

Scientific Committee Strandings Update and Recommendations – SC68A/SC68B/SC68C/SC68D

Introduction

This document is a compilation of IWC recommendations on strandings developed at Scientific Committee annual meetings (SC68A, SC68B, SC68C and SC68D) and it provides information to support discussions under Agenda item 7. SC recommendations are boxed. See WKMWI/68/7.2/02 for progress to recommendations.

SC68A

15.3 Strandings and mortality events (and see Annex K, Item 4)

15.3.1 Update on the IWC Strandings Initiative

15.3.1.1 PROGRESS REPORT

The Committee received a progress report on the IWC Strandings Initiative (SC/68A/E05) that summarised the main intersessional activities of the Strandings Coordinator (Stockin) and the Strandings Expert Panel (SEP). Some of those activities included further plans for a Global Strandings Network and discussions with relevant international agreements such as CITES, ACCOBAMS and ASCOBANS. The Committee welcomed the update and thanks Stockin for her efforts.

15.3.1.2 TRAINING PRIORITISATION MATRIX

The Committee reviewed the training prioritisation matrix (SC/68A/E04) that was devised in conjunction with the SEP to guide decisions for prioritising stranding response training following requests for training by contracting governments and outlines procedures during emergency response requests. The Committee noted that this would be an iterative process and that the matrix, which is designed to be flexible, could be modified as necessary in the future. It also discussed the availability of training materials that could be used by the Strandings Coordinator and how these might be summarised, perhaps in the form of case studies, for fund raising and outreach purposes. In addition, the Committee encourages the Strandings Coordinator and SEP to develop a package of training materials for use in IWC events and for outreach purposes.

Attention: SC, C, CG, S

The Committee reiterates its support for the IWC Stranding Initiative and the work of the co-ordinator, noting that it is entering a new and important critical phase. The Committee:

- (1) agrees that the guidelines in the Prioritisation Matrix (SC/68A/E04) for providing stranding response training by the strandings coordinator should be adopted and modified in future as necessary;
- (2) encourages the Strandings Coordinator and SEP to develop a package of training materials for use in IWC events and for outreach purposes;
- (3) recommends that funding be sought for the continued support of the Strandings Coordinator beyond October 2020;
- (4) encourages Contracting Governments to consider providing support for this initiative; and
- (5) encourages the Secretariat to pursue wider fundraising efforts for Strandings Initiative activities

25. Scientific committee budget for the current biennium

SC67B RP07 IWC STRANDINGS INITIATIVE – EMERGENCY RESPONSE AND INVESTIGATIONS

Over the next two years, the Emergency Response and Investigations fund will support response, collection of data to determine the cause(s) or contributing factors for the event and/or to fill critical data gaps identified by the SC or Commission. The initiative is evaluated annually, and policies and procedures adapted according to feedback from responses and through Steering Group/Expert Panel advice.

SC68B

14.3 Strandings and mortality events

14.3.1 Update on IWC Strandings Initiative and work plan 2020-22

14.3.1.1 REPORT ON PROGRESS

Mazzariol presented an update on progress with the IWC Strandings Initiative 2019-20 (SC/68B/E/08). A draft new four-year work plan is being developed that will be presented at SC68C. In addition, work is underway to explore the relationship between the IWC Strandings Initiative and the proposed 'Global Strandings Network' which was an outcome of a Workshop at the World Marine Mammal Conference in December 2019 and the 'Barcelona resolution'. Recommendations on the possible synergies and relationships between these two entities will be presented at SC68C. Mazzariol invited the Committee to: provide comments on the development of the new strandings work plan; provide advice on how the Committee can best engage with the development of the new strandings work plan as it proceeds intersessionally; and approve the proposal for expansion in membership of the Strandings Expert Panel to address geographic gaps and gaps in expertise. The Committee welcomes the work to develop a new four-year work plan for the Strandings Initiative.

Brownlow provided further information on the development of the four-year work programme for the IWC Strandings Initiative. The review has three main foci: (1) to recognise progress on the initiative so far and lessons learnt; (2) to identify those areas in global strandings response which could be best addressed by the capabilities of the IWC Strandings Initiative; and (3) to develop a costed work plan as to how the IWC Strandings Initiative could develop over the next four years.

The Committee thanked Mazzariol and Brownlow for the updates. It recognised that the Strandings Initiative encompasses a broad range of issues related to cetacean strandings, including responses to both live and dead stranded cetaceans, entrapped or 'out of habitat' animals, scientific investigations to determine causes of strandings, as well as associated welfare implications, and that science related to strandings can improve both cetacean conservation and welfare. Furthermore, it noted that cross-cutting issues spanning the work of different sub-committees needs to be interlinked. A request to carry over the existing strandings funding to 2021 is discussed under Item 22.

Attention: S, CC, C

The Committee recalls previous recommendations stressing the importance of the IWC Strandings Initiative. The Committee:

- (1) draws attention to the need for funding for the Strandings Coordinator position and the Strandings Initiative work programme;
- (2) encourages Contracting Governments and relevant organisations to contribute funding to the initiative; and
- (3) requests the Strandings Expert Panel and Secretariat to pursue wider fundraising opportunities.

