CLIMATE CHANGE AND CETACEANS – INFORMATION DOCUMENT

Issue: Climate change

Background

During MOP8, Parties requested the Scientific Committee to contribute to regional initiatives on climate change, in particular by liaising with relevant CMS Working Group.

Climate Change and Cetaceans – information document

Mark Simmonds, CoP-Appointed Councillor, CMS and Laetitia Nunny, Senior Science Officer, OceanCare

1. Literature Review

Further to the paper provided to the last meeting of the ACCOBAMS Scientific Committee on climate change and cetaceans[1] and summarised here in figure 1, a limited literature review was conducted for the last few years using Web of Science and some selected new publications are noted here in Annex.

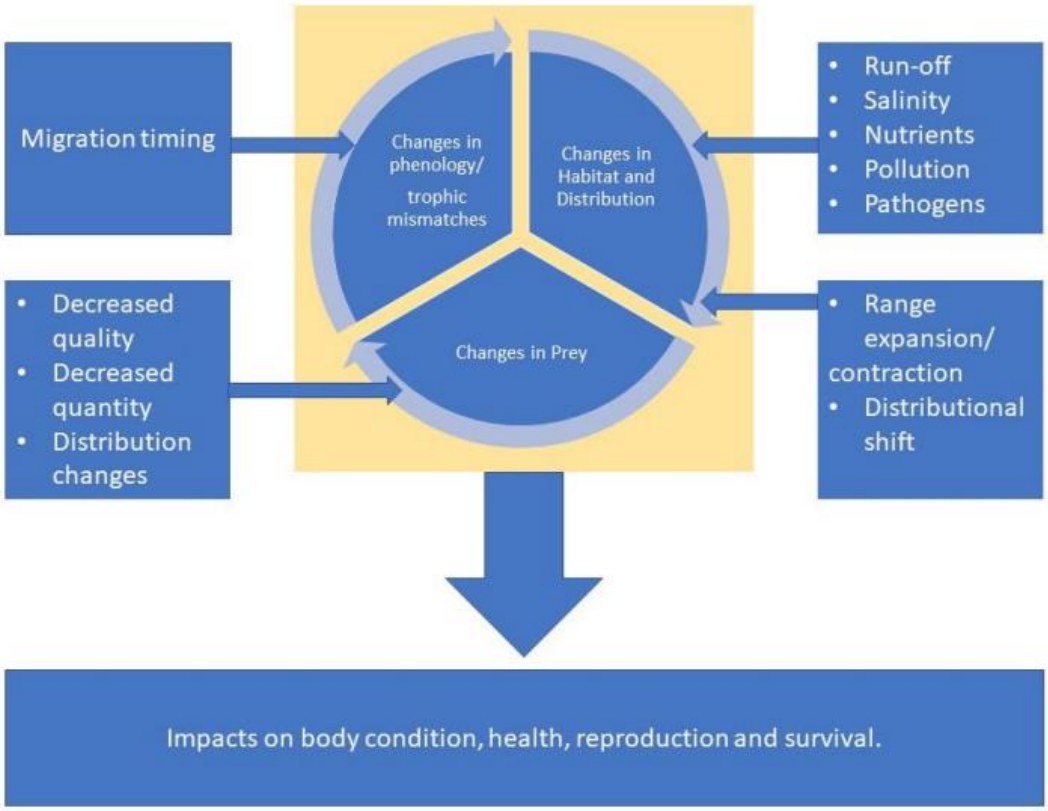

Figure 1: Climate change and cetaceans - some of the main interlinkages and key factors based on the available scientific literature.

2. CMS Workshop

The CMS Secretariat, together with the Government of the United Kingdom, is organising an expert workshop on migratory species and climate change. The meeting will take place in person from Tuesday 11th to Thursday 13th February 2025 in Edinburgh, United Kingdom. Virtual participation is also available.

This Workshop is held under the auspices of the Convention on the Conservation of Migratory Species (CMS). It implements Decision 14.214 i) of the Fourteenth Meeting of the Conference of the Parties to CMS (COP14) to convene an international in-person workshop on migratory species.

