

# Annex G

## Report of the Environmental Concerns Subcommittee

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The Subcommittee agreed that DeMaster and Genov would serve as co-conveners. It was agreed that Noren and Vrooman would serve as rapporteurs. Parsons served as rapporteur for one session.

Available documents: SC/69B/E/01-24; Yaghmour *et al.*, 2023; Schaap *et al.*, 2023; Murawski *et al.*, 2024; Andvik *et al.*, 2023; Noren *et al.*, 2024.

### 1. CHEMICAL POLLUTION

The Pollution Intersessional Correspondence Group (ICG) updated an Overview of the History of the IWC Pollution Initiative (Appendix 1) to inform the Subcommittee of the work and progress of the Pollution Initiative from 1981 through 2023. This work, which is based on a resolution from the Commission in 1981, initially focused on consistency in analyses and reporting, followed by studies to evaluate mechanisms and effects. The group then evaluated trends over time, as well as across species and geographic areas. In 1995, the Initiative reviewed literature to identify tools to investigate cause-effect relationships and to develop initiatives aimed at determining the actual impact of pollutants on cetacean populations and facilitate the design of a monitoring scheme. In 2007, a report covering the phase 1 strategy was published. The next step was the development of risk assessment model framework(s) and conceptual models to estimate effects of chemical pollutants on populations. During 2010-16, work focused on the development of an individual-based model to assess risks to cetacean populations (SPoC) and was later refined to include effects on reproduction and immunity. Following the request of the Commission, the work focused on evaluation of mercury in cetaceans. The more recent work in 2021 addressed multiple stressors and cumulative effects.

#### 1.1 Review intersessional work

SC/69B/E/13 reported on toxicology research and monitoring of gray whales off Chukotka Peninsula (Russia) during 2008-23. Russian scientists continued to investigate organs and tissues of gray whales (*Eschrichtius robustus*) after aboriginal whaling and landing by Chukotka Natives in 2008-23. They

concentrated efforts mostly on heavy metals, pathogens, radioactivity and plan to also focus on biotoxins, micro-plastic and POPs in the future. Chukotka Natives consume intestines and meat of whales and walruses, which is why concentrations of heavy metals are analysed. These never exceeded the maximum permissible levels (MPLs) in the studied intestine samples of gray whales in 2015-23. The serum-positivity to nine pathogens (*Toxoplasma*, *Mycoplasma*, *Trichinella*, *Candida*, *Chlamydia*, Papilloma, Herpes, Morbillivirus and Parvovirus) was determined for serum in 67 gray whales, harvested in Chukotka during 2018-23, all of which were serum-negative to Herpes and Papilloma virus. In 2022, 30% of the individuals were positive to *Toxoplasma gondii*, whereas this was 3-10% in 2020-21 and 2023. *Candida* spp. prevalence was 3% in 2020-2023.

The Subcommittee thanked the authors for presenting their results. In discussion, the authors were requested to clarify the measures of quality control that were applied to ensure no contamination occurred during analysis, and to provide literature references for the used maximum permissible levels reported. The Subcommittee members also wondered whether data were available to estimate times from first approach to actual sampling, specifically for interpreting cortisol measurements. The Subcommittee further inquired whether there was any attempt to correlate cortisol levels in any samples. The authors responded that they did not record times during the hunt and capture, but that it was a good suggestion. The authors stated that they plan to develop this paper further for publication in the coming year and would take the comments regarding references into consideration.

SC/69B/E/24 reported on the work of the Intersessional Correspondence Group (ICG) on Pollution 2025. The group focused on collating and reviewing recommendations on legacy and emerging contaminants affecting cetaceans. The report highlights the importance of the previous work, draws attention to the impacts on chemical pollutants and recommends specific actions.

The Subcommittee thanked the ICG and particularly Holm for her leadership in this endeavour.

**Attention:** SC, CG, R, I, NGOs

*The Subcommittee **drew attention** to the serious impacts of legacy and emerging chemical contaminants on various marine mammal populations, as referred to in its previous reports and many scientific publications, and summarised, among others, in Workshop reports Pollution 2025 and in SC/69A/E04 and therefore **recommended**:*

**Strengthening of Regulations and Compliance Mechanisms:** SC, CG, R

- *That the Scientific Committee (SC) should regularly reevaluate the trends in marine mammals, the efficacy of current regulations, and the monitoring protocols for POPs, PBDEs, PCBs, PFAS and PFOS in coastal and marine environments. To facilitate this, contracting governments should be encouraged to disclose results of efficacy studies of current regulations and monitoring protocols. The research community should establish species-specific toxicity thresholds (where lacking) to assess potential health risks to marine mammal populations effectively.*
- *That contracting governments (CG) should adopt stricter regulations on the production, use and disposal of POPs, PBDEs, PCBs, PFAS and PFOS ensuring that further coastal and marine*

*contamination is less likely to occur.*

- *The enforcement of compliance mechanisms should be strengthened by the contracting governments to ensure the elimination of further exposures of these pollutants to the coastal and marine environment.*

**Capacity Building and Support:** CG

- *The provision of additional capacity building and support to assist developing countries in meeting targets set by international conventions such as the Stockholm Convention. This includes technical assistance, training and financial support to enhance monitoring, management, and disposal efforts.*

**Monitoring and Ecological Assessment:** R, SC, CG, NCG, IGOs

- *That the research community should support cross-disciplinary efforts to integrate chemical monitoring with ecological monitoring to better understand the impacts of these pollutants on marine ecosystems.*
- *The inclusion of PCB tissue concentrations in assessments of marine mammal conservation status.*

**Global Coordination and Prioritisation:** CG, C

- *That governments should engage in global regulation and remediation of harmful marine pollutants through international bodies such as the United Nations Environment Programme, the Stockholm Convention, and the U.S. Environmental Protection Agency. Prioritise the strengthening of international conventions, such as the Stockholm Convention, to address the open applications and disposal of PCBs and other persistent pollutants.*
- *Review internal workstreams on chemical and plastic pollution to identify areas of overlap, existing knowledge gaps and opportunities for collaboration.*

**Producer Responsibility and Public Awareness:** I, CG, NGOs

- *That industry (I) should develop greater producer and user responsibility, putting the burden of proof on industry to demonstrate the safety of chemicals and products.*
- *Contracting governments and NGOs should improve public awareness and education regarding chemical management and disposal to reduce the inadvertent release of pollutants into the marine environment.*

**Phase-Out and Banning Initiatives:** CG, IGOs

- *Leveraging more support for initiatives aimed at the phase-out and eventual ban of harmful chemicals such as PFAS, with specific timelines and milestones for implementation.*
- *Creating restrictions on the production and use of emerging PFAS chemicals and for chemical manufacturing companies and users to develop and implement mandatory strategies for phasing out PFAS.*

- *That the role of plastic debris as a carrier for the enhanced transfer of chemical pollutants that are adsorbed on it and included in its composition (plastic additives) justifies urgent actions to reduce plastic production and use.*

## 1.2 Review new information

Yaghmour *et al.* (2023) investigated the presence of heavy metals and persistent organic pollutants in baleen whales stranded along the United Arab Emirates coastline, providing the first baseline information on contaminant levels in mysticetes in the Northern Indian Ocean and Arabian Gulf. It is also the first study looking at PAH in humpback whales. The samples collected were from one blue whale (*Balaenoptera musculus*), one humpback whale (*Megaptera novaeangliae*) and five Bryde's whales (*Balaenoptera edeni*) (two animals were most likely this species). Twelve heavy metals (Cd, Se, Hg, Pb, Cr Mn, Ni, Cu, As, Zn, Al, Fe), 16 PAHs, 18 OCPs and 20 PCBs were tested. The results revealed no exposure to any of the 18 OCPs analysed, and the presence of only one PCB (PCB-8) in tissues (kidney, blubber and skin) of two Bryde's whales, at a concentration lower than reported in other studies. Low molecular weight PAHs were the primary contaminants detected in all samples, suggesting exposure to petrogenic sources. Among heavy metals, Al and Ni exhibited the highest concentration in all specimens, which was also higher than in other studies from the northern hemisphere. Cr and As were also high but of the same order of magnitude as those in the northern hemisphere. Hg was not detected in all the individuals or samples and the levels detected were much lower than those reported in samples from other regions.

The Subcommittee welcomed the paper and noted that information on pollutants in this geographic area is limited. It also noted that the detection of only one PCB, out of 20 PCBs tested, in the two Bryde's whales was striking. However, these results are consistent with other studies on megafauna in the region and it is possible that the exposure in this region is low. There are efforts to conduct similar studies on small cetacean samples, which may provide useful comparisons. The Subcommittee encourages the presentation of results from these small cetacean studies in the future.

Andvik *et al.* (2023) reported on persistent organic pollutants (POPs), including brominated flame retardants (BFRs), perfluoroalkyl substances (PFAS) and metals in the blubber, liver and muscle of adult common minke whales (*Balaenoptera acutorostrata*) from the Barents Sea. Legacy lipophilic POPs were the dominating compound group in every tissue, and the authors observed generally lower levels compared to previous studies from 1992-2001. They also detected the emerging BFRs hexabromobenzene (HBB) and pentabromotoluene (PBT), but in low levels compared to the legacy POPs. They also detected nine PFAS, and levels of perfluorooctane sulfonate (PFOS) were higher than detected from the same population in 2011, whilst levels of Hg were comparable to 2011. Levels of lipophilic contaminants were higher in blubber compared to muscle and liver on both a wet weight and lipid adjusted basis. Tissue partitioning of the emerging BFRs could not be determined due to concentrations being below the limit of detection in a high number of samples. The highest muscle PFAS levels were detected in foetuses, followed by adult males and adult females respectively, showing substantial placental transfer from mother to foetus. In contrast, Hg levels in the foetuses were lower than those in the mothers. Levels were below the thresholds for the onset of health effects.

Schaap *et al.* (2023) assessed pollutant-induced health effects within the IUCN red-listed marine mammal species to provide insight into the extent of pollutant impacts. The authors found that for species at higher risk of extinction less exposure-effect information is available (16% for critically endangered, 15% for

endangered, and 66% for vulnerable species). The authors report a geographical bias towards studies in the northern hemisphere. The disparity in research effort among regions contributes to a relative lack of pollution-effect studies on data-deficient and threatened species. Several vulnerable species, especially those susceptible to climate change, lack descriptions of pollutant-effect relationships. Despite their importance for threatened or data-deficient species, there is a paucity of pollution-effect studies on marine mammals in the polar tundra climatic zone in the southern hemisphere. Emerging pollutants, although studied to some extent, deserve more attention. The study also emphasised that most pollution-effect investigations focus on early physiological impacts occurring at molecular and cellular levels, often utilising non-destructive sampling methods and screening for general responses. The authors proposed innovative next-generation risk assessment tools that are well-validated in human and animal risk assessment practices. These computer-assisted tools use pollution-effect data to establish quantitative links between exposure and effects, integrating species physiology, growth, dietary information and chemical-specific characteristics. Such tools serve as a foundation for bridging the gap between molecular data and broader effects, particularly in understanding species' sensitivity to pollutants. Furthermore, these tools could potentially be applied to determine thresholds in dietary levels, extrapolate findings across species with less available ecological data, and evaluate various compounds with similar structures.

The Subcommittee welcomed the paper and noted that it represents a great example of a study advocated for by the ICG on Pollution. While the paper provides some suggestions on how to translate effects from a molecular level to an organism or even population level (by means of modelling approaches), it was concluded that this is still one of the most important but also most challenging aspects in addressing the effects of pollutants. The Subcommittee **reiterated** that understanding the transition from individual effects to population level impacts is crucial.

