from a health and welfare perspective. Throughout the event data should be collected on perceived animal behaviour, location, and judged efficacy in order to better influence future efforts and decision making.

7.1.1 Discussion on measures to prevent strandings and mass strandings

During discussion it was noted that much of this presentation had focused on small cetacean species and it was asked whether herding would be possible for large whales. There was some anecdotal evidence from several participants who had managed to turn large whales around but they did not experience much influence over their direction thereafter, or an ability to steer them. It was noted that herding success can be very variable. Ogle reported that, in New Zealand, herding from a boat had worked with some pods but others have gone around or under the boat.

In response to a question on the usefulness of pingers, Sharp reported that this had been variable - there had been some reported success but at other times they were ineffectual. He further noted that it has appeared to their team that both herding and pingers were increasingly effectual the larger the group size. Sharp also reported that the use of drones to measure the efficacy of herding operations is being considered and will be put into practice as soon as possible. They had also put acoustic measures in the mouth of some strandings hot spots to see if it was possible to improve early detection of the problem.

7.2 Live stranding response in Cape Cod Massachusetts, with a focus on rescue and release

Moore presented on live cetacean stranding response on Cape Cod Massachusetts, with a focus on rescue and release. She highlighted that response to live stranded cetaceans has many important components. One of the most important aspects is the key relationship between scientific investigation and the welfare of the animals involved. Both single and mass strandings of cetaceans present an excellent opportunity to gather data on wild populations. In some cases, such as in Cape Cod, Massachusetts USA, mass strandings often involve individual cetaceans assessed as generally healthy that are suffering only from the effects of the live stranding events. As such, these animals provide the best glimpse at detailed health data for those populations. Mass stranding events in areas of historically high frequency of strandings, like Cape Cod, may in turn serve as a baseline or 'control' for those events which we think may be anthropogenically induced. There is an obligation for stranding responders to provide for the welfare of the animals that are stranded, as well as responder safety. These are integral parts of all response protocols. However, these cases also present an outstanding opportunity for systematic data collection. These data can in turn improve future stranding response efforts and welfare considerations, as well as be used in sound management strategies and conservation efforts. Data collection is included as an integral part in all phases of live stranding response. These include initial response to the scene, provision of supportive care, health assessment, disposition decision making, transport, release and post-release monitoring. Similarly, there is a welfare element in each of those phases as well. Finally, Moore emphasised that whether the response is done using state of the art equipment and techniques, or using the most basic of means, quality data collection is possible and vital to the understanding of the health and welfare of marine mammal populations and their environment.

7.2.1 Discussion on the live stranding response in Cape Cod, Massachusetts

With reference to the comments on data collection in the presentation, the Workshop agreed that the collection of even the most basic observation and data (e.g. length and girth measures) can be useful, and that a level of data collection can

be conducted by volunteers and in the absence of sophisticated facilities and technology. Subsequent conclusions and recommendations on information gathering can be found in Item 16.4.

Moore was asked whether, from a welfare perspective, erecting a screen around live stranded animals during handling would be beneficial, as well as other measures such as keeping dolphins together. Moore noted that for animals exhibiting stress (vocalisations) the stress response seemed to decrease when animals were placed in a circle. Their policy was to try to minimise human activity around the animals. Meyer reported (from experience responding to strandings in South Africa) that placing wet towels over the eyes of animals had seemed to calm them and noted that they had not observed any irritation from this.

In response to her comment that rehabilitation was not an option in Cape Cod due to facilities being too far away, Moore was asked if consideration had been given to what distance would be appropriate to transport animals. She answered that this was highly case dependent and not relevant in this case, since the nearest place was in New York and that would be simply too far. Sharp reported that there have been discussions about the potential benefits of short term rehabilitation using some sort of temporary ('pop up') facility and concluded that this could be beneficial in some cases. More consideration of this concept is needed.

8. EUTHANASIA

8.1 IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans

Paul Jepson gave a brief summary of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans (IWC, 2016) held at the Institute of Zoology (Zoological Society of London) in September 2013. A number of different chemical and physical methods for cetacean euthanasia were reviewed in the Workshop. Individual case studies were also discussed in detail – both 'successes' and 'failures'. Of the available methods, none were perfect – all methods had significant 'pros' and 'cons'. All new methods developed had been trialled on dead animals initially before being used on live stranded animals. The Workshop report tabulated the methodological details of the physical and chemical methods, providing a very useful resource for stranding responders globally. This included drug doses, effects, costs, reference species and potential hazards (to humans, environment and relay toxicity) for chemical methods. Physical methods included high calibre ballistics, hydrostatic bullets, the sperm whale euthanasia device (SWED) and peri-cranial implosion (using shaped charges). Media management was another potentially critical area when considering euthanasia, whatever the methods used.

