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Editorial: Small cetacean conservation: Current challenges and opportunities

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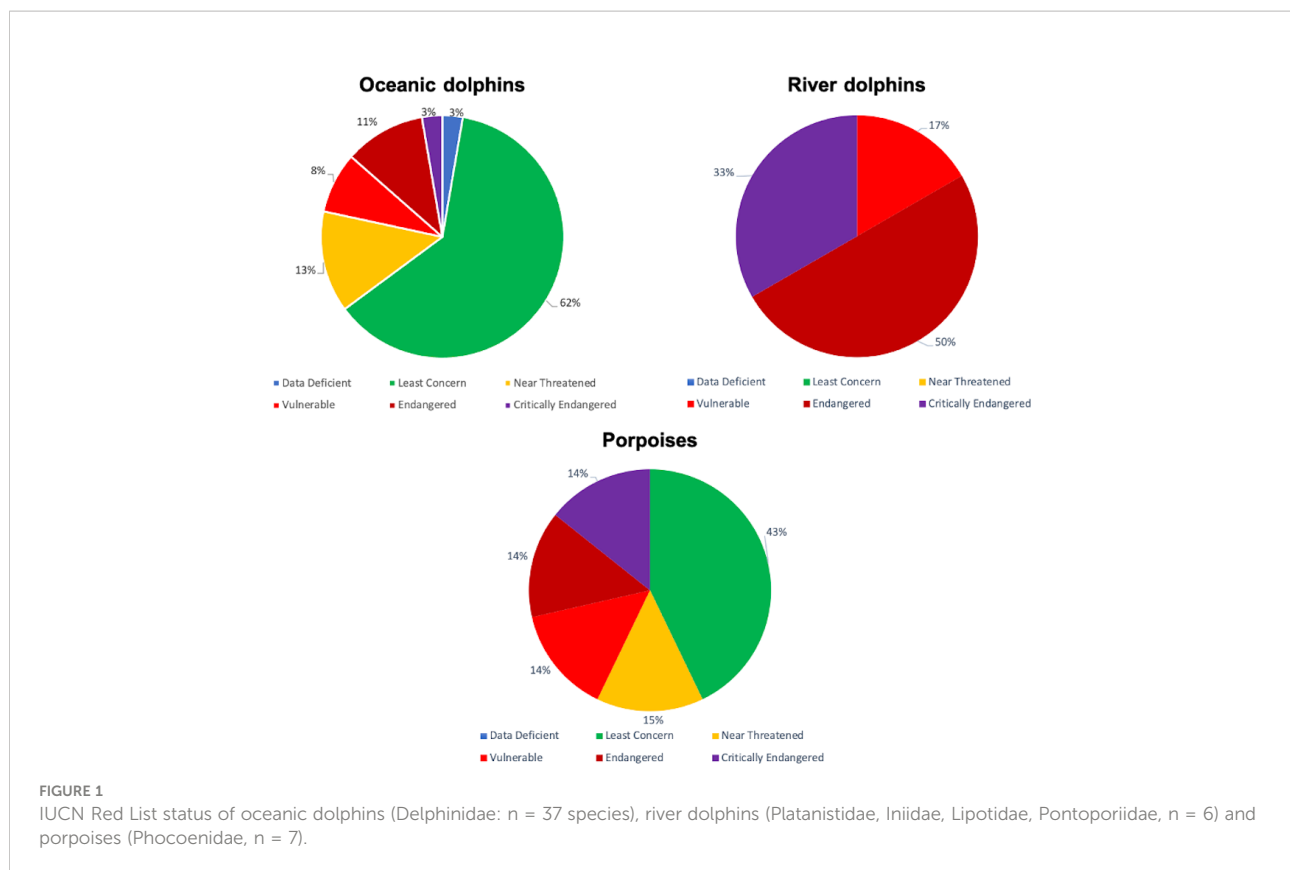
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Editorial on the Research Topic

Small cetacean conservation: current challenges and opportunities

Dolphins (oceanic and river dolphins; Delphinidae, Iniidae, Lipotidae, Pontoporiidae, Platanistidae) and porpoises (Phocoenidae) are the smallest members of the odontocete suborder. These species have colonized most aquatic ecosystems globally, from rivers to deep oceanic habitats, and from tropical to polar waters. Due to their habitat preferences, high metabolic rates, foraging behaviors, and diets, small cetaceans exhibit a wide range of ecological roles and functions across ecosystems where they occur and have the potential to affect communities *via* multiple pathways (top-down, bottom-up effects, and a range of behavior-mediated processes, [Kiszka et al.](#)). Dolphins and porpoises have also generated significant interest from the scientific community and more broadly by human societies since antiquity, with research on these animals increasing exponentially over the past 40-50 years. Despite protection by a range of international conventions (e.g., Convention on Migratory Species, Convention on the Trade of Endangered Species) and national legislation in most countries, some species are at increasing risk of decline and extirpation in aquatic habitats worldwide, with losses driven by a range of direct and indirect impacts from human activities. Today, more than 20% of species of oceanic dolphins, half of all species of porpoise, and all river dolphins are threatened with extinction ([Figure 1](#)).

This Research Topic, entitled *Small cetacean conservation: current challenges and opportunities*, includes a record number of 50 papers, which is the highest number of contributions for any Research Topic published in *Frontiers in Marine Science*, and covering a range of subjects on the ecology, behavior, and threats to small cetaceans. It



also includes contributions from emerging nations where little research has been published in the peer-reviewed scientific literature in the past, such as Kenya, the Philippines, Indonesia, Ecuador, Venezuela, St Vincent and the Grenadines, or Taiwan, for example (e.g., Fruet et al., Mustika et al., Mwango'Mbe et al., Quintana-Rizzo et al., Sahri et al., Tiongson et al.). This is a great sign of the increase in research in countries of the Great South, where small cetaceans are facing major conservation challenges, but also where expertise is expanding and new talents are rising. All these contributions, combined with the most recent peer-reviewed literature, help us to have a clearer understanding of the threats small cetaceans are exposed to, what the main research gaps are, and shed light on the reasons we can hope for a better future for these iconic species.