[1] Sandra Striegel, Laetitia Nunny and Mark P. Simmonds 2022. An update on the implications of climate change for cetaceans - with a particular focus on the Mediterranean. Paper submitted to the Scientific Committee of the IWC. 29 pages. SC/69A/E/07 Seahttps://archive.iwc.int/pages/download.php?ref=19985&ext=pdf&alternative=6392&noattach=true&k=

The workshop will consider elements identified by COP14 under Decision 14.214 b)-h) on the basis of an update of the report *'Climate change and migratory species: a review of impacts, conservation actions, indicators and ecosystem services'* published in 2023.

The workshop will focus on:

- Identification of migratory species likely to be negatively impacted by climate change, especially those that are in need of human-mediated interventions, such as translocations
- Discussions around species that have a high probability of changing their migration routes because of climate change, and the connectivity options available to them
- Case studies of the role of migratory species in maintaining and enhancing climate change mitigation and adaptation, as well as other related ecosystem services
- Solutions to the issues, and actions that could help migratory species shift ranges (e.g. Nature-based solutions and Ecosystem-based adaptations), as well as synergies (alignment with Kunming-Montreal Global Biodiversity Framework), gaps and priorities for action.

The meeting will be held in English only.
The draft agenda is available here: https://www.cms.int/en/document/draft-agenda-5

There will be one session focused on cetaceans and the IWC Intersessional Correspondence Group on Climate Change will be presenting information. ACCOBAMS might seek to contribute to this process.

Annex

Some recent papers that are relevant to climate change in the agreement area.
This list is not meant to be exhaustive.

1.

Ben Chehida, Y., Stelwagen, T., Hoekendijk, J. P. A., Ferreira, M., Eira, C., Torres-Pereira, A., Nicolau, L., Thumloup, J., & Fontaine, M. C. (2023). Harbor porpoise losing its edge: Genetic time series suggests a rapid population decline in Iberian waters over the last 30 years. *Ecology and Evolution*, 13: e10819. https://doi.org/10.1002/ece3.10819

"Impact of climate change is expected to be especially noticeable at the edges of a species' distribution, where they meet suboptimal habitat conditions. In Mauritania and Iberia, two genetically differentiated populations of harbor porpoises (*Phocoena phocoena*) form an ecotype adapted to local upwelling conditions and distinct from other ecotypes further north on the NE Atlantic continental shelf and in the Black Sea. By analyzing the evolution of mitochondrial genetic variation in the Iberian population between two temporal cohorts (1990–2002 vs. 2012–2015), we report a substantial decrease in genetic diversity. Phylogenetic analyses including neighboring populations identified two porpoises in southern Iberia carrying a divergent haplotype closely related to those from the Mauritanian population, yet forming a distinct lineage. This suggests that Iberian porpoises may not be as isolated as previously thought, indicating possible dispersion from Mauritania or an unknown population in between, but none from the northern ecotype. Demo-genetic scenario testing by approximate Bayesian computation showed that the rapid decline in the Iberian mitochondrial diversity was not simply due to the genetic drift of a small population, but models support instead a substantial decline in effective population size, possibly resulting from environmental stochasticity, prey depletion, or acute fishery bycatches. These results illustrate the value of genetics time series to inform demographic trends and emphasize the urgent need for conservation measures to ensure the viability of this small harbor porpoise population in Iberian waters.

2

Ingrosso, M., Tintoré, B., Cipriano, G., Ricci, P., Grandjean, T., Tsimpidis, T. et al. (2024). Environmental variables influencing occurrence and distribution of *Delphinus delphis* in the eastern Aegean Sea (eastern Mediterranean Sea). *Aquatic Conservation: Marine and Freshwater Ecosystems*, 34(1): e4031. https://doi.org/10.1002/aqc.4031

"...The study confirms that long-term time series of satellite-derived data are useful to assess the occurrence and the spatial distribution of *D. delphis*, suggesting the need for a better understanding of the influence of these environmental factors especially in the framework of climate changes. Outcomes highlight the need to test further variables and further methods in order to provide increasingly reliable results in view of the conservation measures that must be adopted to stop or reduce the degree of pressure to which these species are subjected."

