Mark–recapture estimates of bottlenose dolphins on the south coast of Portugal

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Introduction

Bottlenose dolphins (*Tursiops truncatus*) are among the most frequently observed cetaceans in the Algarve - South of Portugal. However, the current knowledge about the population demographics is limited, hampering the development of effective management and conservation measures. Moreover, marine activities such as fisheries and tourism are ubiquitous in this area, which may represent a serious threat to the species' prevalence.

Methodology

The population demographics of bottlenose dolphins were assessed between 2009 and 2016 by combining photo-identification of the dorsal fins and an open population mark-recapture model based on the POPAN implementation of a Jolly-Seber model. The POPAN model was fitted using the R package Rmark to estimate bottlenose dolphins' apparent survival and annual abundance. The model-estimated parameters apparent survival, super-population size and capture probability were held constant while the parameter recruitment (i.e. probability of entry into the population) was allowed to be constant or vary by year. The optimal model was selected using Akaike's Information Criterion (AIC). We also determined the site fidelity by calculating the ratio between the number of recaptures of each individual and the number of days surveyed between the first and the last capture – Capture Rate (CR). This index ranges between 0 and 1, with 1 indicating that an individual was captured on all surveyed days from the first to its last capture.

Discussion and Conclusion

Bottlenose dolphins in the Algarve revealed low values of site fidelity suggesting that the study area may function as a transit area or migratory route. This hypothesis may partially explain the fluctuations in the estimates of annual abundances. The relatively high estimate of survival suggests that the Algarve waters offer suitable conditions for the occurrence of this species however, considering the growing exposure to anthropogenic activities the probability of dolphins' survival may be presently lower.

Results

A total of 774 sightings of bottlenose dolphins were recorded, resulting in 548 individuals being identified. The optimal model selected according to the AIC allowed the recruitment to vary between years. The annual abundance of bottlenose dolphins followed a negative trend from 2009 and 2013 decreasing the estimate from around 700 individuals to circa 200 animals. On the other hand, between 2014 and 2016 the annual abundance of bottlenose dolphins was estimated to recover to 500 individuals (Fig. 1a). The apparent survival was estimated at 0.68. Finally, the bottlenose dolphins in the Algarve revealed low site fidelity (averaged CR = 0.028), with most of the individuals detected just once (Fig. 1b).

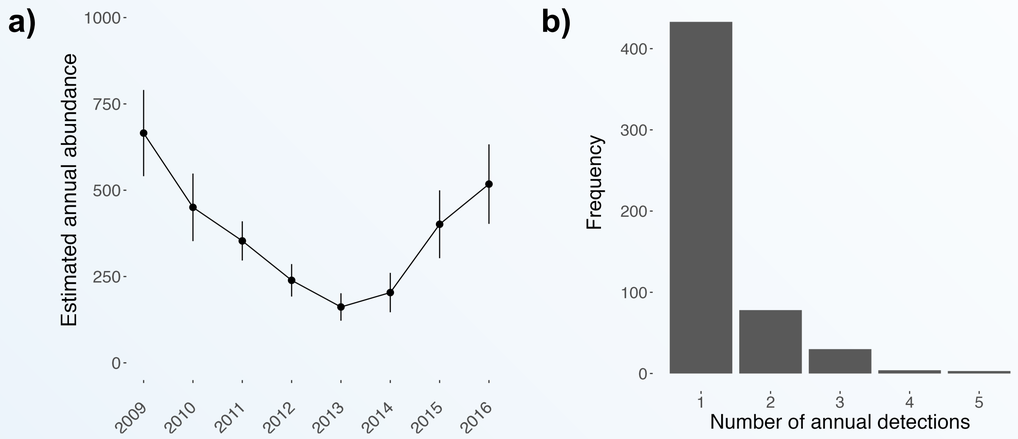

Fig. 1 – a) Population trend of bottlenose dolphins inhabiting the Algarve between 2009 and 2016. Vertical bars indicate 95% confidence intervals. b) Frequency of observation according to the number of yearly detections by individuals.

More info here!

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