Attention: S, CC, C

Regarding the new four-year work plan for the Strandings Initiative, the Committee:

- (1) agrees on expanding the scope of the Expert Panel to address geographic gaps and gaps in expertise,
- (2) requests the Strandings Initiative Steering Group to identify appropriate additional members; and
- (3) encourages the Committee members represented on this group to engage with development of the work plan as it proceeds intersessionally.

14.3.2 strandings - other issues

The Committee welcomed SC/68B/E/04, which provided an overview of the recent effort of the Indian Ocean Network for Cetacean Research (IndoCet) to compile regional strandings data. The effort seeks to coordinate stranding response within IndoCet and the Western Indian Ocean region and identify a stranding coordinator to provide assistance and support with stranding response, documenting injury and mortality stranding data, sample collection, and training. IndoCet has collect unpublished stranding data from South Africa, Mozambique, Tanzania, Kenya, Reunion, Seychelles, Mayotte, Mauritius, Comoros, and Madagascar. The authors conclude that a lack of baseline data on animal health in the region is of concern as such data are required to assess the potential impact from anthropogenic activities in the region, as well as concerns regarding possible impacts from consumption of stranded cetaceans on human health. The report highlights the fact that regional capacity building is needed, and that ongoing efforts be focused on establishing geographical areas of response and determining the level of capacity and/or training requirements.

SC/68B/E/06 provided information on an unusual level of cetacean strandings in northern Norway, during spring 2020. A total of 17 animals of at least 7 different species was found stranded in a relatively small area of the coast during a short period of time. Based on meteorological simulations of drift, the carcasses may have originated from the same area in the Norwegian Sea, southwest of the Lofoten Islands. There were also unusually high numbers of reported strandings in Iceland during spring 2020. However, an increase in the frequency or range of species stranding during this period was not noted in Scotland, though there was a cluster of beaked whale strandings in southeast Ireland and the Atlantic coast of the UK in December 2019/January 2020. Anthropogenic causes were not suspected in the latter cases, based on necropsy data.

A high number of strandings was also noted in SC/68B/E/07, which presented information collected during beach monitoring along approximately 1,000km of Brazilian coastline from 2015-19. During this period, 215 baleen whales and 4,162 toothed whales were found. Of toothed whales, 87% were from only three species: franciscana, Guiana dolphin and bottlenose dolphin. The authors believed that the average number of franciscanas stranding each year may indicate a population decline considering the population size estimates for this area. Daily beach monitoring revealed much higher numbers of stranded small cetaceans than previously recorded in the same area when opportunistic or less frequent sampling occurred, suggesting that turnover of carcasses on beaches may be relatively high.

SC/68B/E/09 summarised events involving cetaceans reported to the Strandings Expert Panel of the IWC Stranding Initiative during the period 2018-20 that could be considered atypical or an 'emergency'. An emergency can be defined as 'any event, or combination of events, natural or man-made, which causes a temporary and unusual increase in wildlife casualties, and which threatens to overwhelm local resources'. For cetaceans, this definition includes, but is not limited to, unusual mortality events (UMEs), mass strandings (MSEs), epidemics, live strandings of large cetaceans found dead in countries with no functional stranding response or in unusual places. In total, 53 events were reported, and geospatial mapping of these events was conducted. This summary of recent unusual marine mammal emergencies helps focus the IWC Strandings Initiative efforts and resources for training for emergency response investigations. A retrospective analysis, a standardisation of event reporting and continuous data entry would help the IWC to have a broader understanding of stranding events worldwide. The aim of the paper was not to undertake an exhaustive review of events, but to provide examples from recent years to demonstrate the need for prioritising the training of responders. The Committee noted the importance of the development and implementation of a database of unusual cetacean stranding events; such a database could be used to extract information on worldwide events in near-real-time.

The Committee also discussed the potential value of development of a database that integrates entanglement, ship strikes and strandings data that are collected by the IWC. Integrating databases is a complex issue that needs to be considered in more detail at SC68C. There was a need for detailed discussions with the Secretariat and the Committee's Ad hoc Working Group on Databases and Related Issues, which already has the mandate to take an overview of existing IWC databases (including considering the potential for merging databases) and for evaluating proposals for new databases. Furthermore, it was noted that data

standardisation and management are critical topics requiring further discussion. Finally, it was suggested that a better definition of the Strandings Initiative Terms of Reference, clarifying which events are classified as novel or emergencies based on long-term 'baseline' datasets versus those that are due to the lack of a stranding network, would facilitate better interpretation of the data and help to focus the efforts of the Stranding Expert Panel. This will be further considered by the Strandings Consultant in development of the new four-year work programme for the Strandings Initiative (see above).

The Committee thanked the authors for their contributions and the new information they provided on stranding events around the world.