The dynamics of POP transfer during the lactation period have been studied in some pinniped species, but comparable studies on cetaceans do not exist. Noren *et al.* (2024) evaluated the dynamics of persistent organic pollutants (POPs, including DDTs, PCBs, PBDEs, HCHs and CHLs) transfer from trained bottlenose dolphin (*Tursiops truncatus*) females to their calves during lactation. Briefly, placentas were collected at birth, and blood and milk were collected from mother-calf pairs 4-6 times over the lactation period from nine days to approximately 15 months post-partum (n=5 placentas, 16 milk samples, 17 female blood serum samples, and 14 calf blood serum samples). Initial POP levels in placenta, blood serum, and milk varied by individual and were related to female age and reproductive history. Regardless of initial POP levels, maternal serum and milk concentrations decreased while calf serum POP levels increased over time. Pollutant transfer varied by POP class and by congener. Percent reduction in female POP serum levels and the concomitant percent increase in calf POP serum levels were also calculated. By the end of the lactation period, calf serum POP levels were considerably greater than those of their mothers, particularly for compounds with fewer chlorines. POP levels were most biomagnified in the calf born to the primiparous female. These results provide critical information on one component of contaminant transfer in the marine ecosystem and for understanding potential risks of POP exposure to developing odontocete calves.

It was queried whether there was any information on the health effects of the measured levels. Unfortunately, the authors had no access to health information on the animals, but the fact that the milk is most contaminated early in the lactation period is a serious concern for the health of young calves. A study on killer whales, currently being conducted by the same authors, consists of more samples over a similar amount of time, and will shed some more light on how rapidly the milk POP levels decline over the lactation period. Another question raised was whether current standard screening of congeners, such as

the most commonly reported ICES 7 indicator PCBs and the WHO 12 PCBs, are sufficient for capturing what has been found in this study in terms of offloading. Indeed, some of the PCB congeners that were prevalent in the dolphins are not included in the standard screening lists. All three congeners decreased considerably in female blood and were biomagnified in calves at the end of the lactation period. This suggests that screening animals for a limited set of congeners, e.g., ICES 7, risks underestimating the physiological impact of the POP burden, as it will miss some potentially biologically significant congeners (e.g., CB99, CB149 and CB199). It was concluded that this is an important question that may need further consideration.

It was noted that there are many different marine mammal research groups working on pollution. The Subcommittee should communicate with other bodies, such as the Convention on Migratory Species (CMS), in order to leverage the Subcommittee's work with those that are doing similar work.

Kershaw provided an updated global review of PCBs, DDTs and mercury in cetaceans, in response to recommendations from the Scientific Committee. A significant spatial and taxonomic heterogeneity was noted. PCB concentrations in harbour porpoises (*Phocoena phocoena*) in the Black and Baltic seas have declined, while concentrations in the North Sea appear to be stable. Both coastal (e.g., bottlenose dolphins (*Tursiops truncatus*)) and pelagic dolphins (e.g., common dolphins (*Delphinus delphis*)) show an increase in blubber PCB concentrations in the South Atlantic, however, concentrations in these two groups show an overall decline in the Mediterranean. Blubber DDT concentrations show an increase in pelagic dolphin species and deep divers of the South Atlantic while DDT concentrations in harbour porpoises in the North Sea have declined between the 1970s and 2010s. Mercury showed an overall increase in the liver concentrations in cetaceans globally since the 1970s. As a next step, the interactive and open access Contaminant Mapping tool (IWC Contaminant Explorer) will be updated with the up-to-date contaminant information.

The Subcommittee thanked Kershaw and the University of St. Andrews and encouraged them to maintain and update the Contaminant Mapping Tool. The Subcommittee further encouraged the completion of the project, but it was also noted that the funds to support this project will be exhausted when the project is complete. The Subcommittee, however, recognises the usefulness of this tool and the continuation of this effort. If the required format and details are provided to the SOCER editors, the report can collate regional contaminant data and streamline the process of updating this tool.

**Attention:** CG, SC, R, ICG, S

*The Committee **drew attention** to the importance of the IWC Contaminant Mapping Tool in evaluating worldwide trends in contaminants in marine mammals and **recommended** that the IWC Contaminant Mapping Tool continues to be maintained and regularly updated.*

*Furthermore, noting that the CMS has put in place a work area on marine pollution specifically, the Subcommittee **recommended** for the ICG to collaborate with them.*

## 2. DISEASES OF CONCERN

### 2.1 Review progress in intersessional work on emerging diseases

The intersessional report on Diseases of Concern (SC/69B/E/04) provides summaries and highlights from ongoing regional cetacean health and disease surveillance response efforts (published and unpublished data) from across the globe. General health monitoring and disease surveillance efforts for known, re-emerging, and novel pathogens in addition to life history and population abundance data are critical to capture climate change driven epidemiological transitions. Climate change driven organismal and ecosystem effects on aquatic habitats are predicted to initiate an epidemiological transition in causes of mortality and morbidity among marine organisms with infectious diseases taking a front row. Across cetacean taxa infection with the big four cetacean diseases of concern (morbillivirus, *Brucella*, herpes, *Toxoplasma gondii*) are not uncommon, while mortality events caused by HABs are sporadically reported and reflect oceanic conditions in the respective waters. The current Highly Pathogenic Avian Influenza Virus (HPAIV) spillover into marine mammals emphasises the dynamic and evolving aspect of pathogen-host interactions in aquatic mammals. HPAIV is an example of an evolving pathogen with ONE Health potential and ecosystem wide consequences. Working with cetaceans through research and stranding responses is likely associated with a higher risk for sporadic HPAIV infection in humans and the authors highlight the recent publication of a 'Practical guide for authorised field responders to HPAIV outbreaks in marine mammals, with a focus on biosecurity, sample collection for virus detection and carcass disposal by the World Organisation of Animal Health (WOAH)'.<sup>1</sup>

The Subcommittee welcomed the report and appreciated the efforts of the ICG. It was noted that climate change may be a major driver of disease and that there is a general need for health monitoring and surveillance. The recent HPAIV outbreak, in particular, is of great concern. It was further noted that the linkage between marine mammal disease and human health is important. The Subcommittee also highlighted the US Marine Mammal Commission's Marine Mammal Health Surveillance Workshop Report as a valuable tool in moving forward with marine mammal health surveillance.<sup>2</sup>

## 2.2 Review new information and recommendations on Diseases of Concern

Herpes viruses are widely recognised for their host range over a wide range of taxa and environments, including marine and aquatic ecosystems. In many cetacean species, herpesvirus (HV) infection and lesions have been reported, but the reports shared information from limited species and regions. SC/69B/E/22 presented the prevalence of HV DNA in various tissues of cetacean species found in Korean waters. In total, 1,101 tissue samples composed of eight organs taken from 176 individuals of 15 cetacean species were examined for the presence of the HV DNA. Twenty-one individuals (11.9%) of five species were confirmed as HV positive. The HV was detected in several organs and tissues. The common dolphin (*Delphinus delphis*) showed the highest prevalence of HV with 36.4% of tested individuals positive. There was no significant difference in the positive rate between gender, region, and organs. However, HV was 5.5 times more prevalent in common dolphins than in narrow-ridged finless porpoises (*Neophocaena asiaeorientalis*,  $P=0.02$ ). This may be due to the different behavioural characteristics of finless porpoises and common dolphins. While finless porpoises largely occur as single individuals or form small groups, common dolphins are typically found in larger groups, where contact among group members may be more frequent.

The Subcommittee welcomed this new information on herpesvirus in Korean waters.

SC/69B/E/23 reported on the first attempt to undertake HPAIV screening in South Korea. Samples were

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<sup>1</sup> <https://www.woah.org/app/uploads/2024/02/woah-practicalguide-forauthorisedfieldresponders-hpaimarinemammals-feb24.pdf>.

<sup>2</sup> <https://www.mmc.gov/wp-content/uploads/Marine-Mammal-Health-Surveillance-Workshop-Report.pdf>



collected from multiple organs from 34 individuals of eight species. No cases exhibited gross lesions consistent with influenza virus infection. Of 215 PCR assays the influenza matrix protein was detected in 27 samples from 18 individuals. No cases subsequently tested positive for HPAIV. This may be because these animals were infected with other strains of influenza virus, or low viral antigen load due to storage degradation of viral RNA.

The Subcommittee welcomed the new and timely information on HPAIV in Korean waters.

Murawski *et al.* (2024) reports on the first HPAIV cetacean case identified in the United States and raises significant concerns about HPAIV's potential to infect marine mammals. The case involved a bottlenose dolphin dying from HPAIV A(H5N1) clade 2.3.4.4b. This particular clade has been responsible for widespread outbreaks in wild birds since October 2020, with detections across Europe, Africa, Asia and North America. The animal live stranded before dying and exhibited brain inflammation, specifically moderate to marked mononuclear inflammation of the brain and meninges. Viral antigens were detected in several organs with the highest viral load in the brain. This finding highlights the increasing prevalence of this specific and concerning strain of HPAI in non-avian hosts and the potential for cross-species transmission. The paper emphasised that the increased prevalence of A(H5N1) viruses in atypical avian hosts and its cross-species transmission into mammalian species highlights the public health importance of continued disease surveillance and biosecurity protocols.

The Subcommittee welcomed this important information on HPAIV and noted the importance of testing the appropriate tissues to determine the presence of HPAIV in marine mammals as well as the importance of continued surveillance.

The recent emergence of HPAIV in marine mammals presents a multifaceted challenge. Beyond its direct impact on marine mammal conservation through potential mass die-offs, HPAIV raises concerns regarding interspecies transmission to terrestrial wildlife and livestock, with associated economic and public health consequences (zoonotic risk). Current surveillance efforts are likely inadequate to effectively track the spread of the virus in these novel reservoirs. Therefore, enhanced monitoring programs are essential to understand HPAIV dynamics in marine mammals and mitigate spillover risks across the ecological interface.

**Attention:** CG, G

*The Subcommittee recognised that Highly Pathogenic Avian Influenza Virus (HPAIV) is causing a global pandemic killing thousands of wild birds and mammals, including pinnipeds, and recent dolphin deaths indicate significant mortality in cetaceans could also occur. National policies for avian influenza (AI) sampling exist for livestock trade management and public health, yet many cetaceans move across national borders. The Subcommittee **drew attention** to the dynamic aspects and serious impacts of HPAIV on various marine mammal populations and implications for human health. As early detection, immediate notification, and timely response, along with relevant biosecurity measures, are fundamental in devising containment and prevention strategies to protect animals, humans, and biodiversity, the Subcommittee **recommended** that:*

*stranded (dead or alive) cetaceans be sampled for AI in concordance with the WOA marine mammal*



*guidelines;*

*competent government agencies should implement epidemiologically robust screening protocols to ensure early detection of HPAIV outbreaks in stranded cetaceans; and*

*competent government agencies provide a timely and coordinated outbreak response, including rapid notification of suspect cases, details of positive cases and instigation of appropriate biosecurity measures.*

*The Subcommittee **encouraged** updates on the HPAIV at future meetings.*

**Attention:** SC, CG, G

**Recalling** recommendation SC20124 where ‘The Committee draws attention to the number of serious outbreaks of cetacean diseases of concern (e.g., morbillivirus) detected since the 1980s,’ the Subcommittee:

1. **acknowledged** that diseases pose a major threat to cetacean populations, alongside existing challenges such as bycatch, entanglement, climate change, chemical pollution and marine litter; and
2. **recommended** the adoption of an ecosystem-wide, multi-taxa approach to disease surveillance in marine environments, including the identification of sentinel species – animal populations that can indicate the presence of disease in the broader ecosystem, including cetaceans.