8.2 A new approach to euthanasia in the Netherlands

Lonneke IJsseldijk and Sabine Ketele gave a presentation on a new approach to euthanasia of large whales under development in the Netherlands. According to the Dutch guidelines a stranded large cetacean should be euthanised 12 hours after the stranding. During the past year, a special method has been developed by expert marine mammal veterinarians, the Ministry of Defense, the Ministry of Economic Affairs and the faculty of Veterinary Medicine (Utrecht University). This involves a 160cm hollow needle with a handle and a width of 16mm with a screw-tip. 30 grams of plastic explosive can be placed in the tip and an electric detonator. The plastic explosive used is based on RDX. The tip of the needle should be injected in the heart of the cetacean. An explosion with a high detonation speed of about 8,400 M/S occurs, euthanising the animal. As this method would lead to destruction of part of the apparatus, it is viewed as single use and is only intended for use in large live stranded whales. This method now needs to be tested on fresh large cetacean carcasses in order to investigate the internal damage of the explosive. The method needs to be validated by this testing before it can be used to euthanise a live stranded animal. This work is currently ongoing, but awaits the stranding of a suitable test case.

8.3 Discussion on euthanasia

During the discussion it was asked what the next steps for IWC were following this Workshop, and it was noted that it would be useful to explore whether and how its recommendations had been implemented by parties and the need for follow up work. A recommendation on this can be found in Item 16.3.

The Workshop noted that the variance in the availability and feasibility of different euthanasia approaches across different countries. For example, it was noted that acepromazine maleate (ACP) was not currently available in the UK in the right concentration and, in any case, was likely to be so expensive that it would not be feasible. At the opposite end of the spectrum potassium chloride (KCl) was readily available in the USA and was sold as salt for swimming pools so could be bought cheaply, kept on the shelf and made into a solution when required. The Workshop also noted that there were limitations in the use of single-use devices for euthanasia delivery (e.g. the needle used in the Netherlands method) for use in mass strandings.

9. POST-RELEASE MONITORING

9.1 Presentation on post release monitoring

Sharp gave a presentation on post-release monitoring. He noted that response and disposition decisions for live stranded cetaceans are complex issues that are best guided by evidence based stranding science. Before considering the release of any live stranded cetacean, a health assessment, which is as thorough as possible given the conditions and responder experience levels, should be completed to best guide the decision making process. If the decision is made to attempt to

release a live stranded cetacean, then post-release monitoring should be considered. Post-release monitoring of individuals is only possible if the individuals are capable of being uniquely identified. The complexity of post-release monitoring can range from basic and low cost to advanced methods that require prior preparation and investment. The most basic method is by clear photographic documentation of stranded animals, taking care to thoroughly document all aspects possible along with any potential identifying features for that species. This thorough documentation will aid in positive identification of individual stranded animals should additional strandings occur in the response area. Another basic and inexpensive identification method that should be considered is the temporary marking of animals with livestock markers. More advanced methods include the use of temporary satellite tags. Satellite tag technology has advanced significantly in recent years with hydrodynamic lightweight models now able to be quickly applied by responders to the trailing edge of the dorsal fin in the field. Data from post-release monitoring methods such as these continue to effectively be used to inform future health and welfare decisions during stranding responses.

9.2 Discussion on post release monitoring

IJsseldijk reported that there is a rehabilitation centre in the Netherlands for porpoises, that rehabilitation can take months and the outcome when released is unknown; and asked about costs of post-release monitoring. Sharp reported that (in the US) it cost approximately USD\$1,800 for a tag and its transmission onto the Argos satellite tracking system would equate to approximately USD\$400 dollars of data charges over two to three months. Other tags with time/depth are more expensive and require set-up. The tags that IFAW use are set on a duty cycle at the manufacturer and can be set on a variety of duty cycles to either save battery life or maximise transmission length depending on the questions trying to be answered. He added that the tags had been fairly easy to fundraise for. Van der Hoop reported that, in Denmark, shared interests between the research community (e.g. at universities) and the strandings networks has led to collaboration and cost-sharing.

Sharp was asked about the reaction of the animal to tag insertion. He reported that a topical anaesthetic was used and that personnel responsible for inserting tags practice first on dead animal fins. The tags take 8-15 minutes to insert including cleaning, anaesthetic and insertion. He had not observed an adverse reaction to the satellite tags. There was more of a reaction to the livestock markers (sheep ear tags), possibly because of the sudden noise that is produced when these particular tags are attached. This led to some further discussion on the welfare impacts of tagging, with different experiences and rules being reported from different countries. The Workshop acknowledged that the consideration of whether and how to tag an animal should take into account the likely welfare impacts and balance these against the potential welfare value of obtaining the data (e.g. to help inform actions during future live stranding events).

In response to a question on why the satellite tags are placed on the dorsal fin, Sharp confirmed that they must clear the water in order to be able to transmit. He also noted that the dorsal fin had the least amount of vascularisation.

10. MASS STRANDING CONSIDERATIONS

10.1 Mass strandings in Scotland

Andrew Brownlow gave a presentation on mass strandings in Scotland. He reported that cetacean mass stranding events (MSEs) elicit much interest from both the public and scientific community but the underlying reasons for such events can be difficult to elucidate. Live stranding events and more specifically mass live stranding events are extreme situations in which public safety, animal welfare and conservation science issues have to be managed with an extremely clear perception of priorities and under the constant pressure of emergency. Thorough investigation of these events usually requires the consideration of a number of natural and anthropogenic factors. The Scottish Marine Animal Stranding Scheme investigated three recent mass stranding events in Scotland involving long-finned pilot whales (*Globicephala melas*): (1) on 22 July 2011, a pod of approximately 70 long-finned pilot whales stranded at the Kyle of Durness, with nineteen animals known to have died during the MSE from a combination of factors including hyperthermia, myositis and water aspiration; (2) on 2 September 2012 a pod of approximately 35 animals were found stranded or attempting to strand on rocky coastline between Pittenweem and Anstruther, Fife, with 21 animals known to have died during the mass stranding; and (3) on 1 June 2015 a pod of 21 long finned pilot whales were found stranded at Brogaig beach, Staffin, Skye, a number of these were refloated but subsequently restranded on a nearby island. Seven animals died or were euthanised.