Threats to small cetaceans

Approximately 98% of marine mammal species are at risk from human activities in more than half of the world's aquatic environments, mostly in coastal and riverine habitats (Avila et al., 2018). Of these, dolphins and porpoises are affected by a variety of threats throughout their range, including fisheries interactions, hunting, chemical pollution, disease, disturbance

from boat traffic, displacement and habitat loss due to coastal/riverine development, and climate change. However, in recent decades it has become clear that incidental capture by fishing gears (bycatch), particularly gillnets, trawls, and longlines (Brownell et al., 2019, Fader et al., Kiszka et al., 2021, Peltier et al.) is the most significant threat to many populations. Although the magnitude of this problem has been quantified in several industrial fisheries (Lewison et al., 2014), there are still major knowledge gaps on the impact of bycatch in small-scale fisheries globally. This is particularly the case in emerging nations where coastal fisheries are critical for food security, and where small cetacean bycatch is a major issue (Temple et al., 2021). These fisheries are of particular concern since they overlap with the distribution of several species of small cetaceans that have limited population sizes and ranges. Currently, the baiji (*Lipotes vexillifer*) is most likely extinct, and 13 other species, subspecies, or populations of small cetaceans are Critically Endangered on the IUCN Red List of Threatened Species. Of these, 11 are principally threatened by bycatch in gillnets, which is the leading cause of their decline (Brownell et al., 2019). The vaquita (*Phocoena sinus*) is also likely to become extinct due to unsustainable levels of bycatch in gillnet fisheries in the northern Gulf of California (Rojas-Bracho and Reeves, 2013). While some mitigation methods to reduce bycatch have proven to be effective, such as acoustic and visual

deterrents, these are expensive or logistically challenging to use, deterring fishers from implementation (Brownell et al., 2019, Fader et al., Kiszka et al., 2021).

Exploitation for food, bait, and traditional uses remains a significant threat to small cetaceans in many countries, particularly in the Caribbean, Latin America, Asia and West Africa, where the sustainability of fisheries for small cetaceans is largely unknown (Fielding and Kiszka, Ingram et al., 2022, Secchi et al.). Coastal and freshwater development also threatens the survival of these cetaceans, particularly where there are small populations in coastal and riverine ecosystems (Avila et al., 2018), and these impacts are expected to increase in the future due to the expansion of infrastructure (e.g., dams, ports, energy production, military activities, aquaculture). Marine debris (including plastics) along with acoustic and chemical pollution are also major concerns for all populations of small cetaceans in coastal and riverine habitats (Nelms et al., 2021). Given the great interest and affinity of humans towards marine mammals, tourism and recreational boating activities now threaten the conservation status of an increasing number of small cetacean species and populations. Finally, anthropogenic climate change is an immediate threat to most dolphins and porpoises, particularly those with specialized diets and habitats, and restricted ranges (Silber et al.).

Research gaps for improved conservation and management

Despite decades of research, significant gaps remain in our understanding of the population biology, ecology, behavior and threats to small cetaceans. This is particularly the case in the coastal waters of emerging nations where endangered species and populations occur. Research efforts in these regions remain in their infancy due to limited financial and logistic capacity. In many cases internationally, species taxonomy and population structure remain unresolved, which impairs our capacity to identify appropriate spatial scales to implement conservation management strategies. A proper assessment of research needs and gaps for improved small cetacean conservation is currently needed. Currently, research priorities are often not driven by management and conservation needs, but rather by combinations of funding opportunities, access to field locations and species, and availability of expertise. However, it is safe to state that small populations of endangered species with restricted ranges require the most significant efforts, including all species of river dolphins, porpoises in Latin America and Asia, and coastal delphinids in Central and South Americas, Southeast Asia, Oceania, and along the east and west coasts of Africa (particularly of the genera *Sousa*, *Sotalia*, and *Orcaella*). Questions that are crucial for the conservation of these animals include identifying stock structure and identity, population size and dynamics, and exposure to increasing

human impacts, some of which are emerging and poorly quantified or understood.

Opportunities for conservation

Despite the challenges that many small cetacean species face globally, there are increasing efforts to improve our understanding of the magnitude of the threats to these species, and this research has been aided by remarkable advances in methods and technological capability to detect and monitor impacts. Most importantly, there have been increasing initiatives along the coasts and major rivers of emerging nations to assess the abundance, population dynamics, and species taxonomy, and threats to small cetaceans, where needs are increasingly important, and where capacity building initiatives have (thankfully) flourished. These programs will promote awareness at local, national, and international levels, and generate the baseline information needed to assess extinction risks and identify needs for management and conservation. Despite these efforts, research and management strategies appear inadequate to tackle and mitigate the most significant threats, particularly bycatch. Developing and implementing low-cost options that are acceptable to fishers remains a major challenge for the decade ahead. However, solutions do exist. Low-cost methods have been tested and implemented in a few regions to reduce bycatch in gillnets (Bielli et al., 2020; Kiszka et al., 2021). In other cases, research has informed management actions to reduce impacts from tourism (e.g., Fumagalli et al.). Together, the papers gathered in this Research Topic show that the call for more research on small cetaceans is being answered at a rapidly gathering pace and that this work is now providing key insights into the opportunities for conservation of these species.

Author contributions

JK prepared the first draft of the manuscript and created Figure 1. All authors contributed with edits, and approved the final version of this Editorial.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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