### **3. STRANDINGS AND MORTALITY EVENTS**

#### **3.1 Review progress of steering committee for IWC Strandings Initiative**

The Subcommittee reviewed several reports from the steering committee for the IWC Strandings Initiative. The presentation covered an update on the progress of the International Whaling Commission (IWC) Strandings Initiative (SI) from May 2023 to April 2024 based on input and feedback from the Strandings Expert Panel (SEP) and the Strandings Steering Group (SSG). This included proposed recommendations and invited comments and discussion on the 2025-28 work plan for the SEP and SSG. The SEP aims to share best practice, assist in the production of globally agreed guidelines on strandings response, help collate and coordinate data from national strandings networks and serve as a network to help support and connect strandings responders globally.

SC/69B/E/18 provides a progress update from the IWC Strandings Initiative (SI) covering the period May 2023 to April 2024. It also outlines plans for upcoming activities. Following a successful in-person workshop held in Venice and subsequent online meetings, the IWC Strandings Expert Panel (SEP) has established a clear set of objectives along with defined strategies for achieving them. Funding secured by the SEP enabled a series of training workshops held across seven Caribbean countries in October 2023. This initiative served as a successful pilot test of the operational model and identified areas where the IWC and SEP can offer the most effective support in the future. Securing long-term funding support is crucial for sustained success, particularly for maintaining the critical position of the strandings coordinator.

SC/69B/E/14 outlines activities in the framework of the CAMAC project, work package 2. The SEP received funding as part of the Caribbean Marine Megafauna and Anthropogenic Activities (CAMAC) project to deliver capacity building workshops in several Caribbean countries within the CARI'MAM region. Conducted in October and November 2023, the workshops aimed to strengthen the capacity of marine mammal stranding monitoring networks in the region. The IWC Strandings team also presented an appraisal of the training toolkit developed by CAMAC, feedback from participants and recommendations for Phase II of the project at the Interactions Between Human Activities and Marine Megafauna of the Caribbean: Progress Made through the CAMAC Project and Potential for Future Actions workshop held at the Gulf and Caribbean Fisheries Institute Annual Meeting (GCF176) on 4 November in Nassau, Bahamas.

SC/69B/E/15 provides a summary of the Strandings Expert Panel Workshop held in the Centro Culturale Don Orione Artigianelli, Venice, Italy in May 2023, to exchange ideas, strategies, and resources. Participants included Strandings Expert Panel (SEP) members from a wide range of disciplines including national authorities from IWC member countries, veterinarians and veterinary pathologists, animal welfare specialists, biologists and academics working on aspects of cetacean welfare, and experts from animal welfare organisations alongside invited participants. The primary objectives of the Workshop were to agree on a strategy to implement the IWC SEP workplan and allow an exchange of ideas to support the work of the SEP. This produced a clear set of objectives and strategies to achieve them, in particular the establishment of five subgroups to work on key themes of emergency response, capacity building, databases, samples and shipment, and diseases. A number of recommendations were agreed during the Workshop and are listed in the report and were endorsed by the Subcommittee. These subgroups have met virtually and have contributed to the development of the 2025-28 workplan.

The SEP has been working on the development of a global strandings database in collaboration with organisations such as ASCOBANS, ACCOBAMS and HELCOM. The goal is to enable better monitoring of emerging threats across species and regions.

In collaboration with CDOC, the SEP has been considering the issue of diseases affecting cetaceans and has recommended adopting an ecosystem-wide, multi-taxa approach to disease surveillance. They also highlight the need to elevate the discussion around disease in general, and HPAIV in particular as an important and emerging threat to cetaceans. The SEP has been working on improving emergency response capabilities, capacity building, and sample movement for diagnostic purposes, in addition to developing links with specific threat-based working groups both within and external to the IWC (e.g., bycatch, entanglement, marine debris, pollution). The need for collaboration with organisations such as CITES and WOAHP to address regulatory challenges was emphasised.

The need to secure funding to support both the strandings coordinator role and to enable development of specific workstreams, specifically the strandings database was highlighted. The precarity of funding presents an existential threat to this initiative and a plea was made for recommendations to encourage contracting governments to further support this work.

The Subcommittee welcomed the reports on the efforts of the steering committee for the IWC Strandings Initiative and congratulated them on the work they had accomplished. The Subcommittee **endorsed** the Terms of Reference and Membership for the Strandings Steering Group, the 2025-28 workplan for the Strandings Initiative, the Terms of Reference and Membership for the Strandings Expert Panel, and the Strandings Expert Panel Workshop Report and its recommendations.

The Subcommittee **agreed** that this work is critical to worldwide stranding response efforts as well as providing information that is important to wider IWC efforts. For example, data and sample collection from stranded animals provides important information to understand impacts of climate change, allows monitoring diseases of concern, and provides information to monitor and evaluate impacts of pollution. As such, these data are particularly important to the work of the E Subcommittee. Given the relationships between climate change, pollutants, and marine mammal health and disease, there is a need for integration of these data sources, which would benefit from having a database. It was further noted that the response to the HPAIV outbreak, which is expected to continue, would benefit from coordination with regards to investigation and response. Furthermore, the health of ecosystems can be evaluated through monitoring sentinel species, such as cetaceans. The ability to successfully execute these efforts would improve with consistency of methods across geographic regions. This includes shipping cetacean tissues to specific countries to ensure rigorous and standardised analyses, which is often challenging due to CITES rules.

**Attention:** SC, CG, G

*The Committee recognises the importance of the work of the steering committee for the IWC Strandings Initiative and their efforts in helping to develop consistent and effective responses to marine mammal strandings, data collection, and sample analysis worldwide. These efforts are critical to the work that the Committee does as well as for understanding ecosystem health, however this work requires continued funding.*

*The Subcommittee **drew attention** to the critical need to secure sustained funding for both the stranding coordinator role and the implementation of the proposed work plan and strandings database.*

*Therefore, the Subcommittee **strongly encouraged** contracting governments to support this initiative through identification of funding or donations.*

*The Subcommittee **recommended** the development of the initial phase of the global strandings database in collaboration with other concurrent initiatives underway by external bodies (ICES, ASCOBANS, ACCOBAMS) and that the initial database is presented at SC70 for review.*

*The Subcommittee also **encouraged** the SI to maintain communication with SPAW-RAC and use this project as a template for similar capacity building in other regions.*

*The Subcommittee also **recommended** a workshop to allow the Strandings Expert Panel to meet and further develop its work.*

**Attention:** SC, CG, G, R, CITES

**Recalling** Resolution on CITES (2007-4) which reaffirms the important role of CITES in supporting the IWC's management decisions with regard to the conservation of whale stocks and the importance of continued cooperation between CITES and IWC, the Subcommittee:

1. **acknowledged** that the delay in trans-border movement of diagnostic samples, due to permitting requirements, can be a significant barrier to scientific research;
2. **requested** from the Commission to re-engage with CITES and open a dialogue with Contracting Governments to facilitate the movement of samples for diagnostic purposes; and
3. **encouraged** scientists through their CITES focal points to engage in a CITES Standing Committee working group on development of appropriate mechanisms to facilitate the efficient international movement of wildlife samples for diagnostic purposes and/or conservation purposes.

### 3.2 New information on unusual mortality events

SC/69B/E/01 provided an update on the Unusual Mortality Event (UME) involving eastern North Pacific gray whales (*Eschrichtius robustus*) from December 2018 through November 2023. The Working Group on Marine Mammal Unusual Mortality Events voted to close the UME after reviewing data provided by the investigative team on stranding rates and findings. A total of 690 whales stranded during the UME, ranging from Alaska to Mexico along the West Coast of North America (316 in Mexico, 347 in the United States, and 27 in Canada). Of the 690 confirmed stranded whales, stranding teams examined/sampled 412 whales, and internally examined 72 whales. A standardised protocol was developed and used to categorise nutritional conditions of 189 whales. Morbillivirus, influenza, or coronaviruses were not detected after screening 25 fresh and moderately decomposed whales. Sixty-two whales were tested for the biotoxins domoic acid and saxitoxin, which were both detected although generally in low concentrations. In-depth evaluations of 61 dead gray whales documented lesions contributing to death in 33 cases, and no cause of death was determined in 28 cases (Raverty *et al.*, 2024). Identified causes of death included emaciation with no other post-mortem findings, vessel strike, pre-mortem killer whale (*Orcinus orca*) attack, entanglements, and entrapment. Gray whale population modelling linked the 1999-2000 and 2019-23 UMEs to a coupling of simultaneous low infaunal prey biomass and high surface sea ice cover that could restrict access to these localised feeding areas around the Bering Strait (Stewart *et al.*, 2023). In summary, the 2019-2023 eastern North Pacific Gray Whale UME was associated with localised ecosystem changes in the whale feeding areas, contributing to the poor nutritional condition observed in live whales in the wintering areas of Mexico and to the deaths of gray whales in all three countries.

The Subcommittee welcomed the report and appreciated the depth of effort involved with conducting necropsies on the numerous gray whales, as well as obtaining the vast amount of data obtained from the strandings. It was noted that this UME is linked to environmental factors, which reiterates the importance of the E Subcommittee in providing information and advice to address certain actions, including advice on species that are taken for subsistence hunting, which is the case for gray whales. It was also noted that the higher frequency and magnitude of these UMEs will be included in future gray whale population analyses. However, it is important to consider that the population may have declined by 5,000 whales, and thus, the number of individuals associated with UMEs are not necessarily reflective of the full scope of population changes.

SC/69B/E/03 reported on the late 2023 UME of Endangered Amazon river dolphin (*Inia geoffrensis*) and

tucuxi (*Sotalia fluviatilis*), which took place in the Western Brazilian Amazon. The UME occurred during a severe historic regional drought, causing the death of over 300 river dolphins. Water temperatures reached unprecedented values, coupled with abnormally high amplitude of temperature throughout the day. Air quality reached unhealthy and hazardous levels, incident solar radiation was higher than normal, and humidity fell around 40% from regular values. Ichthyotoxic algal blooms were noted in both lakes, but fish mortality was deemed normal under drought conditions. Tefé Lake area was reduced by 75%, and average depth was around 50 cm. The event affected both sexes and all age groups of both species. Most animals were adults, in good body condition, with no or little amount of gastrointestinal content. The paper describes necropsy findings and sampling results. Research findings indicate the river dolphin mortality was most likely related to severe environmental conditions triggered by the extreme drought, abnormally high-water temperatures, daily temperature range, and poor air quality.

This study highlights the benefits from, and need for, mortality investigations adopting a multi-factorial approach which fully considers biological, pathological, environmental and physical processes.

**Attention: R, CG**

*The Subcommittee **drew attention** to the UME of river dolphins in the Amazon that occurred in 2023 and which was associated with climate change. Considering predication of more frequent and severe climate events (e.g., extreme droughts) in the future, the Subcommittee:*

- 1. **encouraged** the implementation of monitoring programs to provide an early warning system to potential recurring similar events; and*
- 2. **recommended** that the Brazilian government implements a Contingency Action Plan in preparation for a likely event in 2024 and subsequent years, engaging stakeholders from different sectors of society, with clear roles in attending to a river dolphin emergency in the Amazon.*

### **3.3 Other information and recommendations**

SC/69B/E/10 presented the first comprehensive review of cetacean stranding records in the United Arab Emirates (UAE), conducted using 125 opportunistic stranding records collected from 1989 to 2023, and using a variety of sources including online news articles, social media, opportunistic reports, official reports from the authorities and directly observed cases. Images and information from the source were independently evaluated to characterise the strandings. Among the records, 58.4% were confirmed at the species level (n=12) and a further 28.8% at the genus level. These included 27 mysticete records (*Megaptera novaeangliae*, *Balaenoptera musculus*, *Balaenoptera edeni*) and 93 odontocete records (*Physeter macrocephalus*, *Tursiops aduncus*, *Sousa plumbea*, *Neophocaena phocaenoides*, *Stenella longirostris*, *Kogia sima*, *Orcinus orca*, *Grampus griseus*, *Delphinus delphis tropicalis*). A seasonal analysis across years suggested a possible higher incidence during winter months, with peaks in February and November. A temporal analysis suggested an increasing trend in the number of strandings across years both for mysticetes and odontocetes. The increasing number of baleen whales strandings recorded in the past three years (n=15) raises particular concern, acknowledging that the UAE coastline represents only a small portion of the Arabian/Persian Gulf and the Arabian Sea region, which is characterised by extreme environmental conditions and is likely to be substantially affected by climate change. It also stresses the importance of the creation and implementation of formal stranding networks, involving authorities and

scientists, to improve the collection of information on strandings.

