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Calibration indexes for boat-based estimates of Striped dolphin (*Stenella coeruleoalba*, Meyen 1833) group size

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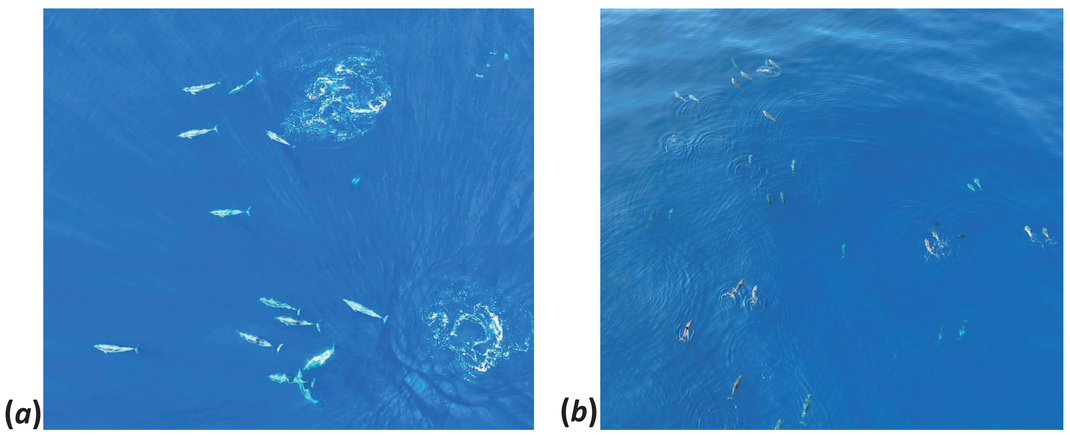
Introduction

Generating accurate dolphin group size estimates from boat-based surveys can be challenging because much of dolphin's activities occur below the water surface (Fettermann *et all*., 2022). Recent studies have highlighted that Unoccupied Aerial System (UAS) surveys can improve the accuracy of population counts and behavioural data for small cetaceans (e.g. Fiori *et al*., 2017). Using data collected by UAS, this work provides information about surfacing behaviour of striped dolphin groups, useful to set indexes for boat-based estimations of dolphin group size.

Materials and methods

Data were collected between 2017 and 2022 using a small commercial vertical take-off and landing (VTOL) UAS. Nadiral videos were collected from 42 different striped dolphin groups in the Ligurian Sea (NW Mediterranean Sea). The predominant behaviour showed by each group was classified into two behavioural state categories: socializing or travelling. For each group and behavioural state, the following parameters were calculated: (i) the average ratio of individuals in the group surfacing at any time (RI) and (ii) the inter-breath interval (IBI) of the dolphins in the group.



(*a*) (*b*)

*Striped dolphins (Stenella coeruleoalba) photographed in the Ligurian Sea during this study and illustrating (**a**) socialising and (**b**) travelling behavioural state.*

Results

The average group ratio of dolphins surfacing at any time was 0.29 (SD = 0.25; 95%CI= 0.01), however the average RI ranged from 0.19 (SD= 0.15; 95%CI= 0.01) when the group was in in travelling mode to 0.52 (SD= 0.27; 95%CI= 0.03) when it was in the socializing mode. Striped dolphins showed an IBI of 14.27 sec on average (SD= 11.75; 95%CI= 1.79) ranging from 6.04 sec (SD= 6.17; 95%CI= 3.42) when they were involved in social interactions to 14.94 (SD= 11.85; 95%CI= 1.94) when travelling.

Discussion

The data show that the dolphin behavioural state can bias boat-based estimations of dolphin group size. The average ratio of individuals in the group surfacing at any time differs when the two behavioural categories are considered. RI is higher in socializing groups than in traveling groups. In contrast, the total IBI is higher in traveling groups compared to the IBI recorded in socializing groups. This work provides a useful index to normalize boat-based estimations and it demonstrates the importance of pairing drone and boat-based information.

References

Fiori L, Doshi A, Martinez E, Orams MB, Bollard-Breen B. The Use of Unmanned Aerial Systems in Marine Mammal Research. *Remote Sensing*. 2017; 9(6):543. https://doi.org/10.3390/rs9060543

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