Attention: SC, S, E

The Committee reiterated the importance of the IWC Strandings Initiative. Recognising the outstanding needs regarding

the data generated through the initiative, the Committee:

(1) requests that the Secretariat liaise intersessionally with this group to facilitate discussion of existing database development

plans, and coordination with the work of the Ad Hoc Working Group on Databases; and

(2) agrees to further consider the topic of database development and data standardisation at SC68C and coordinate this with the on-going work on database development in the Ad Hoc Working Group on Databases.

14.3.3 new information on unusual mortality events

SC/68B/E/10 provided information regarding an Unusual Mortality Event of sperm whales in the Mediterranean. Between December 2018 and July 2019, an increase of stranded sperm whales was recorded along the Tyrrhenian coastline of Italy, with 16 individuals found stranded or floating close to shore. Two additional whales were reported in France, and eight in Algeria. Epidemiological and molecular data suggest that cetacean morbillivirus (CeMV) had a role in the deaths. A CeMV related outbreak was reported in bottlenose dolphins living in a contiguous area between July and September, further supporting the circulation of the virus in the Mediterranean Sea. It is not clear if the virus represents a significant threat for the Mediterranean population. Marine debris and fishing gear were considered incidental findings, although it cannot be excluded that the ingestion of marine litter may have had a role in predisposing animals to infection (i.e. reducing food ingestion, transporting chemicals or pathogens). The number of entangled individuals found in a short period stresses the need for constant monitoring and a continuous transboundary dialogue regarding human-related threats to cetacean conservation. In discussion, it was noted that this paper highlights the timeliness of next year's focus session on CeMV, which has been documented over the last 30 years to have caused multiple cetacean mortality events among a variety of cetacean species, across different oceanic basins, and with multiple CeMV strains circulating among different cetacean stocks.

14.5 Review Report of the Workshop on Marine Debris

Simmonds presented the report of the third IWC Workshop on Marine Debris, held in La Garriga in Catalonia, Spain, 3-5 December 2019, with experts from nine countries attending, and supported by the IWC and the government of Netherlands (SC/68B/REP/03).

The Workshop aimed to progress the IWC's work on this threat by: (i) reviewing the latest evidence on interactions with cetaceans (both ingestion and entanglement) and considering evidence for associated toxicology; (ii) identifying best protocols for gross pathology, pathology for microdebris and the standardised classification of recovered plastics and other debris; and (iii) developing liaison with other relevant expert bodies.

The Workshop considered published and unpublished information, including reviews of the latest literature and a comprehensive overview of marine debris-related activities by other international organisations, as well as regional reports (Mediterranean, the Spanish Canary Islands, German and Dutch waters). It was agreed that the scale of the actual and projected increase in plastics is alarming. Cetaceans can die after marine debris ingestion, due to gastric impaction/occlusion, perforation, or the associated lesions. Besides causing direct lethal effects, plastic debris can affect marine mammals' health if they persist in the gastrointestinal tract (GIT), for example by reducing the space for food and, subsequently, reducing their fitness and the nutritional condition. Presence of foreign bodies could also cause inflammatory changes to the GIT and/or induce stress and pain. An additional concern on the health effects of marine debris on cetaceans was related to the potential role of plastic debris as a carrier or vector of toxins and pathogens. The Workshop also considered the relationship between marine debris and entanglement in fishing gear and received new information on Fisheries Aggregation Devices. Noting that approximately 640,000 tonnes of Abandoned, Lost and otherwise Discarded Fishing Gear (ALDFG) enters the oceans every year, the Workshop also called for actions to address this threat, including for bowhead whales in the Bering Sea which may be at particular risk.

The Workshop made a series of detailed recommendations, including emphasising the importance of long-term studies; the need for standardised approaches for post-mortem studies; the importance of strandings networks; the assessment of floating debris during aerial surveys and the integration of marine debris concerns into the IWC's Conservation Management Plans, where appropriate. The vulnerability of some species was highlighted and the potential of some to be used as indicator species. The Workshop also called on the IUCN to consider marine debris in its next assessment of the sperm whale.

22.1 Status of funded research

SC/68B/RP/25 IWC Strandings Initiative

This funding remains unspent due to its nature of being an emergency response fund and in this biennium no eligible requests being received. This funding will therefore be carried forward to 2021 with the same main purpose. Currently, a consultancy project led by the IWC Secretariat is underway to review the progress of the IWC Strandings Initiative overall and to develop a new four-year work programme. The outcome of this may indicate the need for revised Terms of Reference for the emergency response funding and thus any proposals for change in use of this funding will be made to the next meeting of the Scientific Committee in 2021.

SC68C

14.3.1 Update on the Strandings Initiative and work plan

The work of the Strandings Expert Panel (SEP; <https://iwc.int/index.php?CID=632&cType=html>) from May 2020 - May 2021 was summarised. In the last year, the SEP have appointed seven new members, to broaden expertise and spatial coverage. Considering the pandemic, the SEP has adapted its provision of training, through use of remote tools such as Whatsapp and Zoom, successfully supporting responses to mass strandings in New Zealand, Australia, the North American UME, the Indian Ocean and more recently Ghana; and successfully administering real time necropsy assistance in the Arabian Peninsula. The SEP has engaged with IGOs, the Arabian Sea Whale Network, and WWF, providing remote training on necropsy, and it continues to engage with IUCN, CITES, ACCOBAMS, and ASCOBANS, to enhance cooperation.