The Subcommittee welcomed this new information, which comes from a region without an established stranding network. The apparent seasonality in strandings was noted and the Subcommittee members raised the possibility that this may be related to temperature and environmental conditions that might prevent fieldwork or the likelihood of documenting stranded animals. Given the sources of data, the authors do not consider it likely that this pattern is due to environmental impacts on field efforts. However, it was noted that there might be a bias in classifying the correct season for stranded animals in advanced states of decomposition.

**Attention:** S, SC, CG, G, R

*The Committee commends the strandings work in the UAE, which is an underrepresented region, and recommends:*

- 1. the continued collection of stranding information from the UAE; and*
- 2. collaboration with partners in neighbouring countries in order to obtain a better understanding of the extent and distribution of cetacean strandings in the region.*

#### **4. CLIMATE CHANGE**

##### **4.1 Review progress in intersessional work on climate change**

SC/69B/E/09 reported on the progress of the ICG on Climate Change. It noted that ocean warming has progressed faster over the past century than at any other time since the end of the last deglacial transition (IPCC, 2021). In addition, ocean acidification has led to unusually low surface open ocean pH levels in recent decades when compared to the last two million years. Both processes are projected to continue, as is ocean deoxygenation. Climate change will also affect ocean circulation, stratification, sea ice cover, salinity, and large-scale atmospheric and ocean modes. The continued mass loss of both the Greenland and Antarctic Ice Sheets will contribute to global sea level rise over the 21<sup>st</sup> Century. Even under large net negative CO<sub>2</sub> emissions, it will take several centuries or even millennia for global mean sea level to reverse course and the Arctic Ocean will likely be practically ice-free for the first time during the seasonal ice minimum before 2050 under all scenarios, a state that might become the new normal by 2100 under continued high greenhouse gas emissions (IPCC, 2021). These changes will pose, or are already posing, major challenges to marine organisms and ecosystems around the globe. Some may be pushed beyond their capacity to adapt or acclimate (Striegel *et al.*, 2023). Climate change affects cetaceans both directly and indirectly, the latter by affecting their prey, habitat, food webs and ecosystems (Figure 1.) Distribution shifts may bring cetaceans into contact with human activities that they were not previously encountering or change the extent of such encounters, for example, with fishing activities or ship traffic.

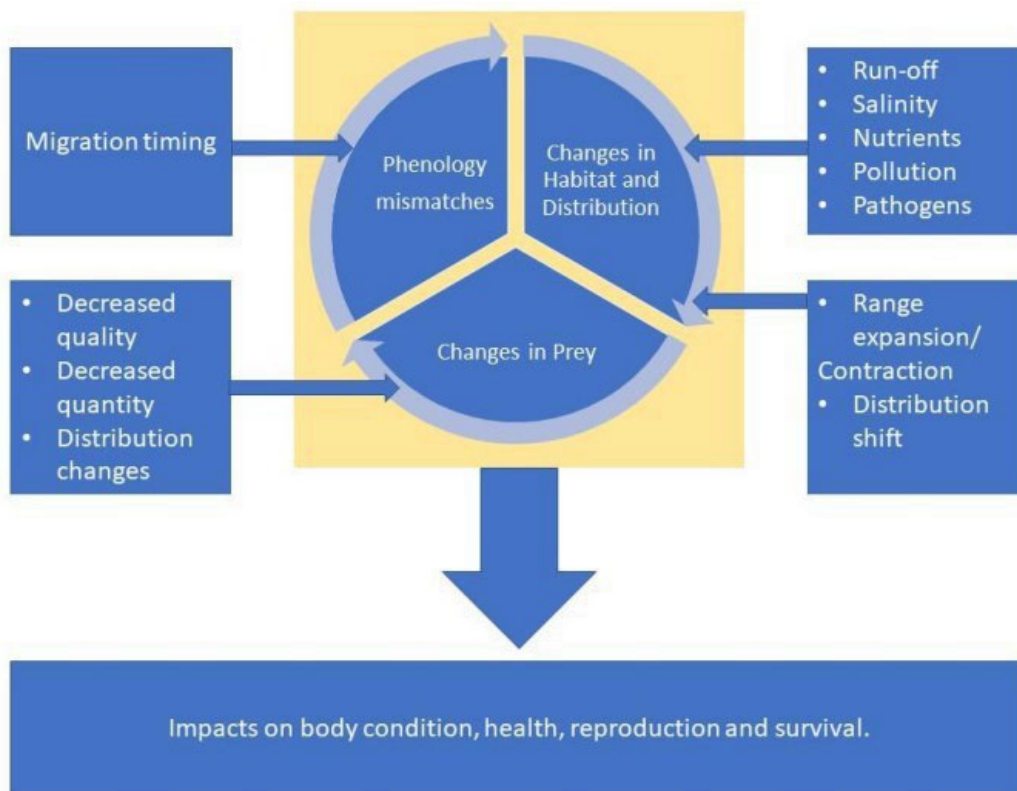


Figure 1: Climate change and cetaceans - some of the main interlinkages and key factors based on the available scientific literature (from Striegel *et al.*, 2023).

The report also noted that, in 2022, the Commission established the Intersessional Group on Climate Change to assess the latest information on climate change impacts on cetacean populations, provide advice on tools to mitigate these impacts and build resilience, and develop an IWC climate change response programme. This followed five IWC workshops on climate change, the first in 1996 and the latest being a virtual meeting held late in 2021. The latter reviewed the latest scientific research and considered both observed and predicted effects of climate change on cetaceans, including on their prey and habitats. It agreed on a series of recommendations, including a prioritisation of future research on regions experiencing intense climate change impacts.

In addition to continuing to monitor the relevant science (see below), members of the group took part in CCAMLR’s first workshop on climate change and the 14<sup>th</sup> Conference of the Parties (CoP) of the Convention on the Conservation of Migratory Species (CMS). The CMS CoP passed a resolution on climate change,<sup>3</sup> which commits it to further actions. Alongside other activities, the resolution calls for CMS to convene an in-person workshop on migratory species and climate change. This offers the opportunity to the IWC to join in with this workshop.

The report noted that Striegel *et al.* (2023) provided the last meeting of the Scientific Committee with an

<sup>3</sup> <https://www.cms.int/en/document/climate-change-and-migratory-species-10>



overview of recent developments and relevant literature on the effects of climate change on cetaceans. In addition, the Scientific Committee took note of the comprehensive review by Gulland *et al.* (2023). Further to these reviews, the intersessional group **draws the Committee's attention** towards the following important publications:

- Bengtson Nash *et al.* (2023) reported on the humpback whale (*Megaptera novaeangliae*) Sentinel Programme, which is a circum-polar biomonitoring program for long-term surveillance of the Antarctic sea-ice ecosystem. They noted that the past six years have been marked by some of the most dramatic climatic events observed in the Antarctic region in recent history, commencing with the 2017 sea-ice extreme low.
- Brandt *et al.* (2023) provided a re-assessment of the climate change 'footprints' on Arctic marine ecosystems (such as altered distribution ranges, abundances, growth and body conditions, behaviours and phenologies, as well as community and regime shifts), last considered in 2011.
- Gerland *et al.* (2023) considered the Barents Sea, one of the Polar regions where current climate and ecosystem change is most pronounced.
- Cheeseman *et al.* (2024) consider the role of humpback whales as 'bellwethers' of climate change.

It was noted that there was previously a proposal for a climate change coordinator to be appointed. It was also noted that climate change impacts should be integrated into other Subcommittees, as climate change touches on many things in the E Subcommittee and interacts with everything the Subcommittee works on. Relationships between UMEs, strandings and climate change were noted, and it was **reiterated** that data from strandings are one of the most cost-effective monitoring efforts available, which reinforces the need to support stranding initiatives. It was also noted that there are synergies with the CMS efforts and that the Committee could provide cetacean expertise to them.

#### 4.2 Review new information and recommendations

It was noted that there are a series of recommendations from the IWC Climate Change Workshop in Annex 1 of SC/69B/E/09.

**Attention:** SC, S, CG

*Noting the ongoing work conducted by other international organisations, including, inter alia, CMS, towards building a better understanding of the consequences of climate change for marine wildlife, the Committee, through the ICG and secretariat, will seek to build appropriate synergies with these bodies and their workstreams.*

*The Subcommittee, noting its continued interest in holding another workshop on the effects of climate change on cetaceans, **agreed** to offer its support to CMS and its proposed workshop.*

*The Subcommittee further **recommended** that time should be allocated at a future meeting of the Scientific Committee for a dedicated, joint session across Subcommittees on climate change, for which an agenda should be developed by the ICG and to which submissions should be encouraged.*

## 5. UNDERWATER NOISE

### 5.1 Review progress in intersessional work on impacts of anthropogenic underwater noise on cetaceans

SC/69B/E/21 summarised the work of the Intersessional Correspondence Group on Anthropogenic Underwater Noise. It was noted that since at least 2004, the IWC Scientific and Conservation Committees have been discussing the effects of underwater noise on cetaceans. Underwater noise has increased dramatically in recent years, with sources ranging from shipping to seismic exploration, drilling and construction. Annex 1 of SC/69B/E/21 summarises the UAN ISCG workplan for 2024-26.

At IWC67 in 2018, the Commission approved proposals for additional work on Anthropogenic Underwater Noise, such as the formation of an intersessional correspondence group to further scope this work and collaborate with other organisations. It also approved a revised work plan for the Commission, which included preliminary activities on underwater noise. At the same meeting, an IWC Resolution on Underwater Noise (Resolution 2018-4) was adopted.

The following activities were developed during the intersessional period 2022 and 2024:

1. Cooperation with the International Maritime Organisation (IMO)

SC/69B/O/06 outlined recent activities of the International Maritime Organisation related to reducing shipping noise. The IMO adopted its Revised Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life at the IMO Marine Environmental Protection Committee (MEPC) in July 2023, and issued these as a circular in August 2023 (MEPC.1/Circ.906). Members of the Secretariat attended a workshop at IMO in September 2023, which examined opportunities to tackle greenhouse gas (GHG) emissions in tandem with harmful underwater radiated noise. A key outcome of the workshop was that reduced speed is a well-documented approach for fixed propeller ship types to achieve lower GHG emissions and underwater noise, but further reductions are possible when carefully integrated with technical measures.

Leaper attended a meeting of the IMO Ship Design and Construction (SDC) Subcommittee in January 2024, where the SDC agreed on an Action Plan to further prevent and reduce underwater radiated noise from ships. The aim is to minimise the adverse effects of underwater noise on the marine environment. The Action Plan includes establishing an experience-building phase during which Member States and international organisations are invited to share lessons learned and best practices, developing targets and policies for underwater noise reduction, and encouraging more research on underwater noise and its impacts on the marine environment.

