



OPEN ACCESS

EDITED AND REVIEWED BY
Mark Meekan,
University of Western Australia, Australia

*CORRESPONDENCE

Léa David

✉ lea.david2@wanadoo.fr

Roberto Carlucci

✉ roberto.carlucci@uniba.it

RECEIVED 02 January 2024

ACCEPTED 31 January 2024

PUBLISHED 06 February 2024

CITATION

David L, Akkaya A, Arcangeli A, Gauffier P, Mazzariol S, Vighi M and Carlucci R (2024) Editorial: Risks, threats, and conservation status of cetaceans in the Mediterranean and Black Seas.

Front. Mar. Sci. 11:1364527.

doi: 10.3389/fmars.2024.1364527

COPYRIGHT

© 2024 David, Akkaya, Arcangeli, Gauffier, Mazzariol, Vighi and Carlucci. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Editorial: Risks, threats, and conservation status of cetaceans in the Mediterranean and Black Seas

Léa David^{1*}, Aylin Akkaya², Antonella Arcangeli³,
Pauline Gauffier⁴, Sandro Mazzariol⁵,
Morgana Vighi⁶ and Roberto Carlucci^{7*}

¹EcoOcéan Institut, Montpellier, France, ²DMAD-Marine Mammals Research Association, Istanbul, Türkiye, ³ISPRA Italian National Institute for Environmental Protection and Research, Roma, Italy, ⁴Madeira Whale Museum, Caniçal, Madeira, Portugal, ⁵Department of Comparative Biomedicine and Food Science (BCA), University of Padua, Legnaro, Italy, ⁶Department of Evolutionary Biology, Ecology and Environmental Sciences, Faculty of Biology, University of Barcelona, Barcelona, Spain, ⁷Department of Bioscience, Biotechnologies and the Environment, Bari, Italy

KEYWORDS

cetacean, Mediterranean Sea, Black Sea, collision, distribution, disease, maritime traffic, genetic structure

Editorial on the Research Topic

Risks, threats, and conservation status of cetaceans in the Mediterranean and Black Seas

Together, the Mediterranean Sea and the Black Sea cover less than 1% of the oceans' surface, but constitutes one of the most important hotspots of biodiversity at a global scale. Unfortunately, they are also amongst the most impacted ecoregions as a result of anthropogenic pressures on coastal and offshore ecosystems that threaten many species (Coll et al., 2010; Avila et al., 2018). Conservation of cetaceans in these basins is a critical issue, as these top-order animals structure ecosystems through trophic cascades, and aid the maintenance of marine food web stability (Schwarz Müller et al., 2015). However, current information about the conservation status of cetaceans is fragmented and requires assessments at geographical scales sufficiently large enough to encompass the movement patterns of these mobile species (ACCOBAMS, 2021). The Research Topic "Risks, threats, and conservation status of cetaceans in the Mediterranean and Black Seas" addresses this issue by presenting 14 studies on subjects including distribution and ecology, genetic structure of populations and major threats including maritime traffic, interaction with fisheries, contaminants and diseases. Together, this research contributes to a better understanding of the relatedness, status and impact of human activities on populations of cetaceans within the region.

Knowledge of keyhabitats where cetaceans exhibit essential activities is central to the optimization of conservation strategies. Five papers in this Topic identified these habitats by exploring the long-term stability or changes in the spatiotemporal distribution of several species over the last decade. Chicote et al. found that the submarine canyons of northern Catalonia (Spain) in the north-western Mediterranean Sea were critical habitats for Risso's dolphins (*Grampus griseus*), whereas Pace et al. found that the coastal areas off the Tuscany