The development and strategy of the Strandings Initiative (SI), including a new four-year workplan, and the staffing and governance of the SI were discussed; and views sought from the sub-committee.

A new four-year (2021-2024) costed work programme for the SI was presented. The review proposed four interlinked strategic themes for the next four years: (1) data collection and dissemination; (2) emergency response; (3) expert advice; and (4) advocacy and capacity building. Specific attention was drawn to the increase in requests for assistance or remote advice during unusual mortality events (UMEs) and mass stranding events (MSEs) in 2020 and 2021, and the associated demands this was placing on SI in terms of frequency and depth of involvement. Three models proposed for filling the SEP Strandings Coordinator role were presented to the SEP for consideration. The SEP advocated a 'hybrid' model, whereby the administrative and technical aspects of the Strandings Coordinator role are separated. Finally, updates on SI governance structure and updated Terms of Reference for the SEP, reviewed in 2018 and 2019, were presented and the Committee was asked to review these proposals and provide any comments or suggested amendments.

In discussion, concerns were raised about the functioning of the Strandings Steering Committee. The Committee agreed that the membership of the Steering Committee would be refreshed in accordance with its new agreed ToR, existing members would be asked to confirm their continued involvement, and a convenor would be selected. The Steering Committee will remain open to Contracting Governments and Accredited Observers.

Attention: C, S, SC-E

The Committee expresses its ongoing strong support for the Strandings Initiative, commended the work of the chair and the rest of the Strandings Expert Panel (SEP) to date and endorses the options presented, subject to an addition to the Terms of Reference (ToR) 10 for the SEP, whereby the SEP will provide regular updates to the Strandings Steering Committee, and endorses membership of the SEP and the Strandings Steering Committee.

The Committee recommends:

- (1) the Committee funds for strandings be carried over to the next biennial budget;
- (2) the refreshed Strandings Steering Committee appoint a convenor; and
- (3) the SEP and the Strandings Steering Committee meet shortly after the close of SC68C to review and complete a costed version of the Strandings Initiative work plan.

Attention: C, S, SC-E

The Committee emphasised the importance of the role of the Strandings Coordinator in underpinning the Strandings Initiative and:

(1) requests the Secretariat to recruit a Strandings Coordinator as soon as possible subject to available funds;

and (2) encourages the Secretariat to seek funding to support the role of the Strandings Coordinator.

A progress update regarding the Indonesian government's engagement with strandings monitoring was provided. Enhanced communication with the Indonesian government would likely improve the government's understanding of the importance of monitoring strandings. Communication challenges remain but are improving. Similar concerns were raised with respect to a recent pilot whale (*Globicephala macrorhynchus*) mass stranding event in Sri Lanka. It was emphasised that receiving information on what is happening and having the IWC support to distribute this information is vital, especially for those working in isolation. Governments and local stakeholders were invited to contact the Secretariat directly, for support during future events. In discussion, a request was made for the IWC to provide expertise and support to build local capacity within south Asia, including marine mammal training for veterinary students in Sri Lanka and necropsy training in Indonesia.

The Committee acknowledged that education and outreach is a key deliverable for the SI.

The request for a synergistic working relationship between the SI and the Global Stranding Network (GSN) was welcomed and Committee members were invited to volunteer as members of the GSN group.

In further discussion, it was suggested the development of 'beach friendly online material to support emergency stranding response', should include resources to assist less experienced responders with basic data collection.

14.3.2 Strandings and other issues

SC/68C/E/11 reported the preliminary results of necropsies performed on six specimens of franciscana (*Pontoporia blainvillei*) found during 2020 at the Río Negro Estuary, Northern Patagonia, Argentina. This area is considered the southernmost breeding and feeding area of this species. Two of the adults were confirmed to be bycaught in gill nets. Two specimens showed beak deviations, which would represent the southernmost report of beak anomalies. Scattered granulomatous lesions compatible with mycobacteria were detected in one franciscana and Mycobacterium tuberculosis complex was identified. This report will be the first case of Mycobacterium tuberculosis complex in this cetacean species. Cultured samples of the whitish nodular lesions showed the development of acid-fast bacilli detection. Based on the macroscopic lesions compatible with infectious diseases discovered here, it is necessary to extend the sanitary study of this population of franciscana. In discussion, the Committee expressed interest in genetic analysis of the mycobacterium complex and it was confirmed that further analyses are planned.