In all cases the investigation included detailed pathological examination to quantify overall disease burden and specific diagnostics. This included microbiology, histopathology, morbillivirus (RT-PCR), and quantitative analyses for algal toxins (domoic acid and saxitoxin), organochlorine pesticides and 25 individual chlorobiphenyl congeners in blubber and metals concentrations in liver. External triggers, such as unusual climatic conditions and influences of underwater noise were also investigated. Requests were made to the UK Ministry of Defence to establish the temporal-spatial distribution of military sources of underwater noise preceding the MSE. In the 2012 and 2015 mass strandings, efforts were made to extract the ears from cases recovered for necropsy to assess indications of antemortem hearing damage. The likely causes and factors in each stranding event were summarised in published reports to Defra and Marine Scotland.

In his conclusions, Brownlow suggested that factors to consider in managing mass stranding events should consider the following.

- There is usually a large variation in characteristics of each MSE.

- Time is critical for certain pathological investigations, particularly for identifying hearing damage.
- People and media management are essential.
- Good data capture is essential and easily overlooked, especially if there is a focus on attempts to refloat live cases.
- The importance of morphometrics and photographs of refloated cases should be emphasised to rescue teams.
- Information should also be obtained from locals/eyewitnesses where possible.
- A record should be kept of environmental parameters, e.g. weather, tide, and observable vessel activity.
- Any animals euthanised chemically should be indelibly marked and secured for safe disposal.
- Communication lines to the media should be established.
- A policy of ‘Collect everything you can. Decide what to test later’.

10.1.1 Discussion on mass strandings in Scotland

In response to a question on whether muscle relaxant was used during euthanasia of the pilot whales in 2011, Brownlow confirmed this was not used due to difficulties in accessing this in sufficient quantities, but that the animals do not appear to have experienced trauma during the administration of opioid euthanasia. For discussion focused on handling of the media and on dealing with the public see Item 11.

10.2 Mass stranding response in New Zealand

Ogle gave a presentation on the response to live cetacean strandings in New Zealand, with a focus on mass strandings. Management of stranded cetaceans starts with keeping the cetacean wet and cool until the tide returns. Once the cetacean is floating it is assisted while it regains its balance and ability to move unassisted. If it is a mass stranding, then individuals are then brought into close proximity to one another before release. This is followed by visual monitoring to determine that the cetaceans do not restrand. The example of 198 pilot whales stranding on Farewell Spit on 13/02/2015 was used to illustrate a large mass stranding response. In this stranding 78 (out of a total of 198) were successfully refloated. An example from the far north of the North Island was detailed. 24 pilot whales were transported 50km, with 22 refloated and two dying *en route*. A gantry, capable of lifting a 1 ton whale, has been designed and built by A-Ward Attachments (Auckland, New Zealand). The gantry (the ‘whale lifter’) is progressing towards live field trials when strandings permit. Health and safety issues were briefly discussed including hypothermia, physical injuries from whale-human interactions, aggressive whales and volunteers being caught by rising tide.

10.2.1 Discussion on the live stranding response in New Zealand

In response to a question on the use of euthanasia, Ogle confirmed that before this can happen the case is discussed with the Iwi (Maori) community and that in most cases an agreement could be reached. Jepson asked Ogle for his view on whether the mass stranding of 198 pilot whales represented one or more social groups and what is likely to be the uppermost size of a cetacean mass stranding. Ogle thought from the arrangement of the stranded pod (i.e. not obviously separated groupings) that it may have been a single social group. Seventy-five tissue samples have been archived for future DNA analysis, which could add some information regarding this aspect. He noted that the highest record for a mass stranding in New Zealand is 1,000 but he was not confident on the accuracy of this. There is another record in excess of 400.

11. DEALING WITH THE MEDIA AND THE PUBLIC

Discussion under Item 10.1, in relation to mass strandings in Scotland led to extensive discussion on dealing with the media and the public. This is therefore reported separately in this section.

11.1 Media handling

Following his presentation on mass strandings in Scotland (see Item 10.1), Brownlow was asked to elaborate on the approach to dealing with the media, and any difficulties encountered. He noted that, in Scotland, locations have tended to be remote which makes the media and public easier to contain and to deal with.

