ESTIMATING SPERM WHALES AVAILABILITY FOR DENSITY SURVEYS

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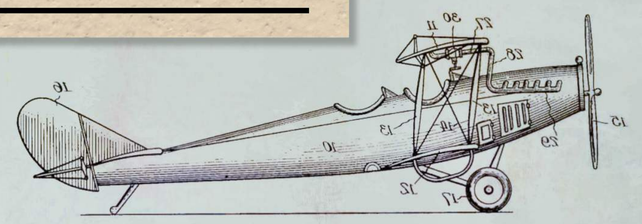
INTRODUCTION

Cetaceans' ecology presents low visual and widely variable acoustic availability, challenging density estimations. Therefore, surveys must include estimates of availability, otherwise, density will be underestimated.

Using data from tagged sperm whales (*Physeter macrocephalus*), we develop on availability for both acoustic and visual surveys.

Digital acoustic recording tag (DTAG)

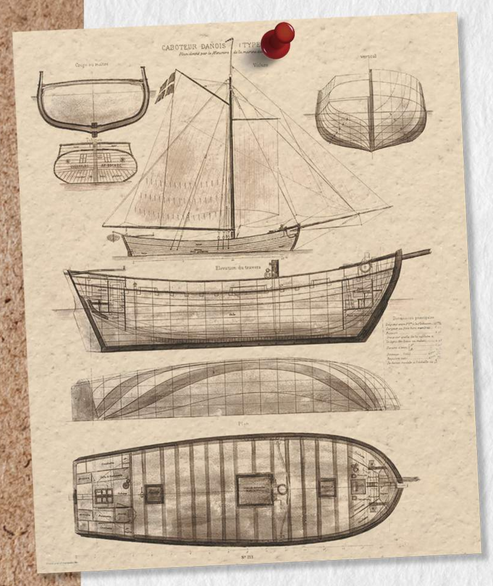
METHODS



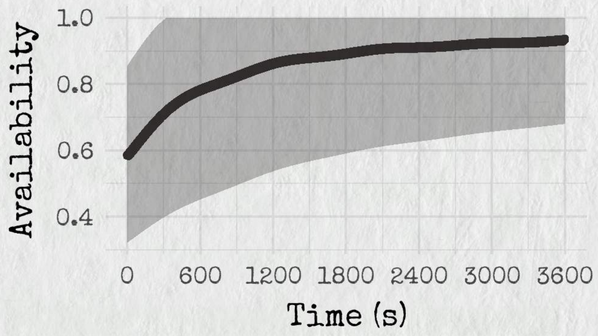
Based on 104 DTAGs, from 8 different locations over several years, we modelled availability for both visual and acoustic surveys with generalized additive models (GAMs). When available, the sex of the tagged animal was recorded.

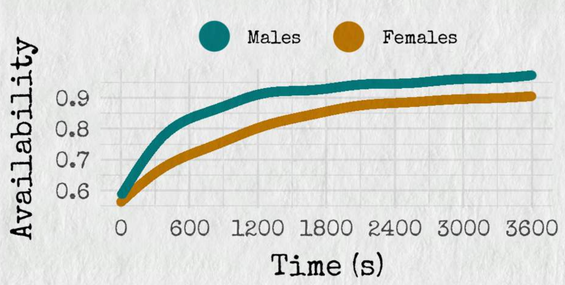
We investigate the impact of different thresholds for considering a detection on the estimated availability, namely the length of the considered acoustic snapshots, or the depth for detection from visual surveys.

RESULTS

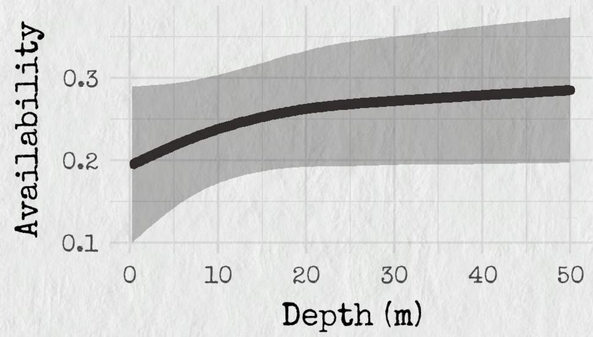


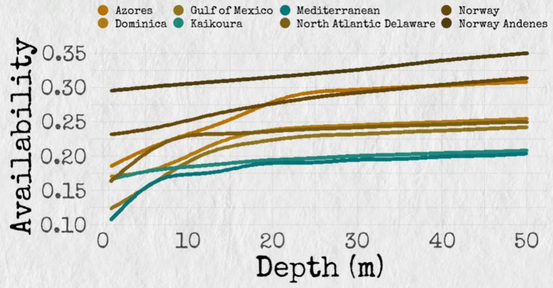
Acoustic Surveys





Visual Surveys





Instant acoustic availability is around 0.59, increasing smoothly with the duration of the snapshot up to 0.93 for a full hour.

For visual surveys, the proportion of time spent by animals in shallower depths (0-50 m) starts at 0.19 and increases up to 0.29.

Evidences were found for differences in availability between sexes, with males showing higher acoustic and lower visual availability than females, and also between locations, with whales sampled over the Atlantic being slightly less vocal and more visible than individuals sampled on the Mediterranean or the South Pacific.

DISCUSSION & CONCLUSIONS

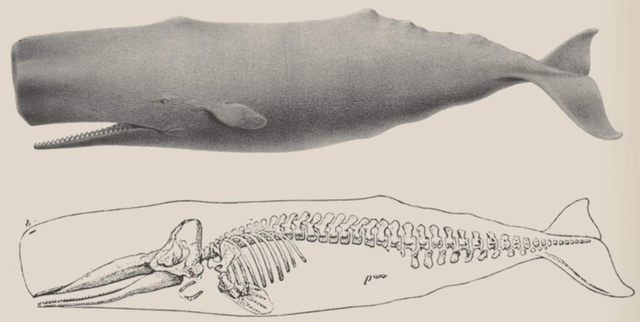
- Visual or acoustic surveys can be severely biased down if availability is ignored

- This bias can be corrected by estimating it from tag data

- Seasonal changes in sound production & diving cycles might affect availability

- Local variability is largely determined by sampling site geomorphology and ecosystem characteristics.

- If real, differences found across locations, times, or sexes, highlight the risks of considering availability estimates from other circumstances than those for the actual survey



References

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