SC/68C/E/14 reported on the mass stranding of melon-headed whales (*Peponocephala electra*), on the southeast coast of Mauritius Island in August 2020. Members of the SEP, the International Fund for Animal Welfare (IFAW), and the Indian Ocean/IndoCet network, provided remote assistance to local responders. Local NGOs and organisations herded live animals out of the lagoon until 13 September, however, 53 individuals of two species were found dead over a 27-day period: 52 melon-headed whales and a single bottlenose dolphin (*Tursiops* spp.). The Minister of Blue Economy, Marine Resources, Fisheries and Shipping, reported the results of 26 necropsies, evidencing lacerations, fractured mandibles, large bite wounds, empty stomachs, congested and emphysematous lungs, acoustic fat haemorrhage and gas embolism as the most common lesions. The Veterinary Services Division indicated the main cause of the death as barotrauma, which could have been triggered by a multitude of factors, such as navy sonar, oil industry seismic airguns,

undersea earthquakes, and volcanic eruptions. In a non-public Forensic Science Laboratory (FSL) report, aliphatic hydrocarbon residue analysis detected a presence in samples from 11 whales. The mortality event occurred a few weeks after the grounding of the bulk carrier, MV Wakashio, on the same coast, which resulted in an oil spill in the area. The exact cause of the strandings has not yet been determined, and further histology, and a full epidemiological investigation of different potential causes is needed. The IWC Secretariat sent a letter to the Mauritian government offering expert advice and support in analysing samples, however, no formal response was received.

Members of the SEP emphasised the challenges of engaging with the Mauritian government and the uncertainty surrounding the current progress of causal investigation. They noted that frozen samples are held by the Ministry of Blue Economy and Shipping Resources, and their value for causal determination of barro trauma, and confirmed further plans to attempt to engage with the Mauritian government and offer support and expertise for further necropsies.

Raverty et al. (2020) reviewed pathology reports from 53 killer whales (*Orcinus orca*) that stranded in the Eastern Pacific Ocean and Hawaii between 2004 and 2013 and used data from 35 animals that stranded from 2001 to 2017, to assess relationships between morphometrics, blubber thickness, body condition, and cause of death. This study included data from ten southern resident killer whales, a small distinct population of endangered killer whales. Of the 53 pathology reports reviewed for the study, cause of death (COD) was determined for 22 (42%) and nine additional animals demonstrated findings of significant importance for population health. Causes of calf mortalities included infectious disease, nutritional, and congenital malformations. Mortalities in sub-adults were due to trauma, malnutrition, and infectious disease. Causes of adult mortalities included bacterial infections, emaciation, and blunt force trauma. Death related to human interaction was found in every age class. This study establishes a baseline for understanding health, nutritional status and causes of mortality in stranded killer whales. It also highlights the threat of human interactions, especially for small, endangered groups of killer whales that occur in close proximity to large human populations.

In discussion, the definition of nutrition, when attributed as cause of death was discussed and stated it could be attributed to a range of issues, namely the inability to absorb nutrients due to disease or defect or malnutrition due to lack of ability to acquire prey. It was suggested to bring the ship strike accident to the attention of the IWC ship strike database.

SC/68C/E/07 explores the possible role of chronic viral infections in gray whale (*Eschrichtius robustus*) unusual mortality events and highlights the utility of viral discovery work using unbiased metagenomic sequencing for prospective and retrospective investigations of gray whale mortalities. The Eastern North Pacific (ENP) gray whale population has undergone two official Unusual Mortality Events (UME) in the past 25 years. Common characteristics in both the 1999-2000 and 2019-2021 UMEs included: (1) increased stranding numbers throughout the species North American range (Mexico to Alaska); (2) apparent emaciation in a proportion of stranded whales; (3) low lipid content of blubber and body tissues in some whales; (4) apparent reduced reproduction (low calf counts) occurred during and following each event, and (5) average to good condition of post-parturient females and their calves observed in the breeding lagoons of Baja California during 2019 to 2021. Emaciation, low lipid content of blubber and body tissues, poor body condition, and reduced fecundity can be associated with a number of infectious diseases of wildlife, in addition to being features of purely nutritionally driven mortalities. A range of viruses detected in cetaceans to date, including morbilliviruses, herpesviruses, picornaviruses, arboviruses, astroviruses, anneloviruses and retroviruses (reviewed in Bossart and Duignan 2018) could cause chronic weight loss or mortality, although the effects of many of these emerging infections on cetaceans is unclear.

In discussion, the Committee recognised the importance of multi-disciplinary collaborations when dealing with strandings and mortality events, and in causal investigation; with emphasis placed on the role of veterinary pathologists. The Committee detailed the value, as well as the limitations, of histopathological sampling and analysis in identifying underlying pre-existing conditions and diseases that may result in the interaction of cumulative stressors.

Clarke et al. (In review) follows on from recommendations made in the SC67A meeting report (IWC, 2018, p.55), where the Scientific Committee agreed the method of Very High Resolution (VHR) satellite imagery to monitor strandings, showed promise, and that continued refinement should occur to fully evaluate its potential.

