MATCHING VISUAL AND ACOUSTIC DETECTIONS TO ESTIMATE DETECTION PROBABILITY FOR SMALL CETACEANS IN THE ACCOBAMS SURVEY INITIATIVE

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With Song of the Whales R/V

INTRODUCTION

Conservation management relies on information on abundance

Difficult to study due to detection biases

Availability bias
Do not surface
Do not vocalise

Perception bias
Imperceptible by the observer/hydrophone

To estimate absolute abundance, the detection probability must be assessed accounting for detection biases

With mark-recapture distance sampling method (MRDS)

VISUAL-ACOUSTIC DOUBLE PLATFROM
Challenging to identify duplicates

OBJECTIVES

1. Develop a method to match visual and acoustic detections.
2. Estimate detection probability accounting for detection biases.

MATERIALS & METHODS

Aerial and vessel-based surveys
Line-transect distance sampling

Large-scale survey
Mediterranean Sea

Summer 2018
Cetaceans

ACCOBAMS SURVEY INITIATIVE

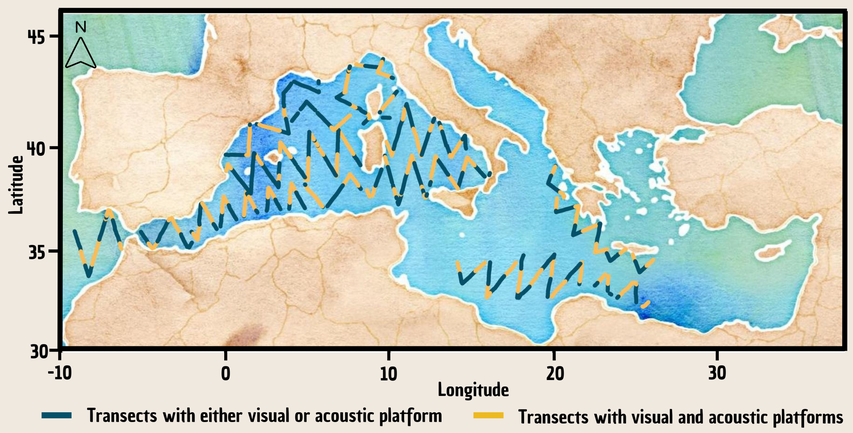
Data used in this study

Studied species
Small cetaceans

Vessel-based survey
Song of the Whale *R/V*

Double platform
Visual/acoustic data collected simultaneously

2 visual observers - on field
Towed hydrophones - post-field analysis based on echolocation clicks



HOW TO ESTIMATE DETECTION PROBABILITY p?

Line-transect distance sampling method allows to estimate detection probability p with g(0), the detection probability on the transect line, assumed to be 1. Due to detection biases, this assumption is violated. The g(0) has to be estimated.

Two independent platforms — Animals detected?

MRDS approach: Two platforms simultaneously sample an area and the number of recorded detections is compared to identify missed and duplicated detections.

This approach allows to estimate g(0) and therefore p can be estimated accounting for detection bias.

HOW TO IDENTIFY DUPLICATES ?

Decision tree

1. Are detections temporally close?
   - No = No duplicates
2. Are detections spatially close?
   - Yes = duplicates
   - No = no duplicates

Further details

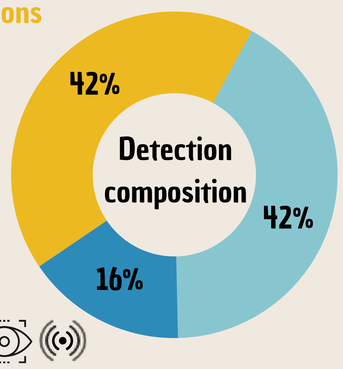
RESULTS

DECISION TREE RESULTS

Under Beaufort Sea State ≤ 4

Visual platform
80 unique detections
g(0) = 0.30
CV=0.23

Acoustic platform
79 unique detections
g(0) = 0.32
CV=0.23

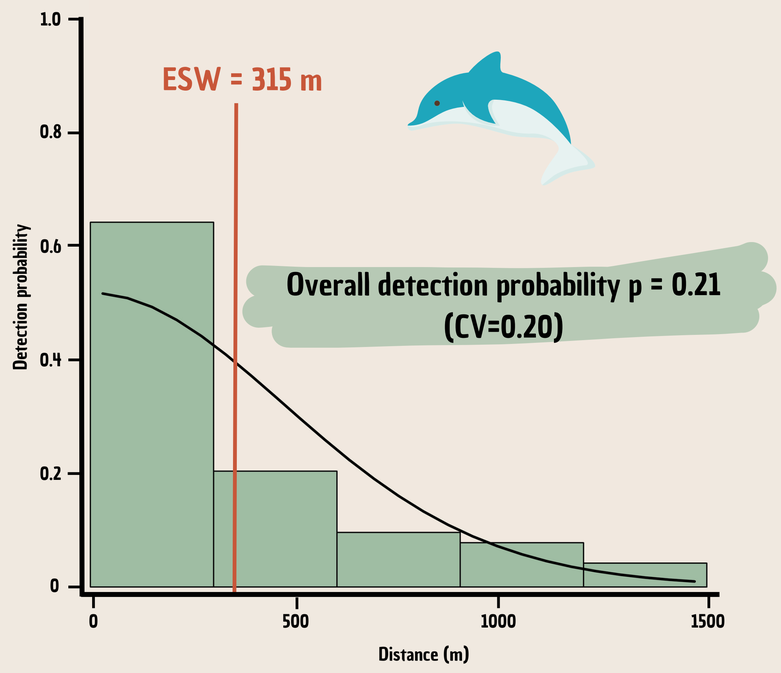


Combined platform
30 duplicated detections
g(0) = 0.51
CV=0.20

The g(0) is similar between platforms and higher when combining platforms.

MRDS DETECTION FUNCTION

Under Beaufort Sea State ≤ 4 & right truncation at 1500 m



CONCLUSIONS

Create a decision tree to match visual and acoustic detections as duplicates

Applicationf of the MRDS method

Estimation of g(0) and detection probability

TAKE HOME MESSAGE

1. Not accounting for detection biases → g(0) is assumed 1
   Accounting for detection biases → g(0) = 0.51
2. If not accounting for detection biases, total abundance underestimated by a factor of:
   2 when using and
   3 when using or
3. Important to use double-platform in surveys to estimate detection probability to improve abundance estimates and conservation efforts

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