

# **Vulnerability Assessment Of Critical Cetacean Habitats Offshore Mauritius For Marine Spatial Planning Applications**

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## **Submission: Background**

The dynamic development of projects related to the territorial waters exploitation of Small Island Developing States (SIDS), such as Mauritius, requires a clear understanding of the location of ecologically sensitive areas for their integration into Marine Spatial Planning (MSP). Critical habitats for marine mammals, especially resident populations, are one type of area that demands priority protection.

Mauritius is part of the Mascarene Islands, a recognized Important Marine Mammal Area (IMMA), where about a quarter of the currently living cetacean species can be found. For the past few years, the national institutions of Mauritius have noted the lack of data on marine mammals in the high seas for effective management and biodiversity conservation. This problem was further highlighted by the mass stranding of melon-headed whales in August 2020, when more than 50 individuals died and about 200 individuals survived the tragic event, although many of them showed injuries, and which was not the first such event in the same area. That was a trigger for this study, which aims to obtain up-to-date data on species diversity, the spatial and temporal distribution of cetaceans around Mauritius, identify critical habitats and assess their vulnerability to anthropogenic activities with mapping of ecologically sensitive areas for marine mammals, that can help to improve conservation management.

The study was carried out with the Mauritius authorities' permission, funded by the Mauritius Research and Innovation Council (MRIC) and private donations.

## **Method**

Data on the cetacean species and the presence of potential threats, were collected through boat-based visual and acoustic observations from March 1st, 2021 to March 1st 2022. During this period 4 research expeditions of 10 days each were conducted, 2 expeditions in each season (Summer, Winter), an effort of 2,946 km. Given that most of the cetacean species previously recorded in the Mascarene Islands are offshore, the research effort focused on areas with depths greater than 200 m with steep slopes and/or seamounts and canyons rich in food. The capture-recapture method and association index calculation were used to determine the likelihood of the populations being resident. The vulnerability assessment of cetacean habitats was conducted by spatial analysis using mapping of ecologically sensitive areas for marine mammals, the distribution and intensity of anthropogenic

activities that are potential sources of risk to cetaceans, considering the sensitivity of cetacean species to various threat attributes.

## **Results**

The total area covered by the survey was in average 3,025 km<sup>2</sup>, which is about 40% of the target study area around the main island of Mauritius. A total of 96 cetacean sightings and 2,390 individuals were recorded during the period. The encounter rate was 0.023 in summer and almost double in winter or 0.042 sightings per km, which may indicate the influence of seasonality on cetacean presence in Mauritius waters. Twelve species of cetaceans were recorded, the most sighted species being Sperm whale (*Physeter macrocephalus*) 35% sightings and Spinner dolphin (*Stenella longirostris*) 11%. Fraser's dolphin (*Lagenodelphis hosei*) was recorded in Mauritian waters for the first time and were seen in 4% of all sightings. The Shannon biodiversity index was  $H'=1.65$ . This is twice the value ( $H'=0.83$ ) calculated from a study conducted in the coastal waters of Mauritius in 2013-2014, but 13% lower than the value ( $H'=1.9$ ) obtained from the 2009-2010 study in the exclusive economic zones of Réunion Island and Mauritius.

The hypothesis of the presence of important habitat for melon-headed whales in eastern Mauritius was confirmed: the survey of the proposed area showed the presence of whales on 100% of survey days (9 out of 9 days), regardless of season and time of day. A total of 272 captures of the species and 62 recaptures (23%) were recorded. Although no recaptures of the same individuals were recorded on all consecutive survey days, given the close social relationships between individuals of this species, analysis showed that the same group, occurred in at least 75% of observations days of this species. But during the study period, no single recapture of 40 captured individuals surviving stranding events in 2020 was recorded. All this may indicate both the presence of resident pods and other pods visiting Mauritian waters. Taking both of these factors into account, the results showed the presence of important habitat for melon-headed whales on the east of Mauritius and that at least one pod of about > 100 individuals appeared to be resident.

The mapping of ecologically sensitive areas for marine mammals and an assessment of the vulnerability of their habitat to human activity showed that cetaceans occur in an area of at least 1,400 km<sup>2</sup>, which is about 20% of the target area, and that about 90% of the habitat was exposed to at least one anthropogenic threat, and over 25% had a medium or high cumulative impacts.

## **Conclusion**

This study updated data on species diversity in Mauritius and filled gaps in the spatial distribution of cetaceans, including confirming the presence of important habitat for melon-headed whales and indication of a resident population. The results showed that although the diversity of cetacean species off Mauritius remains high, a significant part of their habitat is of medium to high vulnerability to anthropogenic activity and requires mitigation measures. The results can serve as an important component for application in MSP tools. In order to improve conservation management and reduce cetacean mortality, it is advisable to repeat such studies, to conduct long-term monitoring of resident cetacean populations to understand trends, reinforce it by satellite telemetry to better know the movements of species, as well as to use tools to predict their presence according to different environmental factors.