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Editorial: The ACCOBAMS Survey Initiative (ASI): implementing large scale surveys for marine megafauna in the Mediterranean and Black Seas

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Editorial on the Research Topic
The ACCOBAMS Survey Initiative (ASI): implementing large scale surveys for marine megafauna in the Mediterranean and Black Seas

In recognizing the need for robust data on the conservation status of cetacean populations in the Mediterranean ecosystem, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) proposed a synoptic survey of the entire region, the ACCOBAMS Survey Initiative (hereafter 'ASI'). The ASI was planned as a multi-species survey, collecting data on cetaceans and other large marine vertebrates, such as sea turtles, sharks and rays and marine birds. The survey consisted of an aerial component covering most of the Agreement area, whereas a vessel-based component was implemented in areas expected to be important for deep diving cetaceans. The core aim of the ASI was to estimate the abundance and determine the distribution of cetaceans and other marine megafauna in the Mediterranean and Black seas. Panigada et al. present a summary of the visual line-transect distance sampling aerial surveys, which covered 77% of the Mediterranean Sea to monitor all the relevant Mediterranean habitats and the species therein. The aerial component of the ASI occurred between June and August 2018. Overall, eight planes monitored more than 55,000 km along predetermined transects, from the Gulf of Cadiz to the west to the Israeli coast in the east, over an area of almost 2 million km². Cañadas et al. present a thorough description of summer distributions and densities of cetaceans, underlining a strong longitudinal gradient, from low densities in the east to high densities in the west, a pattern shared by most cetaceans. Paiu et al. present the results of the aerial surveys conducted in the Black Sea in 2019, completed under the umbrella of the ASI, within the framework of the CeNoBS project "Support MSFD implementation in the Black Sea

through establishing a regional monitoring system of cetaceans (D1) and noise monitoring (D11) for achieving GES". These aerial surveys yielded the first insights into overall abundance, density and distribution, providing regional baseline values and density maps for all three species of cetacean (*Delphinus delphis ponticus*, *Tursiops truncatus ponticus*, *Phocoena phocoena relicta*) in the Black Sea during the summer months, to be used for the elaboration of effective conservation measures and to address national and international requirements (e.g., achieving and maintaining GES (Good Environmental Status), and national conservation plans for cetaceans). Boisseau et al. summarize the results of ship-based visual and acoustic distance sampling surveys, focusing on those areas known or expected to be important for deep-diving species (sperm whales *Physeter macrocephalus* and Cuvier's beaked whales *Ziphius cavirostris*), as well as to survey those areas for which it was not possible to carry out aerial surveys. Lerebourg et al. used acoustic data to model habitats of sperm whales to fill knowledge gaps on distribution of the species in the Mediterranean Sea. These models highlighted a higher concentration of sperm whales in the western basin and the Ionian Sea along the Hellenic Trench, than in the eastern basin in summer. DiMatteo et al. analyzed data on marine turtles collected during the ASI effort and combined them with data collected between 2003 and 2018 to estimate distribution and abundance throughout the Mediterranean Sea.

The ASI was also an opportunity to develop or refine tools and methodologies. Nivière et al. developed an *ad-hoc* open-source plugin (PelaSIG) for QGIS 3 to facilitate and standardise the different steps before and after distance sampling surveys. The plug-in comprises tools for survey preparation, automatic data checking, visualisation and presentation of survey effort and sightings and is designed to process aerial datasets collected with the dedicated SAMMOA software, during marine megafauna surveys. The paper analyzed the use of the plug-in with the dataset from the aerial component of the ASI, using a multi-target protocol. Ollier et al. matched visual and acoustic events recorded in a double platform setting during the vessel-based component of the ASI to estimate visual and acoustic detection probabilities for small cetaceans in the Mediterranean Sea. Their results illustrate how passive acoustic monitoring can be used as an independent platform in Mark-Recapture Distance Sampling (MRDS) to estimate the detection probability, highlighting the importance of using dual-platform vessel surveys to estimate detection probability, and improve robustness of abundance estimates. Sol et al. analyzed temporal patterns in acoustic detections of small delphinids in the western Mediterranean. They highlighted a strong diel rhythm with as much as five times more detection during the night than during the day. The authors discussed putative ecological mechanisms underlining these patterns and recommended that these patterns should be considered when estimating dolphin abundance from acoustic detections collected during both day and night.

Finally, the ASI allowed the assessment of several anthropogenic stressors that are of major conservation concern for cetaceans and other marine megafauna. Popov et al. overlapped bycatch rates in the Black Sea with robust abundance estimates made during the CeNoBS project, confirming that bycatch poses the most serious threat to harbour porpoises in the Black Sea, and stressing the

urgent need for implementation of mitigation measures to reduce bycatch immediately in order to allow the population to survive in the basin. The CeNoBS project also allowed Frassà et al. to investigate the habitat preferences of the three subspecies of cetacean in the Black Sea, with the aim of developing habitat models to estimate the probability of their presence and using the habitat models in support of environmental status assessments in relation to human stressors, such as shipping noise. The ASI effort also allowed the collection of data on marine debris, which can have harmful effects on marine mammals through both entanglement and ingestion (Deudero and Alomar, 2015). Lambert et al. (2020) provide the first abundance estimate of floating mega-debris in the Mediterranean and mapped distributions at the basin-wide scale. Perna et al. analysed presence and abundance data of cetaceans in relation to marine plastic litter – collected through the Plastic Busters MPAs (PB MPAs) project – to assess the risk of exposure for cetaceans to this growing threat.

Initially developed to improve knowledge of cetaceans in the ACCOBAMS area, the ASI has been also crucial to fulfil European Union (EU) Regulations and Directives, specifically the Habitats Directive and the Marine Strategy Framework Directive (Authier et al., 2017), as well as other relevant instruments, including, but not limited to, the "Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" of the Barcelona Convention, the "Convention on the Protection of the Black Sea Against Pollution" known as the Bucharest Convention, the "Convention on the Conservation of Migratory Species and Wild Animals" (also known as CMS or Bonn Convention), and the "Berne Convention on the Conservation of European Wildlife and Natural Habitats". The ASI survey is the first step towards establishing a long-term monitoring program across the entire ACCOBAMS area, and, as such, it creates the environment for further basin-wide monitoring efforts using systematic, shared, coordinated and comparable methods in the future. The information gathered will further enhance knowledge of cetacean status, facilitating the development of informed measures for conservation and mitigation, as well as supporting the implementation of the above-mentioned international obligations. Furthermore, the outcomes of this survey will support both place- and threat-based conservation efforts in the ACCOBAMS area, through the identification of Important Marine Mammal Areas (IMMAs) and Cetacean Co-occurrence with Human activities (CCH).

Author contributions

SP: Writing – original draft, Writing – review & editing. NB: Writing – original draft, Writing – review & editing. OB: Writing – original draft, Writing – review & editing. AAÖ: Writing – original draft, Writing – review & editing. VR: Writing – original draft, 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.

Publisher's note

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