and Lazio regions of Italy were important for the common bottlenose dolphin (*Tursiops truncatus*). Within the eastern basin, the southern coastal waters of Israel were found to be important for common dolphins (*Delphinus delphis*) by Mevorach et al. and the eastern Rhodes and Finike basins hosted two priority areas for deep diving cetaceans and a large area for delphinids off Türkiye (Awbery et al.). A statistical analysis using a spatial log-Gaussian Cox Process was used by Pace et al. to highlight the persistent presence of bottlenose dolphins in the same coastal areas both in winter and summer. Similarly, Mevorach et al. employed photo-identification to show the long-term site fidelity and residency of a critically endangered population of common dolphins, with a recent decline in abundance of this species. In contrast, a statistical analysis using generalized additive models by Chicote et al. showed a displacement of Risso's dolphins to more pelagic waters off Catalonia in recent years. Finally, Arcangeli et al. tested four potential indicators (the Observed Distributional Range: ODR, the Ecological Potential Range: EPR, the Range Pattern and the proportion of ODR over the EPR) to assess the range and short-term changes in habitat of three species of deep diving cetaceans that occur at low densities in trans-border fixed-transects. Changes in range were found for all three species. This combination of complementary indicators proved to be the most valuable approach to evaluate the significance of changes for highly mobile species such as cetaceans. The concurrent analysis of species with similar ecologies was found critical to determine whether the detected changes were species-specific or representative of broader trends. Combined, these five papers contribute to a better understanding the ecological preferences of cetacean species, recognize priority areas to be protected and underline the importance of monitoring changes over space and time for a better definition of conservation strategies.

Antonacci et al. explored genetic diversity in a local population of striped dolphins (*Stenella coeruleoalba*) in the northern Ionian Sea (central-eastern Mediterranean Sea) using two mtDNA markers. Their results suggested a population now in rapid expansion after a period of reduction in size and diversity, together with at least two lineages, the former shared with the overall Mediterranean population and the latter specific to the local region. They also found a potential problem of hybridization between striped and common dolphins, which needs to be further investigated, as presence of admixed individuals and human disturbances that cause hybridization can lead to genomic extinction of already threatened species or population or conservation units.

Other manuscripts in the Research Topic investigated human pressures that can affect cetacean populations locally or on a wider scale. Interaction with fisheries is one of the most predominant threats for cetaceans (Read, 2008; Avila et al., 2018; ACCOBAMS, 2021) and was the focus of four manuscripts. Two of these characterized cetacean interactions with the pelagic longline fishery for albacore tuna (*Thunnus alalunga*) based on commercial logbooks and interviews, onboard observations and stranding data, from the waters around Cyprus in the eastern Mediterranean (Papageorgiou et al.) and in all the active fisheries

operating in the region off Valencia, Spain NW Mediterranean Sea (Izquierdo-Serrano et al.). In both studies, common bottlenose dolphins and striped dolphins were the main species involved in depredation and/or bycatch, with differences between fishing gears and areas. By quantifying the economic consequences of depredation, estimating dolphin bycatch and identifying dolphin-fisheries conflict areas, they provide information to support the implementation of mitigation strategies to minimize interactions between dolphins and fisheries. The third manuscript approached the interaction of bottlenose dolphins with bottom trawlers near the River Tiber estuary (Italy, NW Mediterranean Sea) from the perspective of social dynamics of individuals of this species of dolphin Pace et al. This study showed that in common bottlenose dolphin sex-specific social dynamics and interactions with anthropogenic activities may affect grouping and induce changes in relationships between individuals. Indeed, females show stronger association compared to any other individuals while individuals interacting with fisheries (only rarely females with calves) showed weaker and short-term associations. This suggested that social and ecological drivers that can influence individual pattern of association were essential aspects affecting animals' responses to both human-related pressures and conservation strategies. Finally, Carlucci et al. applied a multi-species bio-economic approach to estimate the characteristics of the Otter Trawl Bottom fishery in potential cetacean conservation areas (CCAs) and fishing grounds in the northern Ionian Sea, adopting the quantitative model SMART (Spatial Management of demersal Resources for Trawl fisheries). The results showed that spatial fishing restrictions due to the establishment of CCAs would have no or negligible effects on trawlers, highlighting the importance of considering spatially integrated information during the designation of CCAs, following the principles of ecosystem-based management.

Maritime traffic and ship strike, another major threat for cetaceans (Pennino et al., 2017; David et al., 2022), was studied in two important cetacean habitats. Castro et al. estimated the monthly risk of ship strikes for fin whales (*Balaenoptera physalus*) in a seasonal feeding aggregation area off the Catalan coast, Spain (NW Mediterranean Sea) that overlaps with major shipping lanes. On the other side of the basin, Awbery et al. delineated potential risk areas in the eastern Mediterranean Sea off Türkiye, where high cetacean encounter rates and dense maritime traffic overlap. In both cases, mitigation of collision risk will require active management actions including rerouting of shipping outside the habitat and/or reducing vessel speed.