The IMO has also progressed a Global Partnership for Mitigation of Underwater Noise from Shipping (GloNoise). The overall objective of GloNoise is to establish a global stakeholders' partnership, with a strong focus on low-income countries, in order to deal with underwater noise from shipping. Lead pilot countries are Argentina, Chile, Costa Rica, India, South Africa and Trinidad and Tobago, five of which are IWC members and the IWC is a Strategic Partner in the project. The Secretariat (Campbell and Webster) and Leaper attended the inception workshop for this partnership in March 2024.

2. Impact of marine seismic surveys on cetaceans: a global review

SC/69B/E/20 summarised the ongoing global review of marine seismic airgun surveys for hydrocarbon

exploration, relative to Important Marine Mammal Areas (IMMAs). This initiative responds to growing concerns about how seismic exploration affects marine life, particularly cetaceans. An intersessional correspondence group was formed during the SC68C to develop and circulate a comprehensive questionnaire to gather detailed data on current and planned marine seismic airgun surveys for hydrocarbon exploration. The objective is to compile a global overview of seismic survey activities, regulatory frameworks, and mitigation strategies to address the environmental impacts on marine life. SC/69B/E/20 included information on the responses received from various stakeholders, such as governmental agencies, private companies, non-governmental organisations and research institutions.

A total of 30 responses were received from a broad range of stakeholders, highlighting the extensive interest and concern regarding marine seismic surveys. The respondents included 16 from governmental agencies, seven from non-governmental organisations, three from research institutions, three from private companies and one from an intergovernmental organisation. Information on 19 countries was received. Of these, 15 countries require an Environmental Impact Assessment before marine seismic activities can be approved and 12 countries have specific regulations or guidelines for conducting marine seismic surveys in national waters, with specific protection for cetaceans from acoustic disturbances. Additionally, 12 countries reported applying mitigation measures to minimise the impact of seismic surveys on cetaceans. Only 19 out of 88 IWC Member States responded to the questionnaire. Therefore, more information is required before an assessment of the global situation can be provided. Whilst welcoming the information and contributions received so far, it was noted that most data sets provided did not include exact locations or lacked other details, which further increases the difficulty of providing an accurate global assessment, including mapping seismic airgun activity and its overlap with IMMAs.

Questionnaire respondents noted the need for further research and more data on the impacts of seismic airgun noise on different cetacean species. For example, understanding the sound level thresholds for behavioural disruptions and physical harm, alongside the efficacy of various mitigation techniques, is essential for informed decision-making and developing targeted protection strategies. Such research should aim not only to fill existing knowledge gaps but also to anticipate future challenges, as the scope and scale of marine seismic airgun exploration evolves.

International collaboration and the standardisation of regulations and mitigation strategies were also emphasised as critical for protecting cetaceans, reflecting the transboundary nature of marine life and the impacts of seismic airgun activities. This entails sharing guidelines and best practices, joint research initiatives, and data-sharing agreements to foster a collective approach to marine ecosystem management.

In discussion, outreach to geophysical groups and organisations for further information was suggested. It was **agreed** that the upcoming aquatic noise conference in Prague (29 June - 4 July 2024; see [aquaticnoise.org](http://aquaticnoise.org)) would be a good venue for SC members and the Secretariat to talk to scientists, industry representatives and Government agencies about seismic survey activity.

The authors of SC/69B/E/20 noted that for the current paper the intention was not to conduct an intensive review but to assess the feasibility of gathering seismic survey information from Member Governments. They noted that during this questionnaire survey they received responses from oil companies that the information requested was confidential and proprietary. The Subcommittee **requested** the Secretariat to communicate with contracting governments to **encourage** them to fill out the questionnaire.

The issue of the impacts of seismic surveys on cetaceans was raised during this year's review of the Southern Ocean Sanctuary (Annex N; Appendix 3; 'oil and gas exploration and exploitation'). Importantly, much of the seismic survey activity in this region was for scientific research rather than industrial surveys (see also Breitzke, 2013). A database collating seismic activity in the Southern Ocean (Antarctic Seismic Data Library System) is available from: <https://sdls.ogs.trieste.it/cache/index.jsp>.

It was noted that seismic (and sonar) surveys are also conducted by wind energy companies when selecting sites for wind energy sites. Although airgun arrays have been used in the past for wind farm site selection, typically these are lower energy sound sources. Considering the rapid growth of wind energy, it was **agreed** that the Subcommittee reviews seismic (and sonar) equipment used by the wind energy industry, its potential impacts and available mitigation measures.

The Subcommittee noted the importance of liaising with IMO and MARPOL, OSPAR, the UNEP Regional Seas programme and CMS, ACCOBAMS and ASCOBANS, all of which have an interest in ocean noise, several with noise-specific working groups. The Subcommittee **encouraged** governments to collate and publicise information on impulsive noise collected as part of both public and commercial developments, wherever possible.

3. Review and analysis of acoustic research documents presented at the 2022-23 IWC Scientific and Conservation Committees

SC/69B/E/07 reported on a scientometric analysis of documents presented to the Scientific Committee in 2022 and 2023, focusing on acoustics and underwater noise. Authors systematically searched the IWC database for publications related to acoustic research. Various bibliometric methods were employed for the analysis. The number of studies focused on acoustics increased from 7.81% in 2022 to 23.24% in 2023. However, specific studies on underwater noise remained relatively few, representing only 3.5% of the total in 2023, suggesting a need for further work in this direction. In 2023, more Subcommittees discussed acoustics than in 2022, demonstrating interest in this research area within the IWC SC. The Conservation Management Plans Subcommittee (CMP) presented the largest number of documents on acoustics in both years, highlighting the relevance of this field to cetacean conservation. Studies covered a wide range of topics, including noise from vessels, seismic exploration and offshore wind energy. Geographically, studies highlighted global concern about this phenomenon. The authors concluded that considering the interest in this issue in the international environmental agenda, and based on Resolution 2018-4, a coordinated agenda between the Scientific and Conservation Committees would be useful.

In discussion it was noted that SC/69B/E/07 only covers a one-year period, whereas the SC's history of work on underwater noise extends more than 25 years, with the Subcommittee's pre-meeting on underwater noise in 2004 having a major impact in both the scientific community and in terms of international policy related to underwater noise.

**Attention:** S, SC

*Noting the growing concern over the effects of anthropogenic underwater noise, the Subcommittee encouraged:*

- 1. The continuing networking with other international bodies in identifying priorities on underwater noise. This has two main objectives: (a) avoid duplicative work; and (b) introduce*

*whenever needed, or reinforce the importance of marine mammal stewardship in the agenda of these bodies to strength the synergy;*

- 2. To expand the scientometric review of IWC documents focusing on acoustics and underwater noise since 2004; and*
- 3. Continued collaboration with international bodies that have work programmes to reduce underwater noise, including the IMO Action Plan to further prevent and reduce underwater radiated noise from ships and Regional Action Plans of Regional Sea Conventions.*

In response to the comment in SC/69B/E/07 that more synergy is needed between the CC and SC, it was noted that the Whale Watching Subcommittee is a good model for synergy and collaboration with the CC. There are several topics within the Environmental Concerns Subcommittee (e.g., noise, climate change, chemical pollution and marine debris) where more could possibly be done with the CC to elevate these topics.

It was suggested that to aid the Subcommittee's outreach goals for the issue of underwater noise to the wider public, collaboration with Discovery of Sound In The Sea (DOSITS.org) might be useful. DOSITS has an excellent website that is widely used and referred to by scientists, agencies, industry and the wider public. Lücke noted that they are involved with DOSITS and volunteered to be a conduit for information sharing.

## **5.2 Review new information and recommendations**

SC69B/E/12rev1 provides a structured compilation of available and emerging detection and monitoring technologies, including some mitigation approaches in a broader sense. It considers both sensors and platforms in various combinations and systematically lists their requirements, constraints and strengths. Detection technologies are evaluated for their technology readiness levels along with a coarse assessment of their capabilities. The paper is intended to serve regulators and stakeholders in marine construction and development alike as a guide to identify the detection and monitoring methods that may best suit their needs and the wellbeing of cetaceans.

In discussion it was noted that this paper is a very useful compilation as the ocean renewable energy industry is expanding rapidly and as a 'sustainable' industry, both the industry and regulating agencies are very keen to ensure that environmental impacts on sensitive species are minimised.

### **Attention: S, SC**

*The Subcommittee noted that the rapid development of offshore renewable energy, which will help to meet national and international greenhouse gas reduction targets, is becoming a substantial source of underwater noise.*

*The Subcommittee **recommended** that the Secretariat reach out to member nations to offer the Committee's expertise in cetacean surveying and monitoring and on noise impacts. The Subcommittee also **noted** that as part of mitigation strategies for wind energy, several Government agencies are monitoring the acoustic environment around wind farms and large amounts of data are being accumulated.*

*The Subcommittee therefore **recommended** that contracting governments consult with knowledgeable*

*Committee members on the best ways to utilise these data both for conducting research on cetacean abundance and distribution, but also for assessing the potential impacts of wind energy-related noise on cetaceans.*

It was noted that the United Nations Decade of Ocean Science for Sustainable Development (2021-30) has a substantial number of projects on underwater noise that would be particularly relevant to the work of the Subcommittee such as the Ocean Decade Research Program on the Maritime Acoustic Environment and the Ocean Sound Atlas (Dziak, 2021; Miksis-Olds *et al.*, 2021; Nuessly *et al.*, 2021; Spence *et al.*, 2021; Spence *et al.*, 2022). As the Secretariat is currently liaising with the UN Ocean Decade Steering Committee, this could be an area where they aid collaboration and communication with these programmes.

It also noted that the European Commission has adopted an approach for setting threshold values for underwater noise in EU waters as part of the Marine Strategy Framework Directive (MSFD). These threshold values are described in terms of the proportion of a habitat exposed to levels of noise over a certain level for a proportion of the time. This will require EU Member States to choose one or more indicator species and select a value for a received noise level above which an adverse biological effect is expected to occur. It appears likely that some cetacean species will be selected as indicator species and there will be a need to define the noise level for that species and also to define the spatial extent of the population or habitat within areas of assessment or so-called Marine Reporting Units. The Subcommittee **agreed** that these are issues where the work of the Committee may make a useful contribution.

## **6. MARINE DEBRIS**

### **6.1 Develop programme to address Commission resolution on Plastics**

See below.

### **6.2 Review progress in intersessional work on impacts of marine debris on cetaceans**

SC/69B/E/16 reports on the work of the Intersessional Correspondence Group on Marine Debris. This is a joint group with the Conservation Committee. Much of marine debris is synthetic, plastics are a particularly long-lived form causing considerable harm to wildlife, and global plastics production is forecasted to triple from 460 million tonnes annually in 2019 to 1,231 million tonnes in 2060, unless controls are urgently put in place (OECD, 2022). Different materials can threaten cetaceans and other marine life in different ways, including larger plastic pieces, which if ingested might block or wound the alimentary canal, but there is also increasing concern about micro debris (pieces smaller than 5 mm) that may interact with cetaceans in other ways – e.g., by acting as conveyors of adsorbed pollutants or, for very small pieces, interfering with cellular processes. Micro- and macro-plastics will require different survey techniques. Microplastics can be ingested directly and also potentially transferred from prey species (e.g., krill, copepods and/or fish) to cetaceans where their accumulation may pose a health threat. There are a number of published peer-reviewed reviews of the effects of marine debris on cetaceans, most recently including Eisfeld-Pierantonio *et al.* (2022).