Other participants reported more extensive media involvement. Deaville elaborated on the case of the ‘Thames whale’, which was first seen on a Thursday during a quiet time in the news, resulting in the entire London metropolitan media grasping the story. The media require constant updates and when they were not getting them, started to turn some criticism towards the strandings responders. This case was learnt from when it came to the mass stranding of 6 sperm whales on the east coast of the UK in January 2016. This took place over a two-week window in highly populated areas including Skegness and received huge media attention. The Institute of Zoology (IOZ) press department captured press coverage in terms of ‘reaching’ over 120 million people and generating comparative revenue for advertising space equivalent to £1.5 million, but this level of attention also brought challenges. One central question posed by the media was why the animals were not being refloated. In the UK there is not the capacity to do this for such large animals and it may not be appropriate to refloat animals that have strayed so far out of their natural environment. Questions were also asked about why the

animals were not being euthanised. The UK responders did not have the capacity for this and had to explain this to the media. There was an ongoing battle to keep the public away from the whales. Learning from earlier experience, it was ensured that regular updates were given so as to maintain the trust of the media, and to prevent any risk to the reputation of the Cetacean Strandings Investigation Programme and the wider UK live stranding response network. Deaville noted that it had been very useful to have a single contact point whose sole role it is to talk to the media. In addition, the IOZ and government press offices worked closely together to ensure they gave consistent messages. There was also coordination with the IWC press office.

Participants noted the importance of coordination with elected officials. There had been several cases where elected officials had made statements (and promises) to the media that were not consistent with the facts on the ground.

The Workshop discussed the huge increase in social media reporting on strandings, and emergence of social media ‘trolls’ (i.e. commentators on social media who were determined to provide a negative spin to strandings/rescue events). Some participants had experienced or seen inaccurate, acrimonious and damaging commentary on strandings on social media, and there was work to be done to overcome this. Mattila noted that social media attacks after certain entanglement events was one of the drivers for establishing the entanglement network.

The Workshop **noted** the importance of engaging with the media and of providing regular updates on the status of animals and feasible and likely courses of action, as well as those that are unfeasible and unlikely (which can be just as important to convey). It was hoped that this could increase public acceptance of difficult circumstances, including those where rescue or euthanasia were not an option. Recommendations on media handling can be found in Item 16.5.

11.2 Discussion on public conduct

IJsseldijk noted a number of difficulties with public behaviour during the sperm whale strandings in the Netherlands, including the public taking teeth. Deaville reported that the removal of teeth and jaws is also a problem in the UK, and during the recent sperm whale strandings there had been some graffiti of the carcasses. The UK strandings investigation team have no authority to stop people doing this and it would require police action. Both on-site investigation (opening up of carcasses) and removal of carcasses can be problematic and take time (e.g. whilst negotiating with landowners) and in the meantime it is difficult to police sites, particularly overnight. In this context, Oozthuisen noted the importance of documenting a case before leaving it overnight, in case of interference or alteration by the public.

It was suggested that an operating protocol or guidance document on handling of the public and on health and safety on the beach could be useful.

The Workshop **noted** that engagement with the public was important in order to minimise stress and suffering for the animal as far as possible, and to safeguard public safety. Recommendations on engagement with the public can be found in Item 16.5. Further discussion on health and safety issues associated with strandings can be found in Item 12.

12. HEALTH AND SAFETY

12.1 National experience

During the discussion on public conduct (see Item 11) IJsseldijk noted the potential health and safety risks associated with strandings and asked fellow participants to comment on their national experiences, including on likely levels of public contact with stranded animals.

Simmonds noted that, in the UK, health and safety standards are applied during strandings response. For example, BDMLR’s Marine Mammal Medics (all of which are volunteers) complete a course, which includes health and safety considerations. Health and safety are also addressed in the BDLMR handbook – which is the best iteration of UK live strandings response. BDLMR and other organisations concerned with live stranding response carry insurance to make sure that they are appropriately covered. In response to a further question on whether the general public would come into contact with animals, Simmonds noted that a driver for setting up MARC was to stop the general public from attempting rescue.

Sharp noted that although IFAW can advise the general public, they do not have enforcement powers and only have responsibility for their own staff and volunteers.

Ogle reported that, in New Zealand, the Health and Safety Act puts the onus on the DOC to make sure that strandings responders and the public are advised of potential hazards. New Zealand government insurance, through the Accident Compensation Corporation, would cover a strandings responder if they had an accident, but potentially not someone becoming ill as a result of contact with an animal. Strandings responders are fairly happy for the public to come onto the site if they act responsibly- this can provide them with a rare opportunity to get up close to whales- but he noted that there appeared to be a variation in this across the world.

Deaville noted that, in the case of the stranded UK sperm whales, the public were discouraged (through the media) from approaching the whales, but were not told that it was not safe. He noted a ‘fine line’ between trying to avoid large crowds accumulating and ‘scaring people away’, which could have consequences if people started to view marine mammals as ‘dangerous’.

Wilkin noted that, in the USA, there is a problem with dogs so occasionally the public are warned that they or their pets could get hurt at stranding events.

Brownlow reported that, in Scotland, there was a desire to stop the public interfering but that it would not be desirable to communicate that there is anything intrinsically hazardous about the marine mammals, and he would be concerned that this perception could impact on volunteer numbers. He noted that during the UK seal distemper virus outbreak there was a warning to the public about risks to their dogs.

Oozthuisen noted that there are places where stranded marine mammals become a source of meat or of traditional medicine and there should perhaps be some guidelines on potential dangers of this.

12.1.2 Discussion on national experiences

The Workshop **noted** the variation across countries in relation to their guidelines and approach to health and safety and agreed that further exchange of experience, and the production of best practice guidance on this might be useful.