Finally, three manuscripts in the Research Topic addressed the widespread threat contaminants (Van Bresseem et al., 2009) and their connection with diseases. Giovani et al. brought new insights about the toxic potential of the chemical additives released by plastic debris, by exposing dolphin cell cultures to increasing doses of one of the most used plasticizer in plastic production, the di(2-ethylhexyl)phthalate DEHP. The results indicate that potential chromosome loss could constitute a threat for marine mammals that are constantly exposed to plastic marine litter. Romani-Cremaschi et al. suggested that the chronic parasitic infestation and the immunosuppressive effects of organochlorine

contaminants were likely to have compromised the health of a Cuvier's beaked whale (*Ziphius cavirostris*). They argued this, predisposed the whale to an opportunistic bacterial infection, leading to the first described case of bacterial septicemia with central nervous system involvement in a wild cetacean due to infection by *Morganella morganii*. Infections of this bacteria also occur in humans. Similarly, Morick et al. reported infection by the bacteria *Streptococcus agalactiae* in a stranded common dolphin in Israel. This is the first published report of an infection by this pathogen in a common dolphin, with the potential for dispersion throughout the Mediterranean subpopulation, which is already endangered.

With an overall number of 14 manuscripts, this Research Topic brings together a wide range of research spread throughout the Mediterranean Sea.

Author contributions

LD: Writing – original draft, Writing – review & editing. AAK: Writing – review & editing. AAR: Writing – review & editing. PG: Writing – review & editing. SM: Writing – review &

editing. MV: Writing – review & editing. RC: Writing – review & editing.

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.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

- ACCOBAMS. (2021). *Conserving whales, dolphins and Porpoises, in the Mediterranean Sea, Black Sea and adjacent area: an ACCOBAMS status report*. Eds. N. di Sciara and A. M. Tonay (Monaco: ACCOBAMS).
- Avila, I. C., Kaschner, K., and Dormann, C. F. (2018). Current global risks to marine mammals: Taking stock of the threats. *Biol. Conserv.* 221, 44–58. doi: 10.1016/j.biocon.2018.02.021
- Coll, M., Piroddi, C., Steenbeek, J., Kaschner, K., Ben Rais Lasram, F., Aguzzi, J., et al. (2010). The biodiversity of the mediterranean sea: estimates, patterns, and threats. *PLoS One* 5 (8), e11842. doi: 10.1371/journal.pone.0011842
- David, L., Arcangeli, A., Tepsich, P., Di-Meglio, N., Roul, M., Campana, I., et al. (2022). Computing ship strikes and near miss events of fin whales along the main ferry routes in the Pelagos Sanctuary and adjacent west area. *Aqua. Conserv.* 32, 442–456. doi: 10.1002/aqc.3781
- Pennino, M. G., Arcangeli, A., Prado Fonseca, V., Campana, I., Pierce, G. J., Rotta, A., et al. (2017). A spatially explicit risk assessment approach: Cetaceans and marine traffic in the Pelagos Sanctuary (Mediterranean Sea). *PLoS One* 12, e0179686. doi: 10.1371/journal.pone.0179686
- Read, A. J. (2008). The looming crisis: interactions between marine mammals and fisheries. *J. Mammalogy* 89 (3), 541–548. doi: 10.1644/07-MAMM-S-315R1.1
- Schwarz Müller, F., Eisenhauer, N., and Brose, U. (2015). 'Trophic whales' as biotic buffers: weak interactions stabilize ecosystems against nutrient enrichment. *J. Anim. Ecol.* 84, 680–691. doi: 10.1111/1365-2656.12324
- Van Bresseem, M., Raga, J. A., Di Guardo, G., Jepson, P. D., Duignan, P. J., Siebert, U., et al. (2009). Emerging infectious diseases in cetaceans worldwide and the possible role of environmental stressors. *Dis. Aquat. organisms* 86 (2), 143–157. doi: 10.3354/dao02101