The paper reviews (1) the current gaps in strandings monitoring globally (2) the opportunities and challenges of satellites to address those monitoring gaps, and (3) the areas where satellites hold the greatest potential to monitor strandings remotely. The authors recommend testing the robustness of this technology through pilot studies on mass stranding hotspots with established stranding networks, to develop working protocols and to address the technical challenges; and to then test on present and future areas of concern, where there is no prior knowledge of mass stranding events. They also recommend the development of automated and semi-automated detection processes, and the collaboration with other remote sensing fields to help develop predictive hypotheses; and for the IWC to encourage the development of collaborative partnerships between satellite providers and stranding networks, NGOs and governments, to develop an inclusive way for this platform to prosper.

Attention: C, SC

The Committee recognised the promise of Very High Resolution (VHR) satellite imagery and encourages the further refinement and use of VHR for strandings monitoring.

Attention: I

The Committee discussed the present accessibility of satellite imagery and encourages satellite image providers to develop collaborative partnerships with stranding networks, NGOs and governments, to allow an inclusive way for this platform to prosper.

SC68D

14.3 Strandings and Mortality Events

14.3.1 Review progress of steering committee for IWC Strandings Initiative

The work of the Strandings Expert Panel (SEP) from May 2021 - April 2022 was summarised. In the last year, the SEP have revised internal policies; met to review the membership, Terms of Reference and the Chair appointment; and responded to recommendations of the Scientific Committee (SC) in 2021. To address the SC recommendations, the SEP appointed a new part-time Strandings Co-ordinator, Emma Neave-Webb and created regional focal points for Western Africa, Sri Lanka, Eastern Asia, South America and the Central Pacific. The role of the focal points is to enhance and facilitate communication and to help and support engagement with local stakeholders. In the last year, the SEP has continued its provision of emergency support and training, through use of remote tools, successfully engaging with IGOs and stranding networks in Kenya, Sri Lanka, and Cambodia. The SEP successfully supported two emergencies; (1) the implementation of onsite training in Mauritius for an event reported last year; and (2) administration of support in response to a request from Sri Lanka and the incident of the MV Express Pearl. Governmental request for the SEPs official involvement in these incidents is required, and absent requests limit the level of support the SEP can provide. The SEP identified three key aims moving forward; (1) to complete the Steering Group (SG); (2) to engage with the IUCN and other animal health and welfare organisations to find synergies for future strandings response; and (3) for the SEP to convene in-person at next year's SC meeting to define and implement the next steps of the 4-year workplan.

In discussion, the process for the selection/nomination of the SG members was considered. The Secretariat confirmed the formation of the SG must follow established Rules of Procedure (ROP). The SG must be chaired by a national delegate (two-year term), who is elected by the Steering Group and appointed by the Commission (through the SC Report adoption).

The Secretariat informed the Committee that amendments to the SG can take place following an update to the ROP and Terms of Reference, after the SG is formed and approved. The Chair and VC of SC along with the Chairs of E, CC and WKM&WI nominated four SC members for the SG. Once the SC report has been endorsed by the Committee this group will elect a Chair and meet to discuss next steps.

The Committee suggested the SEP produce visible open-source products providing practical advice and expert knowledge. The Chair of the Expert Panel emphasised the complexity of strandings science and the challenges to summarising the diversity of existing tools. The Chair of the Expert Panel highlighted the SEPs current focus is to evaluate the economics of the materials and tools in existence, and to review their suitability for the capacity of different countries to respond to strandings.

In discussion the absence of local representation and expertise for Africa within the SEP was highlighted. The Chair of the Expert Panel strongly supported local representation from Africa and Asia in future reviews of the SEP membership.

Attention SC, S, C

The Committee notes the absence of representation and expertise from Africa within the Strandings Expert Panel (SEP). The Committee and the Chair of the Expert Panel therefore strongly recommends identifying and recruiting local representation from Africa and Asia in future reviews of the SEP membership.

14.3.2 New information on unusual mortality events

SC/68D/E/08 presented information on the unusual mortality event of harbour porpoises in the Netherlands. In August 2021, a remarkably high number (~ 200) of dead harbour porpoises (*Phocoena phocoena*) washed ashore on the Dutch Wadden Sea Islands in a period spanning ten days. They all appeared in similar state of advanced decomposition, indicating that they died around the same time. Information derived from a drift-

model indicated a location NW of Frisian Front and E of Cleaver Bank as the most likely origin of the carcasses. There were no unusual anthropogenic activities in that area during August (e.g., no Unexploded Explosive Ordnance detonation or military activities). Necropsies were conducted on 22 carcasses and revealed that animals were in good nutritional condition with mild to moderate parasitic loads and most were reproductively active. Despite their relatively good nutritional state, no or few prey remains were found in the stomachs. This is indicative of an overall fair to good health status, and a subacute cause of death. Ancillary testing showed that harmful algae blooms (HABs), Influenzavirus, Morbillivirus, herpesvirus and SARS-CoV-2 were unlikely the cause of the mass mortality. Cultures of liver samples (n=21) and from organs with macroscopic changes (n=3) revealed the presence of *Erysipelothrix rhusiopathiae* in 76% of harbour porpoises tested. This bacterium has not previously been cultured from harbour porpoises investigated in the Netherlands. There are no reports in literature of cetacean mass mortality as a result of *Erysipelothrix* infection. The investigation is ongoing.