12.2 Presentation on health and safety risks

In order to further inform discussions on health and safety, IJsseldijk gave a presentation on the risks to health and safety associated with strandings response. Rescues of live stranded cetaceans and investigations of carcasses pose several risks for the volunteers and researchers handling the animals. Behaviour of animals, inhalation or infection with potential zoonosis and environmental difficulties (e.g. tides, wind, darkness) during rescues should be assessed especially when getting volunteers or public involved. During necropsies, sharp knives and large machines could be risks for people involved, but also environmental conditions resulting in dehydration or hypothermia should be assessed. During recent stranding events in the Netherlands questions were raised by the local authorities on risks for public during necropsy, as strandings attract large crowds. Zoonoses are rarely reported and only four documented cases exist on infection by human with *Brucella ceti*, of which three persons did not have contact with cetaceans and the fourth worked in a lab culturing this bacterium. However, externally zoonosis cannot be observed and when present, this will only be known when dedicated additional research is conducted afterwards (e.g. PCR and culturing). Informative folders and/or documents could help inform public and authorities about these risks. In conclusion, she expressed the view that rescues and necropsies should only be conducted by experienced people.

12.2.1 Discussion on health and safety risks

In response to the discussions under Item 12.1 and the presentation under Item 12.2 the Workshop noted that there were very significant health and safety issues involved in responding to stranded cetaceans. These included risk of wounding (for example from unexpected movements of large animals) and the transfer of zoonotic disease.

One potentially serious and relatively common zoonotic infection is 'seal finger' which can be treated only by a specific antibiotic (Dierauf and Gulland, 2001).

The Workshop agreed that rescue attempts should ideally be undertaken by appropriate trained individuals, and that calling for expert intervention (where possible) would probably be the best immediate response when encountering stranded cetaceans. It further agreed that where appropriate, those involved in strandings response should abide by their national health and safety legislation, and those involved should ensure that they have appropriate insurance. A recommendation on this can be found in Item 16.6.

13. POST MORTEM INVESTIGATIONS AND TISSUE SAMPLING

13.1 Necropsy as a research tool in the UK Strandings Investigation Programme

Jepson gave a brief summary of pathological and other research activity using the necropsy as a research tool on the UK Cetacean Strandings Investigation Programme (CSIP). The necropsy is a very powerful tool for determining causes of disease and mortality and also for determining drivers of conservation concern and factors that might influence animal welfare. In the UK, cetacean necropsies have provided the first scientific evidence of cetacean bycatch, fatal bottlenose attacks on harbour porpoises, cetacean infanticide, acoustically-induced cetacean mass stranding events and links between high chemical pollution (PCB) exposure and marked population declines in UK/European killer whales. Necropsies can also be conducted with relatively low cost equipment. The current necropsy protocol used by the CSIP in the UK is based on the report of the First Pathology Workshop of the European Cetacean Society (ECS) in 1991 and is now long overdue to be updated.

13.1.1 Discussion on necropsy in the UK strandings investigation programme

During the discussion, the Workshop agreed that it was possible to obtain much useful information from basic necropsies in the absence of a high tech approach. This was useful to note in relation to capacity development.

13.2 Development of a European Cetacean Society (ECS) Necropsy Protocol

IJsseldijk provided an update on the development of a necropsy protocol by the European Cetacean Society (ECS). In 1991 during the European Cetacean Society (ECS) conference, a necropsy protocol was established by Kuiken and García Hartmann. This is nowadays widely used, but out dated due to increasing current knowledge e.g. on inter-species interactions. During the ECS in 2016 (March, Madeira), a workshop was organised involving European experts in cetacean necropsy and the basic protocol was updated. This focusses on standardisation of measurements and tissue

sampling, in order to improve collaborations between different countries and institutes. Currently, the next steps are being undertaken (led by IJsseldijk (Netherlands) and Brownlow). Experts on specific topics (e.g. bycatch, entanglement, gas bubbles etc.) will be invited to write a one-page summary including current knowledge, important publications and contact persons, to add to the appendix of the protocol. With this information, new stranding networks can find current knowledge and useful contacts for specific aspects of research. A future aim is to set up an online 'wiki-like' page including the protocol and summaries of specific topics, which can be updated over time in this ever-changing environment. Collaboration is recommended with work currently undertaken in other parts of the world, e.g. the toolkit as established by NOAA. IJsseldijk suggested that adoption of the protocol by bodies as ASCOBANS, ACCOBAMS and IWC is desirable. This work is all funding dependent, and currently funding is lacking.

13.2.1 Discussion of ECS necropsy protocol

IJsseldijk was asked to elaborate further on the timeline for development of the ECS protocol. She noted that the first step had been to draft a new basic protocol (a baseline of information that it is recommended all countries collect) and the draft of this was currently being finalised, with the intention of submission to ECS soon for approval. It was hoped that the IWC might also endorse this. The next step would be the development of a more detailed protocol.

The Workshop noted that it would be useful for the IWC to coordinate more closely with ECS, ASCOBANS, ACCOBAMS and others with regards to this work on necropsy protocol, as well as the development of strandings guidance and best practice. A recommendation on this is found in Item 16.4.