In 2022, the Commission passed Resolution 2022-1 on Marine Plastic Pollution, which rededicated the body to further action to better understand and address this threat. Activity set out in the resolution includes increased collaboration and cooperation with relevant international organisations and a request to the Scientific Committee to work towards a global risk assessment that identifies ‘hotspots’ of cetacean exposure to plastic debris. It was explained that the ICG had formed several subgroups to look in more detail at particular topics. One group focused on hotspots, the second on strandings and the third on

interactions with fishing gear.

More details of the work conducted to date by the ICG can be found in SC/69B/E/16, including the development of a draft questionnaire on fisheries gear marking. Moreover, another annex provides an update of progress made towards a global plastics treaty (see Annex 6 in SC/69B/E/16) - it was hoped that there will be close collaboration between IWC and member nations of this treaty in the future.

Opportunities for collaboration with other bodies, including the CMS, ASCOBANS, ACCOBANS and other regional seas conventions were also highlighted.

Based on the deliberations of the ICG, new work focuses including two areas (\*) for possible funding were identified:

1. The completion of a carefully focused review of the effects of marine debris on cetaceans which gives specific attention to the various definition of and location of hotspots of interaction between cetacean populations and marine debris\*;
2. The development of the IWC marine debris database\*;
3. A virtual meeting of experts to further develop approaches to risk assessment in the context of the risk posed by marine debris to cetaceans; and
4. Development of a strategy to help reduce the contribution made by fishing gear to marine debris, including via gear marking questionnaire.

The Subcommittee welcomed the work of the Intersessional Correspondence Group on Marine Debris, and it was commented that this continues to be an escalating issue both in terms of research and for conservation.

It was highlighted that, in this year's State of the Cetacean Environment Report (Annex T), there are a multitude of studies summarised, which highlight the issue of marine debris, especially in the Mediterranean and Black Seas.

The Subcommittee noted that the topic of marine debris has significant resonance with the wider public, potentially because it is such an immediately visible pollution issue, and the public can personally engage with it. Therefore, this issue is likely to continue to be a priority for the wider public and, therefore, Contracting Governments.

The recommendations from the ACCOBAMS workshop on 'Ingested Marine Litter Monitoring and Entanglement Evidences in the ACCOBAMS Area' held in Catania, Italy, 6-7 April 2024, were also presented (Appendix 2). Particular attention was drawn to recommendations related to:

- Fish Aggregation Devices (FADs) as a source of marine litter and that CMS was planning to explore this further;
- The development of new methods to evaluate the exposure to plastics and plastic additives in free-ranging organisms, including new approaches such as 'Omics', which could reveal the exposure to a plethora of stressors (microplastics, emerging chemicals, etc.) and drive the identification of new end-points (via e.g., metabolomics, transcriptomics, epigenetics); and
- Promoting cetacean species as indicators for microplastics (i.e., fin whale, *Balaenoptera physalus*) and macro-litter pollution (i.e., sperm whale, *Physeter macrocephalus*, and Cuvier's beaked whale, *Ziphius cavirostris*).



The ACCOBAMS workshop also made a series of recommendations about prevention and mitigation approaches, including for example the adoption of biodegradable materials and related research into the durability, performance, and environmental impacts of biodegradable fishing gear, while addressing economic implications. Further suggestions are detailed in Appendix I.

It was highlighted that, in this year's State of the Cetacean Environment Report (SOCER, Annex T), there were reports of several deaths and injuries of cetaceans reported due to entanglement in FADs, highlighting the timeliness of ACCOBAMS recommendations.

The issue of marine mapping hotspots was discussed, and it was **agreed** that river systems are frequent hotspots for marine debris, are a threat to riverine cetaceans and should be considered. It was also noted that comprehensive identification of hotspots will be hindered as many locations are offshore where research is lacking. Where there is such an absence of information, it was noted that providing advice would be difficult. Modelling approaches may help to predict potential areas of debris accumulation to address data gaps offshore and in under researched areas. It was highlighted that the IUCN Joint Marine Mammal Protected Areas Task Force is identifying Important Marine Mammal Areas (IMMAs), which can be used for mapping potential overlap of marine mammal and marine debris hotspots.

Another issue raised was that while we have data on cetacean distribution, information on cetacean behaviour that may make them more likely to interact with marine debris is lacking. For example, why some age classes of animals (e.g., young animals) and certain species (e.g., sperm whales) more frequently ingest or are entangled in debris than expected. The Subcommittee **recognised** the risk that FADs pose to cetaceans through the generation of marine debris and entanglement and **encouraged** countries to consider this risk before authorising the use of FADs.

### 6.3 Review new information

SC/69B/E/17 reported on plasticizer contaminants in a population of Amazon river dolphins (*Inia geoffrensis*). Contaminants in phthalate esters (PAEs) have widely been used as plasticizers in plastic polymers and can be found in animals as a result of ingestion of plastic debris and in contaminated environments. This contamination has been associated with carcinogenic effects and animal endocrine and reproductive disruption. SC/69B/E/17 assessed PAE exposure in free-ranging Amazon river dolphins in a remote area of the Brazilian Amazon, within the Amanã Sustainable Development Reserve. Levels of 4 PAEs were determined in blubber samples collected from 14 animals. Additionally, cholesterol levels were also measured to evaluate potential metabolic disturbances associated with PAE. All sampled animals were contaminated with at least two PAEs, with DEHP (di(2-ethylhexyl) phthalate) and DBP (dibutyl phthalate) being the most frequently detected, with the highest levels. Finally, significant positive correlations were detected between DBP, DEHP and DEP (diethyl phthalate) amounts and the animal total body length, suggesting possible bioaccumulation of contaminants.

The Subcommittee discussed that these river dolphins are supposedly less exposed to plastic pollution, as they inhabit a reserve within the Amazon rainforest, and were previously considered to be a healthy and protected population of animals. Therefore, the contaminant levels reported, and the conclusions of this paper, are of concern.

**Attention: CG**

*Noting the concerns raised in paper SC/69B/E/17 about the high levels of plasticizers in important Amazon river dolphin habitat in Brazil, the Subcommittee **strongly recommended** every effort should be made to avoid further plastic pollution entering the Amazon river and called for improved public education and outreach in support of this aim.*

## **7. DEEP-SEA MINING IMPACTS ON CETACEANS**

### **7.1 Review progress in intersessional work on impacts of deep-sea mining on cetaceans**

SC/69/B/E/08 reported on the work of an intersessional correspondence group (ICG) on deep-sea mining and its potential impacts on cetaceans. The ICG's terms of reference were to: (1) review the topic and report back to the next SC with a further assessment of the likely consequences of deep-sea mining for cetaceans; (2) seek to establish contact with others who are investigating this matter; and (3) encourage further submissions on this topic to the SC. The ICG met once via Zoom and corresponded via email to prepare a report summarising background information on deep-sea mining, which includes information on the activity's competent authority, the International Seabed Authority. Deep-sea mining is most likely to directly affect cetaceans due to the noise it would produce, which, inter alia, may cause masking of important signals to cetaceans, as well as alter energy budgets by displacing animals from feeding areas. It may also indirectly affect cetaceans via impacts on food webs. The ICG made a number of research recommendations designed to fill substantial data gaps regarding the impact of deep-sea mining on cetaceans and their ecosystems. It recommended against investigating potential methods for mitigating deep-sea mining impacts until these data gaps are adequately addressed. The ICG also urged researchers, contractors and industry to share all they know about sound characteristics of test mining operations conducted to date. Proxies are helpful but limited in utility. Finally, the ICG noted that beaked whales in particular, due to their deep-diving behavioural ecology and cryptic nature, may require specialised survey effort.

The Subcommittee welcomed the update from the ICG on deep-sea mining and its potential impacts on cetaceans and thanked them for their efforts on this important issue. It was noted that deep-sea mining is still in development, though concerns were raised that permitting may occur before the potential impacts to the habitat and cetaceans are fully understood and before appropriate mitigation measures are developed. Of concern is that most current research on deep-sea mining is being directed at ecosystems, fish and the environment with no dedicated focus on cetaceans. It was noted that deep-sea mining will likely cause considerable impacts. For cetaceans there will be direct (noise) and indirect (effects on prey and food web from sediment release, toxin release, etc.) impacts. Of particular concern is that masking of sounds used for cetacean communication may be of significance for deep divers, as it is a region of the ocean that is rarely disturbed. Seamounts may also be a focus for concern, as those areas are important for some marine mammal species. It was also noted that prototypes that are currently being tested are roughly ¼ of the size of the actual mining equipment, which undoubtedly will cause greater impact. Furthermore, it is also important to consider that in 20-30 years, there may be multiple sound sources from multiple operations operating 24/7. Thus, the scale of deep-sea mining needs to be considered.

Given the potential impact and unknowns, it would be prudent for IWC to be involved in discussions around deep-sea mining. There may be opportunities to be involved with the International Seabed authority (ISA). It was proposed that the ICG members review the ISA letter and peer review attachment, in which the ISA indicated awareness of environmental concerns.

**Attention:** SC, C

The Subcommittee **drew to the attention** of the Commission the most recent resolution of Convention on Migratory Species (CMS) regarding deep-seabed mineral exploitation activities and migratory species.<sup>4</sup> In addition, at least 20 nations, including Contracting Governments of the IWC, have made a call for a moratorium / precautionary pause on deep-sea mining. Given the background information provided in SC/69/B/E/08, the Subcommittee **encouraged** the Commission to consider this information intersessionally with a view toward establishing a position on deep-sea mining.

The Subcommittee **recommended** that the Conservation Committee discuss possible steps for the Commission to follow on this issue during its next meeting, making use of the work done by the ICG and other relevant multilateral agreements such as CMS as they see fit.

The Subcommittee **recommended** that the Commission work, communicate, consult and partner with other international bodies, in particular with CMS, regarding the impact of deep-sea mining on marine animals and ecosystems, including those on which cetaceans depend. Further consideration also needs to be given to potentially liaising with other bodies, including the International Seabed Authority, where opportunities exist.

## 7.2 Review new information

SC/69/B/E/06Rev1 reported on a passive acoustic survey for cetaceans in a potential deep seabed mining region, Clarion Clipperton Zone, Eastern Pacific, summer 2023. The Clarion Clipperton Zone (CCZ) of the Eastern Pacific is an abyssal area punctuated by numerous seamounts. There is a drive to mine the CCZ for polymetallic nodules, though this is still not a commercial reality. Records suggest that up to 30 cetacean species are present in the CCZ, though dedicated surveys have yet to be published. The paper reports results of a passive acoustic survey conducted over 13 days (summer 2023) in two blocks of the CCZ – NORI-d and TOML-e. The survey covered 4,328 km of track with 273 hours of recordings. Seventy-four cetacean groups were detected acoustically, with six visual encounters. Sperm whales (*Physeter macrocephalus*) (one individual), Risso's dolphins (*Grampus griseus*) or Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) based on acoustic characteristics (two groups) and common dolphins (*Delphinus delphis*) (one group, confirmed by sighting) were detected in addition to 70 dolphin groups that could not be identified to species level. No baleen whales, kogiids or beaked whales were detected. Beaked whales are challenging to detect, such that a lack of detections cannot be taken to confirm absence and could instead be due to a combination of vessel self-noise, survey speeds and beaked whale behaviour. The findings indicate that more extensive data are needed on distributions and densities to understand the risk of harm to oceanic cetaceans that may arise from deep-sea mining. Also highlighted are opportunities for collaboration across intergovernmental organisations, scientists, non-governmental organisations and regional seas agreements to provide a coordinated response to address future threats from mining. A lack of data on oceanic cetaceans should not mean that emerging industrial use of the deep ocean is overlooked in distant marine realms.

