

# SC/69A/EM/05

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**Update on Progress in Ecosystem Functioning Work during the Intersessional Period with Suggestions for the Work of the Scientific Committee**

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# Update on Progress in Ecosystem Functioning Work during the Intersessional Period with Suggestions for the Work of the Scientific Committee

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## **Abstract**

Cetacean ecosystem functioning is important for healthy marine ecosystems and has multiple positive co-benefits for human society. Recovering whale and dolphin populations will likely lead to increased nutrient cycling, biodiversity uplift and additional carbon fixation, storage and sequestration within the marine environment. Since the 2021 IWC-CMS workshop on the topic to identify knowledge gaps, a series of further symposia, funded research projects and collaborations, has resulted in progress to enhance and deepen understanding of cetacean ecosystem functioning. To fully address IWC Resolutions 2016-03 and 2018-02 on this subject, a wider effort to advance this area of work within the IWC Scientific Committee is suggested.

## **Introduction**

The topic of the ecological role of cetaceans was first touched upon in the 1980s. It was noted that cetaceans play an important part in marine ecosystems, through nutrient cycling (Kanwisher and Ridgway, 1983; Katona and Whitehead, 1988), via their carcasses, and that whales circulate nutrients at a large scale by lifting them from deep waters towards the surface, and by releasing faecal material which disperses instead of sinking when released (Katona and Whitehead, 1988).

A number of studies have since documented great whales' contribution to deep-sea biodiversity and sequestration of carbon via their carcasses, known as whale falls (Smith & Baco, 2003; Smith, 2006). Studies have also attempted to quantify nutrient cycling and vertical transport within the water column by great whales. This process makes nutrients available to phytoplankton in the upper layers of the oceans, increasing productivity – known now, as the whale pump (Roman & McCarthy, 2010). Additional work focused on horizontal transport of nutrients across large distances during migration (Roman *et al.*, 2010), as well as on nutrient and carbon cycling by cetaceans (Pershing *et al.*, 2010). Commercial whaling and the continued loss of cetaceans due to a suite of anthropogenic

factors have therefore likely had a detrimental effect on the ecosystem functions of great whales and small cetaceans alike (e.g., see Pershing *et al.*, 2010).

In 2016, IWC resolution 2016-03 asked the Scientific Committee (SC) to screen existing research on the contribution of cetaceans to ecosystem functioning and develop a gap analysis and a plan for remaining research needs.

Two years later, IWC resolution 2018-2 commended the Scientific and Conservation Committee for their efforts to increase understanding of the contribution of cetaceans to ecosystem functioning and encouraged collaboration with the Convention on Migratory Species (CMS) and other international organisations. It also encouraged contracting governments to integrate the value of cetaceans' ecological roles into local, regional and global conventions and agreements on biodiversity and the environment.

A first expert workshop, co-hosted by IWC and CMS, took place online in April 2021. The Workshop identified three broader categories of ecosystem functions of cetaceans: 1. Nutrient transfer and circulation. 2. Feeding related traits. 3. Provision of habitat, contribution to biodiversity and "blue carbon". The workshop elaborated an extensive list of cetacean ecosystem functions under each of the categories (IWC, 2021). The workshop also identified knowledge gaps across the three subject areas and noted the strong need for more studies into the ecosystem functions of small cetaceans, especially their roles in linking offshore and inshore habitats.

Therefore, the workshop [report](#) (SC/68C/REP/03) proposed a list of general questions, hypotheses and tasks to be completed or considered for a second workshop.

### **Current Progress**

Since the IWC-CMS workshop (SC/68C/REP/03), a number of peer-reviewed papers have been published which have contributed to the filling of the highlighted knowledge gaps (Savoca *et al.*, 2021, Rhodes-Reese *et al.*, 2021, Herr *et al.*, 2022, Quaggiotto *et al.*, 2022, Sheehy *et al.*, 2022, Kiska *et al.*, 2022, Letessier *et al.*, 2022, van Weelden *et al.*, 2022, & Durfort *et al.*, 2022. In particular, knowledge was advanced on the topics of species-specific diving behaviour, comparisons of pre and post whaling numbers, feeding rates, nutrient cycling by small cetaceans and climate change implications.

Soon after the IWC-CMS workshop (SC/68C/REP/03), Whale and Dolphin Conservation (WDC) established a new core workstream with the initial priority of addressing the most pressing research gaps identified in the IWC-CMS workshop. Between October 2021 and January 2023, five scientific symposia were convened with a range of experts and researchers working on eco-system functioning. Following the first symposium, WDC sought proposals from researchers to address the identified, existing knowledge gaps. As a result, to date, WDC is funding three research projects that advance understanding of cetacean ecosystem functioning. One project, Pearson *et al.*, 2023 has been published and the others are still in the pre-publication stage. Two large projects are currently planned, for which funding is being sought.

On 17<sup>th</sup> April 2023, WDC hosted a workshop at the 34<sup>th</sup> European Cetacean Society (ECS) to assimilate and discuss the latest research on the contribution of small cetaceans to ecosystem functioning. Participants discussed the identification of research gaps and how these could be addressed. Participants looked at various species and/or populations, the different habitats and ecosystems that small cetaceans inhabit (from rivers to coastal waters, open ocean to enclosed bays) and discussed and considered the 'decision matrix' developed by the ecosystem functioning Advisory Group for the IWCs Conservation Committee which will provide a framework for gathering details about data gaps and help identify the most appropriate potential projects moving forward. A Working Group has been convened to progress this area of work.

### **Suggestions for future SC work**

Although there has been an increase in ecosystem functioning literature and study over the last two years, significant research gaps remain. It is therefore suggested that the IWC SC liaises proactively with CMS ahead of the upcoming 2<sup>nd</sup> IWC-CMS joint workshop planned for November 2023. Given the new evidence which has arisen for the important differential roles of small cetaceans in nutrient cycling, the ecosystem functioning benefits of coastal cetacean carcasses and the impact of climate change on ecosystem function provision, the IWC SC Small Cetacean (SM) Subcommittee should include work on ecosystem functioning in its agenda and work plan, to be able to co-ordinate understanding and data as scientific study expands in this area.

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