13.3 Cetacean pathology as a tool for conservation and welfare

Antonio Fernandez gave a presentation on cetacean pathology as a tool for conservation and welfare based on experience in Gran Canaria. Veterinary Pathology is a strong diagnostic tool that contributes to information regarding lesions and causes of death/ stranding. Specialisation is needed to recognise lesions and undertake analysis using different tools (histopathology, microbiology, virology, toxicology, etc.). Forensic pathology is a useful tool for investigation when human activities could have caused strandings and cetacean deaths. The Department of Veterinary Pathology at the Institute of Animal Health (University of Las Palmas) offers specialised facilities for Cetacean Pathology. For some years they have been working on 'fingerprints' in tissues caused by severe stress related to human activities. After localising anatomically 'stress nuclei' and other nuclei in the Central Nervous System and ear, the following objectives have been followed: (1) characterise the catecholamine cardiomyopathy, as injuries resulting from extreme stress responses in actively stranded cetaceans and subjected to capture and interaction with humans (capture myopathy), ship strikes and fishing interaction (bycatch) and mid-frequency active sonar (MFAS); and (2) analyse the degree of activation of the Central Stress System (activation of the HPA axis, Amygdaloidal Complex, and Locus coeruleus) in cetaceans under acute stress, and their relationship with those injuries resulting from extreme responses to acute stress, which often cause death among the animals and taking special attention to the catecholamine-induced cardiomyopathy (1). It was recently decided to include euthanised cases in these investigations. IUSA-ULPGC offers its Veterinary Task group to be involved as international level upon request and is available to work together in joint networks and projects that require specialised Veterinary pathologists.

13.3.1 Discussion on necropsy in Gran Canaria

The Workshop noted, in response to some of the detail in this presentation, that marine biotoxins are another potential threat to cetacean welfare and that efforts need to be made to monitor them.

In response to a question on whether Gran Canaria was particularly exposed to naval sonar, Fernandez noted the importance of a good relationship with the navy in investigating possible causes of cetacean strandings. With good information exchange, he had had been able to prove that the navy had not been the problem in some cases. He expressed interest in looking in more detail at the post mortem markers of stress to further investigate this issue. Nicol noted that this is a common research technique with the farm animal community.

The Workshop noted the importance of cooperation between local and international universities and veterinary schools, in regards to necropsies and post mortem analysis and the potential for this to contribute to improved analysis of the causes of strandings and their relationships with anthropogenic activities.

14. CARCASS DISPOSAL

14.1 Carcass disposal in New Zealand

Mike Ogle gave a presentation on carcass disposal in New Zealand. Various methods are used for transporting carcasses depending on the size of the cetacean, e.g. manual lifting, lifting using heavy machinery, and towing by ship to an offshore site. The results of a trial of carcass disposal by tethering in a tidal flat was described through a series of photos of sperm whale and pilot whale carcasses. Both species degraded to bones over several months, although the sperm whale carcasses appeared to degrade more quickly. Legal requirements for marine mammals in New Zealand are guided by the Marine Mammal Protection Act, Conservation Act and Treaty of Waitangi Act. Disposal onto land or sea is controlled through the permits issued by local councils under the Resource Management Act. Involvement of Iwi (Maori) is given effect through the Conservation Act and Treaty of Waitangi. Iwi (Maori) will often undertake a karakia (prayer) for dead cetaceans.

14.1.1 Discussion on carcass disposal

In response to a question raised by one participants as to whether polychlorinated biphenyl (PCB) levels would ever be too high to bury an animal, Jepson noted that this is possible but that sealed landfill would be an option. Incineration is a possibility but would require large industrial incineration plants (e.g. burning PCBs at 1,200 degrees Celcius for a significant period in forced oxygen) to destroy PCBs. Lower temperature incinerators are far more widely available but these will not destroy PCBs and also risk the transformation of some PCBs into even more toxic dioxins. Another participant noted that carcass digesters might be useful for dealing with PCBs – as are currently and successfully used in the US.

Other participants volunteered information on carcass disposal in their country. This included a variety of means such as leaving in situ or burial on site; towing out to sea and sinking or letting go; composting; incineration; carcass digesters; or burying in landfill, depending on the situation and the legislation in place in country. Where there were predators (sharks) present, leaving them was not usually an option and in some cases it was illegal to leave carcasses on beaches. Responsibility for carcass disposal also varied across countries e.g. in Iceland it is the responsibility of legal authorities responsibility (in consultation with landowners) to dispose of carcasses; in Scotland, animals below 25ft are the responsibility of the local council, whereas those over this threshold are termed ‘royal fish’ and the responsibility of Marine Scotland (the Scottish Government Marine Directorate). Brownlow revealed one case of a sperm whale incineration which had cost in the region of £54,000. The high cost was due to the rebuild costs of the incinerator as a result of the large amounts of energy released by the sperm whale.

15. WELFARE CONSIDERATIONS IN A STRANDINGS REPONSE - CASE STUDY

15.1 Presentation of case study - fin whale stranding in Baltimore

Paul Kiernan presented a case study of a stranded fin whale in Baltimore in order to facilitate some further reflections on the consideration of welfare in the handling of stranding events. This animal became stranded in the mouth of the harbour and remained alive close to the harbour wall for three days. Initially, there was little evidence of external injury and the animal appeared outwardly healthy, though obviously emaciated. The event quickly became a high profile media story attracting a large number of public at the site in a very short space of time. Throughout the three-day period the animal appeared to suffer stress and significant discomfort demonstrated through periods of violent thrashing, resulting in significant physical injury and bleeding in the water. The lack of a protocol for dealing with these events in the country meant that there were no clear lines of authority for handling the event or procedures for dealing with the media and the public. Though the public responded well to efforts that were made to engage them, there was a feeling of negativity due to the obvious distress and injury being caused to the animal against an apparent lack of response or effort to help it. It was established that the only course of action was to euthanise the animal, but the fact it was mobile and in the water made this complex and there were no procedures for making decisions and enacting euthanasia. Eventually the military was involved and a solution agreed for euthanasia. Due to the nature of the artillery involved this required clearing of a significant radius around the stranding area. Just as the process of clearing people was due to begin, the animal died. No necropsy was undertaken on the animal.