The Subcommittee **welcomed** the report and congratulated the authors on collecting valuable information from an area that is poorly studied. It was noted that there are inherent logistical issues

<sup>4</sup> <https://www.cms.int/en/document/deep-seabed-mineral-exploitation-activities-and-migratory-species>

associated with working in this large, remote area, but that this was an important first step in collecting empirical data on density and occurrence of marine mammals in this area for potential deep-sea mining. However, due to the logistical constraints and limitations, some species that could have been present (e.g., beaked whale species), were not detected. It is **encouraged** that additional monitoring of these blocks that are identified as potential deep sea mining areas be conducted. This report also highlights that monitoring this area for cetacean disturbance during future deep sea mining operations would be difficult and that it would also be difficult to stop mining activities once they started. The authors noted that additional research will be conducted in the coming years and that there will be new data to present in 2026, which the Subcommittee will welcome.

Williams updated members of the Subcommittee on a collaborative effort being undertaken to review the scientific literature to assess likely impacts of noise arising from deep-sea mining activities on marine taxa in the Clarion-Clipperton Zone. The review is expected to be completed by November 2024. Preliminary results from the exercise found that the ranges of 28 species of cetaceans overlap with the CCZ. A systematic review of the literature resulted in 650 relevant studies, of which, 286 included cetaceans. Initial results from the review revealed evidence of negative impacts of anthropogenic noise on 15 of the 28 cetacean species (54%) found in the CCZ. In addition to eliciting behavioural responses in cetaceans, chronic ocean noise from DSM is expected to cause acoustic masking, lost communication space, or acoustic habitat degradation in any animal that relies on passive listening, including all cetaceans.

**Attention:** SC, R, CG

*The Subcommittee **recommended** the following research be conducted, at a minimum, to adequately inform decisions relating to proposed deep-sea mining operations:*

- 1. An in-depth Assessment of the degree of overlap between areas of interest for deep-sea mining and critical cetacean habitat;*
- 2. Further analysis and modelling of sound characteristics and propagation from mining for normal operations and reasonable accident scenarios;*
- 3. Further studies and analyses of the sensitivities of cetaceans to acute and chronic exposure to sound across the range of sound frequencies potentially produced by all deep-sea mining operations (including ore transfer to transport vessels);*
- 4. Further assessments of potential impacts of deep-sea mining, including from noise, suspended sediments and light, on marine food webs; and*
- 5. A thorough analysis of how comparative assessments—e.g. noise from shipping lanes vs deep-sea mining operations; known impacts from shallow water mining vs potential impacts from deep-sea mining—might inform our understanding of the minimum potential impacts from deep-sea mining on cetaceans.*

## **8. HABITAT ALTERATION AS ANTHROPOGENIC IMPACT ON CETACEANS**

While nothing was received specifically on habitat alteration as an anthropogenic impact on cetaceans, it was noted that deep sea mining could be discussed under this topic. As such, the ICG on deep sea mining will be discussed under this subheader during the next meeting.

## **9. SOCER**

In response to several IWC resolutions, the State of the Cetacean Environment Report (SOCER) provides regular updates on environmental matters that affect cetaceans. The focus region of the 2024 SOCER (SC/69B/E/19) was on the Mediterranean and Black Seas, in addition to a global section. A new five-year compendium will be prepared for 2025, with no separate SOCER that year. Editorship will transition in this interim, after 20 years of leadership by Stachowitsch, to Rose and Parsons.

SC/69B/E/19 noted that the Mediterranean Sea features a water exchange rate at the century scale and is therefore sensitive to pollution; it is one of the most oil-polluted seas. Mercury poses the main heavy metal threat. The Ocean Health Index ranks at least 12 of the 22 coastal states here below the global average value. Five of the six coastal countries in the Black Sea are also below that average. In both seas, the large number of bordering states complicates regional conservation measures. The Mediterranean is a hotspot for biological invasions (primarily tropical species via the Suez Canal). Plastic pollution is among the most serious concerns in both seas and both, as semi-enclosed seas, are sensitive to climate change due to limited northern migration possibilities. On a positive note, the ship strike threat for sperm whales off the west coast of Greece has been reduced thanks to vessel-rerouting by major shipping companies. Globally, management efforts have done little to reverse extinction risk of small cetaceans, a group where research is not prioritised toward the greatest predictors of this risk: small-scale fisheries and habitat degradation. Ocean warming is increasing faster than terrestrial warming, with marine heatwaves on the rise and Atlantic ocean circulation predicted to collapse this century. North Atlantic right whales, a species at extreme risk of extinction, show reduced survival and reproductive output after even 'minor' entanglements, and sonar impacts in testing ranges may cause localised extinctions in Atlantic beaked whales.

The Subcommittee **welcomed** the report and congratulated the authors on this very extensive work. The noted threats reported in the Mediterranean and Black Seas SOCER include pollution, bycatch, vessel traffic, and noise. It was also noted that this way of compiling information could be very useful for other topics. For example, the polar themed SOCER (Stachowitsch *et al.*, 2022) was valuable to the Southern Ocean Sanctuary review (Annex N). It was also noted that while the target audience of SOCER is the Commission and the general public, these reports could also be useful for researchers to use as a base for literature review. The published data in SOCER could be useful for those working in the specific region and could also be used to help further populate data in the contaminant mapping tool. The SOCER authors noted that one of the three editors, Stachowitsch, would like to step down and that they would welcome a new editor. The Subcommittee thanked Stachowitsch for his amazing work over the two decades that the SOCER has been produced.

#### **10. REVIEW STRATEGY TO BETTER INTEGRATE E WORK PLAN WITH OTHER COMMITTEE SUBGROUPS**

No documents or working papers were brought to the attention of the Subcommittee on this topic.

Throughout discussions on multiple agenda items, the Subcommittee reiterated the importance of considering the effects of cumulative threats on cetacean populations. The Subcommittee expressed concern that the threats discussed (e.g., disease, pollution, noise, climate change) are occurring simultaneously, however relationships between threats are not well understood. Frameworks able to evaluate the cumulative effects of multiple stressors (e.g., pollution, habitat loss, noise) are essential for valid impact assessments and management. Stressors can interact synergistically, and potentially in non-linear ways potentially exceeding the impact of individual threats. Even low-level stressors may contribute significantly when combined, leading to unforeseen population declines.

It was **agreed** that this Subcommittee should work with other Subcommittees and Working Groups (e.g., HIM, ASW, HIM) to help better understand the combined effects of these various stressors. Given the importance of cumulative effects in several of the topics discussed under this Subcommittee and others, it was decided by the Subcommittee that it would do a scoping exercise on cumulative effects-related work within the SC and present this at SC70.

### 11. REVIEW STRATEGY ON DEVELOPING AND USING A ‘ONE HEALTH’ APPROACH

No explicit, new information was brought forward for discussion on this topic. However, many references to ONE Health were made this year, including during the discussion of HPAIV under the topic of diseases of concern. The reconstitution of ONE Health discussions may be important in the future and the Subcommittee **agreed** to keep this agenda item open.

### 12. PROGRESS ON PREVIOUS RECOMMENDATIONS

The information on previous recommendations in the recommendation database was reviewed and updated.

### 13. BIENNIAL WORK PLAN

Topic	Intersessional	Next Meeting	Intersessional	Subsequent Meeting
Pollution 2025	Continue collecting information on legacy and emerging contaminants in cetaceans, on cumulative impacts (ADD CURRENT RECOMMENDATIONS)	Review Progress	Continue collecting information on legacy and emerging contaminants in cetaceans, on cumulative impacts	Review Progress
Cetacean Diseases of Concern	Continue collecting information on Emerging diseases (SC23-E02)	Review Progress	Continue collection information on emerging diseases	Review Progress
Strandings	Continue work of Strandings Initiative through implementation of the 2025-28 Workplan	Review Progress	Progress towards work plan	Review Progress
Climate Change	Continue collecting information on impacts of climate change, follow up on workshop, adapt ToR (ICG-9), (SC2262)	Review progress of intersessional work	Continue work to follow up on recommendations	Review progress
Noise	Adapt ToR (ICG-9), (SC2183, SC2264)	Review progress of intersessional work	Continue work to follow up on recommendations	Review progress
Marine Debris* (*marine = aquatic to include rivers, bays, etc.)	Follow up on recommendations, adapt ToR (ICG-10), develop work plan for SC response to Commission resolution 2022-1 (highest priority); (SC2185, SC2265)	Review progress; finish work plan for Commission re resolution 2022-1	Continue work to follow up on recommendations. Implement work plan re resolution 2022-1	Review progress

SOCER	Report compilation on the Atlantic Ocean and 5-year compendium, assuming funding	Review SOCER report. Address plans for biennial meetings of SC	Report compilation	Review SOCER report
Deep Sea Mining Impacts	Collect information on potential impacts of deep-sea mining on cetacean populations, ICG-11 (SC23-E04)	Review progress	Continue ICG	Review progress
ONE Health approach	Continue to develop recommendations; work across subcommittees, and specifically with the ecosystem functioning group	Review progress of intersessional work	Continue work across subcommittees	Review progress of intersessional work

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## **Appendix 1**

### **Overview of the History of the IWC Pollution Initiative (Update of SC/68B/E/02)**

This Appendix lists the major activities and key stages that occurred during the four phases of the Subcommittee on Environmental Concerns Pollution Initiative (2000, 2000+, 2020 and includes activities to date in 2025). The objective here is not to provide a complete list of all the outputs but to simply summarise the key stages in the initiative and document the main phases and developments in order to assist the next phase of the Pollution Initiative in the advancement of this field within the activities and priorities of the Committee and Subcommittee.

#### **Key dates and activities**

**1981** Commission passes a Resolution noting the potential threats to whales raised by heavy metals, Polychlorinated Biphenyls (PCBs) and other Organochlorines (OCs).

**1984** Committee adopts a standard approach for the collection of samples and presentation of OC results.

**1985** Working group established to consider **chemical pollution** ensuring (a) consistency of method and reporting (b) studies to example mechanisms and effects.

Also considered that cetaceans although not suitable for monitoring global ocean pollution in a strict sense, may be possible to obtain some information on trends in certain pollutants.

In addition, they considered the problem of using data from stranded animals.

**1993** Work on pollutants reconsidered by SC in broad context of overall environmental change.

**1995** Workshop on chemical pollutants held in Bergen to: (a) review current knowledge; (b) identify tools to investigate cause-effect relationships; (c) develop initiatives aimed at determining the actual impact of pollutants on cetacean populations and facilitate the design of a monitoring scheme. Establishment of Pollution 2000 initiative (Reijnders *et al.*, 1999).

- The workshop recommendations were (a) sufficient data on effects to warrant concern for cetaceans (b) fundamental research needed to address effects of pollutants on cetaceans (c) a multidisciplinary, multinational programme of research was therefore needed.

**1998** Proposal for future work submitted to IWC. Reviewed and accepted (Reijnders et al 1999). The rationale was to study biomarkers in selected populations of the same species subject to a gradient of pollutant exposure. Species selected were bottlenose dolphins, harbour porpoises and white whales.

**1999** Workshop to develop Pollution 2000+ held in Barcelona.

**Pollution 2000+** - Phase 1 – biomarker development (including effect of post-mortem time and live biopsy sample biases).

**2000** Steering Group for Pollution 2000+ established, dealing with organisational issues and fund raising.

**2001** Progress on two subcomponents of project (biomarkers and studies on bottlenose dolphins and stranded harbour porpoise for post-mortem effects). Pared down study due to limited resources.

**2004** Workshop on Habitat Degradation, University of Siena. Discussion and recommendations relating to the impact of multiple stressors on cetaceans; linking habitat quality with exposures, including effects of chemical pollutants (IWC, 2006).