The Committee welcomes this information. In discussion, it was noted that investigations of mass mortality of seabirds in the North Sea are currently ongoing, and that results of that investigation should be considered in interpreting the likely causes of the harbour porpoise unusual mortality event, as well as potential effects of any disposals of dead fish at sea, or potential sources of pathogens via river Thames. Committee members pointed out that links between water quality and prevalence of this bacterium have been demonstrated previously and that further efforts may provide further clues about these links and their effects on harbour porpoise health. The Committee also noted that information on such mortality events and their likely causes should be considered in light of cumulative impacts on harbour porpoises in the region (and cetaceans in general), despite bycatch in fishing gear being identified as the primary threat to this species and stressed the importance of the OneHealth approach.

SC/68D/E/03 reported on the bowhead whale (*Balaena mysticetus*) Unusual Mortality Event (UME) in the Gulf of Boothia, Canada, between 1 October 2020 and 14 April 2021. Eleven bowhead whales were discovered, near Kugaaruk, Nunavut. Tissue samples from eight whales were collected to investigate potential causes and extent of the mortalities. In addition, demographic, epidemiologic, pathologic, image analysis, adipocyte, lipid, and contaminant analyses were compiled and reviewed. Due to the remote location and lack of access, sonar/seismic testing, ship strikes, and infectious disease could not be investigated. No gross indication of vessel or propeller strike was observed. Analysis of environmental, morphometric, histopathologic, and contaminant data did not reveal a definitive cause of the mortality. Unusual oceanographic processes and contaminant exposure were unlikely factors. The strandings were concurrent with sightings of killer whales in the region and predation marks and damage to the carcasses were observed by local Inuit. A contributing factor may have been an interaction between poor body (nutritional) condition and predisposition to predation. Sea ice coverage was low in autumn 2020, which allowed killer whales greater access to the Canadian Arctic and for longer than usual. Most of the dead whales were juveniles, which may enhance the risk of killer whale predation. The mortality event was likely related to broad changes occurring to the Eastern Canada-West Greenland (ECWG) population's habitat, due to complex and dynamic ecologic changes associated with climate warming. Fisheries and Oceans Canada plan to continue to monitor the population, further research will include analysis of; drone-collected images to assess body condition; reproductive history from baleen plates; satellite imagery to assess harmful algal blooms; population modelling to determine carrying capacity; and modelling of physical factors to associate future whale health within a larger environmental context.

In discussion, the Committee considered whether the animals were near moribund when predation occurred, the authors acknowledged this possibility and confirmed that moving forward further drone footage will be collected to better understand changes in the ECWG population body condition over time. The Committee also discussed the challenges associated with the analysis of environmental data, for example harmful algal blooms, using satellites in the coastal zone (<40km to the coast). The authors recognised these challenges and confirmed that further investigations are planned, and satellite analyses will be supported with analysis of ring seal stomach content before and after the event.

The Committee discussed the typical number of bowhead whale strandings that occur annually in the region, and while the numbers were low relative to the population, the occurrence of strandings in this region is unusual. The authors raised possible concerns of an increasing trend of predation by killer whales in the Canadian Arctic and highlighted the need for continued monitoring.

14.3.3 Other information

SC/68D/E/02 presented a first look at strandings data collected between 2000-2020, by various members and collaborators within the Indian Ocean Network for Cetacean Research (IndoCet), covering over 14,815km of coastline belonging to nine countries. The southwestern Indian Ocean (SWIO) is a region of global importance for marine mammal biodiversity, yet our understanding of most of the species and populations found there is still rudimentary. Cetacean stranding patterns and finer scale spatial and spatio-temporal patterns were characterised. Between 2000-2020, there were 398 stranding events, representing 1,259 individual animals, 17 genera, and 27 species, comprising six families: four balaenopterids, one balaenid, one physeterid, two kogiids, six ziphiids and 14 delphinids. Seven mass strandings were recorded: two were composed of three to 20 individuals and five were composed of >20 individuals. Spatial analysis of stranding events indicated local spatio-temporal clusters were present in all countries/territories except for the Comoros; however, the only significant cluster was detected on the southwest coast of Mauritius just west of the village of Souillac. The SWIO region is predominantly composed of relatively poor range countries, yet imminent Blue/Ocean economy developments are prevalent throughout the region. This study highlighted the importance of establishing baselines, upon which any future potential impact from anthropogenic developments in the region can be measured.

The Committee commended the authors for this comprehensive study. In discussion, interest in the analysis of class and gender of the individual strandings were discussed and the authors confirmed that this information was not included in this higher-level review. The data presented was reliant upon the confidence of individual networks across the IndoCet region. In some regions, little or no manpower, limited the data availability and confidence level. The work presented proved useful to highlight regions needing training and the levels of investment required.