15.2 Discussion of welfare considerations in a strandings response

In response to this case study, the Workshop reflected on whether there were any points, from a welfare perspective, at which different decisions might have been made. In particular, the Workshop reflected on whether it would have been appropriate to attempt herding the animal back into the ocean. It was concluded that this might have been something to consider as a response to public expectations, but from an animal welfare perspective (with an emaciated and injured animal that was unlikely to survive) this would likely lead to more suffering and was considered unacceptable. The Workshop also discussed the potential for towing the animal to a nearby beach in order to euthanise it. Again, this may have seemed advantageous for managing the public response, but was likely to increase the suffering of the animal. Deaville speculated that the behaviour of the animal suggested it was compromised and that it demonstrated similar behaviour to fin whales examined in Italy, that were subsequently shown to be dolphin morbillivirus positive. Without a necropsy, this would have been impossible to determine either way and demonstrated the value of the necropsy in informing future welfare led decision making and helping to inform the public and media about the potential drivers of stranding events.

With regards to management of the public, and in particular whether it would have been appropriate to keep the public away, there were some differing perspectives amongst Workshop participants. In some countries (e.g. South Africa) it was more standard practice to clear the beach during strandings events. In other countries (including USA) strict closure was not considered to always be necessary but the public were asked to keep their distance. It was noted that some animals appearing to be embayed in a semi-enclosed area of water (e.g. a harbour) had been known to find their own way out to safety and in these cases a safety perimeter around the animal (for example keeping kayakers away) was useful and might contribute to a positive outcome. The Workshop agreed that there needed to be flexibility in approach but that further guidance for countries and sharing of best practice could be useful.

The Workshop noted the importance of managing the public and the media and of providing clear briefing on decisions that are made, particularly where this involves euthanasia or (where this is not feasible), the administration of palliative

care whilst the animal dies. Some participants reported an improved public acceptance of euthanasia where it was well explained. A recommendation on this can be found in Item 16.5.

The Workshop noted a standard press release developed by MARC and shared across the UK strandings networks, which outlines why, for bigger whales it is not always possible to attempt euthanasia and the potential for standard documents such as this to increase the coherence of press briefing from the different parties involved in a strandings response.

The Workshop agreed that there was a potential role for the IWC in providing further advice on the handling of the public and media during strandings events. It was noted that the horse racing world has had extensive experience of euthanasia and some developed protocols that might be useful for the IWC to review.

The Workshop agreed that a national strandings protocol would have been of significant benefit for handling the case presented in this case study. It confirmed its view (see Item 4.2.1) that the IWC has a role in facilitating the further development of best practice guidance and as a repository for case studies and best practice documents. A recommendation on this is in Item 16.1.

16. CONCLUSIONS AND RECOMMENDATIONS

16.1 IWC role in strandings capacity building efforts

The Workshop **notes** the challenges faced by some countries in responding to cetacean strandings in the absence of resources (human capacity, suitable equipment and financial support) and clear national protocols, guidelines and responsibilities (see Items 4.2 and 15.2). It **agrees** that there was a clear role for the IWC in assisting with these national efforts. The IWC should not interfere with national sovereignty but should help set a framework and provide best practice guidelines for countries to use in adaption to their national circumstances (see Item 4.2.1).

The Workshop **recommends** that the IWC establish a framework to provide advice to contracting governments on critical elements to include in the establishment of a national strandings response network. It also **recommends** that the IWC promote capacity building by acting as a repository for the dissemination of best practice on strandings response, including national strandings response strategies, appropriate training materials, and euthanasia.

The Workshop **recommends** that case study examples from around the world be pulled together, with information on successes and failures, to help illustrate best practice in responding to stranding events, and that these be hosted on the IWC webpage.

16.2 The Global Marine Animal Stranding Training tool kit (GMAST)

The Workshop **welcomes** the progress made towards development of the Global Marine Animal Stranding Training tool kit (GMAST) and recognised that this is a well progressed initiative, for which the first phase will be concluded in the coming months. It thus **agrees** that the work of the IWC should seek to build on and utilise rather than duplicate this existing effort (see Item 5.1.1).

The Workshop **recommends** that the IWC Scientific Committee actively engage in the phase 2 development of the GMAST by facilitating a meeting of relevant experts and providing advice to the Commission on its use within the IWC.

16.3 Euthanasia

The Workshop **notes** that it would be useful to explore whether and how IWC recommendations on euthanasia have been implemented and the need for follow up work (see Item 8.3).

The Workshop **recommends** that IWC Contracting Governments should be invited to provide updates on how the recommendations of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans have been implemented at a national level.