**2004-06** Analysis and reporting of Phase 1 studies completed, papers submitted to SC and published in peer reviewed literature (see Reijnders *et al.*, 2007 for list of publications relating to Phase 1).

**2007** Publication of Report from the Pollution 2000+ Phase I initiative (Reijnders *et al.*, 2007) as part of the Report of the Standing Working Group on Environmental Concerns.

Workshop to develop Phase 2 held in Barcelona to develop a risk assessment model framework(s) and conceptual models to estimate effects of chemical pollutants on populations.

**2008-09** New Steering Committee formed, and Phase 2 planned.

**2010** Workshop on implementing Phase 2 held in Sausalito.

**2010-16** Phase 2 work undertaken, individual based model to assess risks to cetacean populations developed (SPoC) and refined over a number of years to include effects on reproduction and immunity. Steering committee meeting held in St Andrews in 2014. Paper published on final model in Environmental Pollution (Hall *et al.*, 2018). Open-source model available through websites and user- friendly interface developed (accessible at <https://iwc.int/chemical-pollution>).

**2017-18** Review of mercury in cetaceans completed (following Commission Resolution) and published in Science of the Total Environment (Kershaw *et al.*, 2019).

**2018-19** Completion of outstanding tasks:

1. **include effects of flame retardants into SPoC model** – further research and preliminary trials of the model concluded that there is currently insufficient dose-response data available, in any species, for this to produce a meaningful tool.
2. **contaminant mapping tool to investigate trends** (see earliest objective of pollution initiative in 1985). Completed and available through the IWC website (April 2020, accessible at <https://iwc.int/chemical-pollution>).

#### **2019 Cumulative Effects**

- Improve knowledge and enable quantitative assessments on the data available for cumulative effects.
- Develop a widely applicable approach for providing precautionary advice for populations in which cumulative effects are of concern.
- Establish cumulative effects as a standing item on the E agenda.
- Encourage additional efforts to identify the relevant threats in Important Marine Mammal Areas (IMMAs) in order to assist with the management of cumulative effects.
- Endorse the results of the IUCN/ACCOBAMS workshop entitled 'Towards understanding the overlap of selected threats and Important Marine Mammal Areas (IMMAs) across the Mediterranean Sea'.
- Encourage that such an effort – aimed at overlaying different sources of threat and pressure on existing Important Marine Mammal Areas (IMMAs)
- Offer its technical assistance in such assessments, when requested.

**2020** Rename the 'Pollution 2020' into 'Pollution 2025'; (ii) to focus on the most urgent issues and structure this topic accordingly into: particulate pollution (comprising nano-, micro-, meso- and macro debris, and this includes plastic pollution), noise pollution, and cumulative effect studies.

**2021** Recommendation to host a virtual Pollution 2025 Cumulative Effects Workshop; Workshop was held in November 2021.

**2022** Workshop Report presented to the SC:

Scientists across disciplines are encouraged to find a shared language and methodology to assess the combined effects of multiple stressors as it is a cross-disciplinary problem. The Workshop identified several models with the potential to integrate data on combined effects of multiple stressors, noting that long-term monitoring studies, to provide base line data and investigate temporal variations, are vital to these models.

**2023** Synthesis of recommendations from Pollution 2025.

**2024** Pollution 2026 and beyond Planning.

## Appendix 2

### RECOMMENDATIONS FROM THE WORKSHOP ON INGESTED MARINE LITTER MONITORING AND ENTANGLEMENT EVIDENCES IN THE ACCOBAMS AREA 6-7 April 2024, Catania, Italy

#### General recommendations

The Workshop:

- **Encouraged** the ACCOBAMS Secretariat to look for opportunities to engage with the UNEA INC process which is working to conclude a new plastic treaty and, subsequently, engage with the treaty as appropriate;
- **Encouraged** Parties to consider a process to develop best practice guidance for marine litter assessment;
- **Encouraged** Parties to address FADs as a source of Marine Litter, noting 'Recommendation GFCM/46/2023/14 establishing a multiannual management plan for the sustainable exploitation of common dolphinfish in the Mediterranean Sea,' IUCN motion 028 – 'For an improved management of drifting fish aggregating devices (FADs) in purse seine fisheries,' and relevant Decisions of the 2024 Conference of the Parties to CMS;
- Noting the increased evidence of impacts on cetaceans and other biota, **called on** Parties to urgently implement mitigation strategies for plastic wastes, including appropriate education programmes (including citizens and shore and offshore workers), and stopping discharges into the marine environment. Potential mitigation actions are detailed below;
- **Took note** of the recommendations from the 'ASCOBANS-ACCOBAMS Marine Debris workshop 15 April 2023, O Grove, Galicia, Spain,' and, in particular, **reiterated** the recommendation to enhance awareness raising by communicating to other scientists, young people and other citizens, stakeholders and policy makers;
- Also **reiterated** the recommendation from the 'IWC Workshop on Marine Debris: The Way Forward, 3-5 December 2019, La Garriga, Catalonia, Spain,' which emphasised that beach clean ups are important initiatives for data collection and public awareness, whilst not directly addressing the problem at source, and welcomed the progress made on this inter alia under the Barcelona Convention;
- **Noted** with appreciation IWC Resolution 2022-1 on marine plastic pollution and **encouraged** further collaborative work between the IWC and ACCOBAMS on this issue;
- **Encouraged** the monitoring of live entangled cetaceans (i.e., free-swimming individuals that have some sort of attached entanglement) and the establishment of a common protocol to assess and disentangle them where possible. Note was taken of the IWC work on this issue and, again, further collaborative work between the IWC and ACCOBAMS is encouraged.

The Workshop also **called for**:

- periodic workshops to update procedures and guidelines for stranding intervention, data collection, and post-mortem analyses to define transboundary best practices;
- training and exchange programmes to be organised to create a shared knowledge platform for marine litter impact assessment;

- the identification of means for the exchange of information, adopting common definitions and a common communication strategy between institutions, governmental bodies, and national focal points; and
- the identification of a coordination centre to promote the creation of a regional database between partners, the sharing of expertise, equipment, and knowledge, as well as working as a reference laboratory and sample collection to promote sharing of knowledge and data.

### **Data Collection Recommendations**

The Workshop:

- **Encouraged** ACCOBAMS Parties to adopt the standardized multi-tier protocol (ACCOBAMS/ASCOBANS, 2019[1]; Corazzola *et al.* 2021[2]) for the analysis of marine litter (including microplastics) in stranded organisms, wherever possible;
- **Encouraged** the sharing of knowledge, facilities, samples and data collection;
- **Noted** it is important to further identify and standardize methodologies for micro/nano plastic analysis to properly compare data in the most affected areas and species; and
- **Noted**, where possible and expertise and facilities allow, that it is important to analyse items smaller than 1 mm, which may represent the majority of plastic particles found in marine mammals.

### **Further Research Recommendations**

The Workshop **encouraged**:

- a more coordinated effort to better understand the toxicological effect of macro and micro litter ingestion in cetaceans (considering both chemical and physical effects);
- harmonisation of a diagnostic methodology that includes:
  - evaluation of the presence of marine litter in marine mammals GIT (at least); - categorisation and quantification of identified marine litter through and determination of polymers by spectroscopy technique (FT-IR);
  - detection of plastic additives
  - impact on microbiota; and
  - risk, impact and mortality indexes.
- parties to further collaborate at a regional level between tissue banks, to facilitate the exchange of tissue samples for joint analyses and retrospective studies; and
- the identification of hotspot areas for seasonal human activities-species risk analysis, noting ongoing work by the IWC on this issue.

### **Adriatic Sea-specific Recommendations**

The Workshop **strongly recommended**:

- monitoring efforts on bottlenose dolphin-set net interactions;
- testing mitigation devices on set-net (gill nets); and
- creating a multi-level multidisciplinary model to identify hotspot risks.

## Recommendations on New Techniques

The Workshop **encouraged**:

- the defining and development of new methods to evaluate the exposure to plastics and plastic additives in free-ranging organisms, including new approaches such as Omics, which could reveal the exposure to a plethora of stressors (microplastics, emerging chemicals, etc.) and drive the identification of new end-points (via e.g., Metabolomics, Transcriptomics, epigenetics);
- the use of new diagnostic techniques to understand the effects of cumulative stressors on cetaceans; and
- investigations into the potential ecotoxicological effects caused by the ingestion of marine litter both through biomarker identification and analysis on tissues of stranded marine mammals and *in vitro* experiments to assess the effects of micro- and nano-plastics through new technologies applied on cetacean cell lines, organoids and 'organ-on-chip' technology.

## Recommendations on Indicator Species

The Workshop:

- **Recommended** that cetacean species should be promoted as indicators for microplastics (i.e., fin whale, *Balaenoptera physalus*) and macro-litter pollution (i.e., sperm whale, *Physeter macrocephalus*, and goose-beaked whale, *Ziphius cavirostris*) at ACCOBAMS scale. *Tursiops* spp. could be used as indicators at sub-basin levels. This could include the use of indicator species within the IMAP candidate indicator 24 (EO10); ML Catania/2024/Rec;
- **Noted** the need for further consideration of indicator species for the Black Sea; and
- **Requested** the Barcelona Convention to encourage the European Commission to adopt cetaceans as indicator species.

## Recommendations on Prevention, Mitigation and Remediation Measures

The Workshop **identified** a number of mitigation measures for Parties and other relevant agencies to consider.

### **Prevention Measures:**

- **Local Spatial/Temporal Management:** Implement measures like soak time limits and gear length restrictions to prevent conflicts and reduce gear loss.
- **Fishing Gear Marking:** Encourage the use of identifiers for better traceability, reducing gear abandonment and unintended catches, while enhancing accountability.
- **Public Awareness and Education:** Support initiatives like the Blue Flag Programme and the Clean Seas Campaign to educate and engage communities in plastic pollution prevention.
- **Design Innovation:** Promote the design of fishing gear with built-in features to minimise loss and entanglement.
- **Promote and utilise wherever possible *The Global Ghost Gear Initiative, 2021. Best Practice Framework for the Management of Fishing Gear: June 2021 Update*** to prevent, mitigate and remediate Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG).



**Mitigation Measures:**

- Adoption of Biodegradable Materials: Encourage research into the durability, performance, and environmental impacts of biodegradable fishing gear, while addressing economic implications.
- Development of Gear with Minimisation Features: Advocate for the integration of escape panels and self-releasing mechanisms to minimise gear loss.

**Remedial Measures:**

- Reporting of Lost Gear: Emphasise the importance of reporting lost or abandoned fishing gear to enable timely retrieval efforts.
- Identification of Hot Spots: Support the use of technology such as sonar and transponders to locate marine litter and retrieve lost gear, enhancing mapping and tracking efforts.
- Retrieval Initiatives: Collaborate with organisations like Healthy Seas and Surfrider Foundation to conduct marine debris removal initiatives, focusing on hotspot areas and engaging local communities.

**Recommendations for Addressing Challenges**

- Persistent Nature of Marine Debris: Recognise the unique challenges posed by the Mediterranean's semi-enclosed nature and advocate for targeted cleanup and prevention efforts.
- Funding and Resource Constraints: Explore sustainable financing mechanisms and public private partnerships to overcome funding constraints and support long-term mitigation initiatives.
- Enhanced Regional Collaboration: Advocate for enhanced collaboration among Mediterranean countries to develop integrated approaches and address the root causes of marine litter.
- Incorporating Emerging Technologies: Embrace emerging technologies and innovations to enhance monitoring, waste management, and sustainable practices in combating plastic pollution in the region.