SC/68D/E/04 examined humpback whale (*Megaptera novaeangliae*) stranding data from 2002 to 2021 (1,260 strandings: 106 alive; 1,145 dead; nine without information), collated from the Brazilian Aquatic Mammals Stranding Network (REMAB), and beach monitoring projects – PMP. There was a positive exponential trend in the number of strandings over time. Most strandings occurred in August (30.2%) and September (22.1%), but there is an apparent shift in the peak of mortality, becoming earlier. Calves were the most frequent in 15 out of 20 seasons, with juveniles predominating in only five seasons. In 2021 30 strandings were recorded with 187 classified as juveniles (where age could be determined). Strandings occurred predominantly close to the main breeding area in the Abrolhos Bank, but for 2016 and 2021 there was a significant displacement to higher latitudes. From 146 necropsies conducted from 2015 to 2021, 19.2% of deaths were caused by anthropogenic interactions, such as entanglement in fishing gear and ship strikes. Regarding body condition, 26.9% were cachectic or thin, and 24.2% were in good body condition. The increase in humpback whale strandings along the Brazilian coast over time might be a result of a combination of different factors. Population growth, which seems to be reflected in the amount of strandings, increases the likelihood of interactions with human activities, hence increasing non-natural mortality. Another factor could be the nutritional condition of the individuals, which relates to food availability in higher latitudes. Previous work suggests a relationship between the occurrence of krill in the Islands at 54°-55°S, 36°-38°W and strandings of humpback whales in Brazil (Marcondes *et al.*, 2017). This seems to mainly affect juvenile individuals that were observed with food remains in their gastrointestinal tracts (on average: 40% per year). Further analyses are underway, focusing on the effect of changes in krill biomass and climate variability on humpback whales' mortality and stranding rates.

In discussion, the Committee considered whether two significant contamination events along the Brazilian coast in 2019 were identifiable within contamination levels of lactating juveniles. While not investigated at this time, the authors confirmed that further analyses were planned.

Boys *et al.* (2021) described the available published data on cetacean euthanasia in 2,147 peer-reviewed articles, highlighting knowledge gaps and providing direction to improve stranded cetacean welfare. The current knowledge and implementation of euthanasia methods remain highly variable, with limited data on the practicalities and welfare impacts of procedures. Two examples of countries by methods employed were drawn from IWC reports. In the UK, chemical euthanasia was most common (52%), whilst in NZ only ballistics methods were used. In general time to death/insensibility (TTD) was rarely mentioned, only reported by 0.5% of peer-reviewed articles, whilst TTD from IWC reports was reported for 35% of individuals in the UK and for 98% in NZ. The findings highlight the lack of available information on cetacean euthanasia and suggest increased data collection and the application of appropriate methods to improve cetacean welfare.

Boys *et al.* (2022a) evaluated Standard Operating Procedures (SOPs) for end-of-life decision-making and technically enacting euthanasia of stranded cetaceans across Australasia. The aim was to highlight similarities and differences in management and explore directions to improve stranded cetacean welfare. For this purpose, twenty-nine parameters for the implementation of end-of-life decisions were evaluated. Euthanasia and palliative care were options for end-of-life, with palliative care recommended when euthanasia was not feasible or presented human safety risks. Three euthanasia methods were recommended. Ballistics was recommended in seven SOPs, chemicals in five and explosives in three SOPs. Variability existed in the exact procedures and equipment recommended in all three methods. Additionally, only five SOPs provided criteria for verifying death, while only two recommended time to death (TTD) be recorded; hindering evaluation of the welfare impacts of end-of-life decisions and euthanasia procedures. The findings highlight the need for detailed guidance and consistency in end-of-life decisions and euthanasia techniques, to ensure reliable welfare outcomes. Systematic, standardised data collection at euthanasia events across regions is required to facilitate assessment of welfare impacts and develop evidence-based recommendations. International collaboration is key to developing objective criteria necessary to ensure consistent guidance for end-of-life decisions.

Boys *et al.* (2022b) explores fundamental concepts and key concerns relating to the welfare and survival of stranded cetaceans. Based on the expert criteria one of the main conclusions was that stranded cetacean welfare should be characterised based on interrelated aspects of animals' biological function, behaviour, and mental state and the impacts of human interventions. The characterisation of survival likelihood should reflect aspects of stranded animals' biological functioning and behaviour as well as a 6-month post-re-floating survival marker. Post-release monitoring was the major knowledge gap for survival. Welfare knowledge gaps related to diagnosing internal injuries, interpreting behavioural and physiological parameters, and euthanasia decision making. Twelve concerns were highlighted for both welfare and survival likelihood, including difficulty breathing and organ compression, skin damage and physical traumas, separation from conspecifics, and suffering and stress due to stranding and human intervention. These findings indicate inextricable links between perceptions of welfare state and the likely survival of stranded cetaceans and demonstrate a need to integrate welfare science alongside conservation biology to achieve effective and ethical management at strandings.

Attention: C, SC Environmental Concerns, and WKM&WI

The Committee welcomes this new information on cetacean welfare and encourages that these papers should be brought to the attention of the IWC's Whale Killing methods and Welfare Issues group.