16.4 Information gathering and necropsy

The Workshop **emphasises** the importance of data collection and information gathering from strandings as vital to the understanding of the health and welfare of marine mammal populations and their environment (see Items 6.1.1, 7.2, 7.2.1, 9.2). This can also (especially if associated with post-release monitoring) feed back directly to inform and improve strandings response (see Items 4.2.1, 9.1 and 9.2). It further **agrees** that even the most basic observation and data can be useful, and that a level of both data collection can be conducted by volunteers and in the absence of sophisticated facilities and technology (see Items 6.1, 7.2). Similarly, necropsy can be undertaken with fairly low cost equipment (see Item 8.1).

The Workshop **notes** the importance of data sharing between strandings networks and countries and the potential for the IWC to assist in this regard, including through the development of a global strandings data portal. It **welcomes** the efforts of other organisations, including the European Cetacean Society (ECS) in developing protocols and guidelines for information gathering and necropsy (see Item 8.2).

As a result of these discussions the Workshop **recommends** that the IWC Scientific Committee consider the need to develop a global strandings data portal.

The Workshop **welcomes** the continued good progress in developing standardised necropsy protocols/guidelines and **recommends** continued coordination between the IWC and other organisations including ASCOBANS/ACCOBAMS, the European Cetacean Society and other relevant regional processes, in order to promote consistent data collection on the causes of strandings and potential welfare issues.

16.5 Media handling

The Workshop **notes** the high levels of public interest in stranding events reported by countries and social media and the importance of actively engaging the public and media including to safeguard public safety and to minimise stress and suffering of the animal (see Items 11.1, 11.2). It **emphasises** the value of clearly briefing the media on decisions that are made and that this can help engender public acceptance in difficult circumstances (for example where euthanasia would be ideal but is not feasible) (see Items 11.1, 15.2).

The Workshop **recommends** that IWC Contracting Governments establish clear and effective strategies for media handling and promote proactive engagement with the media and public during high profile stranding events.

16.6 Health and safety

The Workshop **stresses** that there were potentially significant health and safety issues involved in responding to stranded cetaceans. These included risk of wounding (for example from unexpected movements of large animals) and the possible transfer of zoonotic disease. Where appropriate, those involved in strandings response should abide by their national health and safety legislation (see Item 12.2).

The Workshop **recommends** that rescue attempts should ideally be undertaken by appropriately trained individuals and **encourages** those involved in rescues to give careful consideration to appropriate insurance coverage.

The Workshop further **highlights** potential threats to public safety during stranding events (e.g. from inappropriate public behaviour and from handling of dead carcasses). It **emphasises** the need for a balanced approach to ensuring public safety, whilst recognising public interest and limitations in resources available (e.g. for policing of sites) (see Item 11.1, 11.2, 12.2, 15.2).

The Workshop **recommends** that, drawing on existing material, the Secretariat create a document to be hosted on the IWC website that provides basic advice to the general public on health, safety, and animal welfare during live stranding events and during the handling of dead cetaceans.

16.7 Cost implications

The Workshop **emphasises** that additional resources would be required to fulfil the role of the IWC as the lead body facilitating the dissemination of strandings advice and for capacity building. The Workshop **recommends** that the IWC give consideration to the establishment of a dedicated funding stream to help improve cetacean stranding response globally. The Workshop further **recommends** that the Secretariat provide cost estimates for taking forward the relevant actions in the IWC Welfare Action Plan and the recommendations of this Workshop.

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Annex A

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Annex B

Agenda

1. Welcome and introductions
2. National strandings and background presentations
 - 2.1 Brief summaries of national experiences with strandings response
 - 2.2 Summaries of previous workshops
3. Assessment (single stranding events)
 - 3.1 Initial stranding report and data recording
 - 3.2 Data recording and information gathering (live/dead strandings, species and length etc.)
 - 3.3 Photography and social media
4. Live stranding response and options
 - 4.1 Preventative measures (to prevent strandings/mass strandings)
 - 4.2 Refloat/rescue/translocate small cetaceans
 - 4.3 Large cetaceans
 - 4.4 Herding/hazing/capture
5. Euthanasia
6. Post release monitoring
 - 6.1 Visual monitoring
 - 6.2 Tagging options
 - 6.3 Tag follow up
7. Mass stranding considerations
 - 7.1 How do mass stranding considerations differ from single strandings?
 - 7.2 Reporting, assessment, intervention, triage and dealing with mixtures of live/dead animals
8. Post-mortem investigations and tissue sampling
 - 8.1 What can the post-mortem investigation reveal about the cause of death and the reasons for stranding. How can the samples and data collected help inform research and policy decisions.
 - 8.2 How can the post-mortem investigation inform welfare led decision making in the future?
9. Carcass disposal
 - 9.1 Logistics
 - 9.2 Requirements (legal)
 - 9.3 Cultural
10. Human health and safety considerations
 - 10.1 Live stranding response
 - 10.2 Dead stranding investigation
11. Legislation and cultural considerations
 - 11.1 National/international legislation
 - 11.2 Cultural considerations
12. Media liaison and public engagement
13. Summarise work to be progressed and establishing the potential role of the IWC
14. Close

Annex C

List of Documents

IWC/M16/CW/GEN/

01. Information for Participants
02. Participant List
03. Detailed Agenda

IWC/M16/CW/ForInfo/

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