3

La Manna, G., Ronchetti, F., Perretti, F. & Ceccherelli, G. (2023). Not only wide range shifts: Marine warming and heat waves influence spatial traits of a mediterranean common bottlenose dolphin population. *Estuarine, Coastal and Shelf Science*, 285: 108320, https://doi.org/10.1016/j.ecss.2023.108320.

"...The increase in sea surface temperature (SST) negatively influenced both dolphin occurrence and group size in the study area. Furthermore, regardless of the sex and social unit to which the animals belong, in July–September 2017–2020 individual home range size increased threefold (on average from 5 to 15 km^2) compared to 2013–2016, when SST was on average 1.34 °C lower and MHWs shorter of 29 days/year. These results can help forecasting the range of consequences of warming effects and to assist local management efforts, in terms of marine protected areas design and management, suggesting that an integrated multi-level approach that examines the influence of warming on dolphin spatial traits together with the abundance and distribution of prey populations and ecological status of foraging habitats (such as the seagrass beds) could be useful in mitigating the effects of climate change on coastal dolphins."

4

Ricci, P., Serpetti, N., Cascione, D., et al. (2023) Investigating fishery and climate change effects on the conservation status of odontocetes in the Northern Ionian Sea (Central Mediterranean Sea). *Ecological Modelling* 485: 110500. https://doi.org/10.1016/j.ecolmodel.2023.110500

"…. A calibrated time-dynamic model (Ecopath with Ecosim) was developed to investigate the effects on the odontocetes and their main prey in the Northern Ionian Sea (Central Mediterranean Sea), according to changes in trawl fishery and primary productivity. In particular, the food web of the Gulf of Taranto (GoT) is described by 51 functional groups (FGs), with four odontocetes (striped, common bottlenose, Risso's dolphin and sperm whale) represented as a single FG, and 5 fishing fleets. The calibration of the Ecosim model was carried out during the period 2009–2018 using a combination of automatic and manual fitting procedures. Changes in trawling fishing effort (increases, reductions and bans) and in primary production were tested in the period until to 2040 to detect the effect on the biomass of odontocetes and their main prey. The cumulative effects of the two drivers were assessed using an Interaction Effect Index. Fishery showed negligible effects on all odontocetes, with the exception of the common bottlenose dolphin which respond in a negative way to an increase in fishing effort. The reduction in top-predators due to fishing seems to lead to a reduction in predation pressure on meso-consumers, and thus to an increase in predation pressure on basal prey. Similarly, the bottom-up effect due to increased primary production tends to be diluted towards the top of the trophic network, with slight effects on odontocetes. The trophic interaction pattern tends to mediate the effects tested in the model with a variety of different outcomes on prey. The application of the interaction effects index could contribute to disentangling the effects of fishing and climate on the food web, providing information to address the analysis required by the SDG 14 targets."

5

Chatzimentor, A., Doxa, A., Katsanevakis, S. & Mazaris, A.D. (2023). Are Mediterranean marine threatened species at high risk by climate change? *Global Change Biology*, 29:1809–1821. https://doi.org/10.1111/gcb.16577

"…Here, we employ a trait-based approach to assess the risk of 90 threatened marine Mediterranean species to climate change, combining species' exposure to increased sea temperature and intrinsic vulnerability. One-quarter of the threatened marine biodiversity of the Mediterranean Sea is predicted to be under elevated levels of climate risk, with various traits identified as key vulnerability traits. High-risk taxa including sea turtles, marine mammals, Anthozoa and Chondrichthyes are highlighted. Climate risk, vulnerability and exposure hotspots are distributed along the Western Mediterranean, Alboran, Aegean, and Adriatic Seas. At each Mediterranean marine ecoregion, 21%–31% of their threatened species have high climate risk. All Mediterranean marine protected areas host threatened species with high risk to climate change, with 90% having a minimum of 4 up to 19 species of high climate risk, making the objective of a climate-smart conservation strategy a crucial task for immediate planning and action. Our findings aspire to offer new insights for systematic, spatially strategic planning and prioritization of vulnerable marine life in the face of accelerating climate change."