Environmental DNA as a cetacean monitoring tool in the Northern Coast of Continental Portugal

CETUS PROJECT

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Background

- Increasing anthropogenic threats allied with cetacean research constraints lead to the urgence of finding **new sampling methods** to obtain data;
- That is where eDNA comes in, currently being an emerging complementary sampling technique for marine biodiversity monitoring programs;
- <u>END GOAL</u>: Develop and optimize a methodology that allow us to successfully **detect and identify cetacean species** present in the Northern Portuguese Coast, from water samples without associated sightings.

Methods

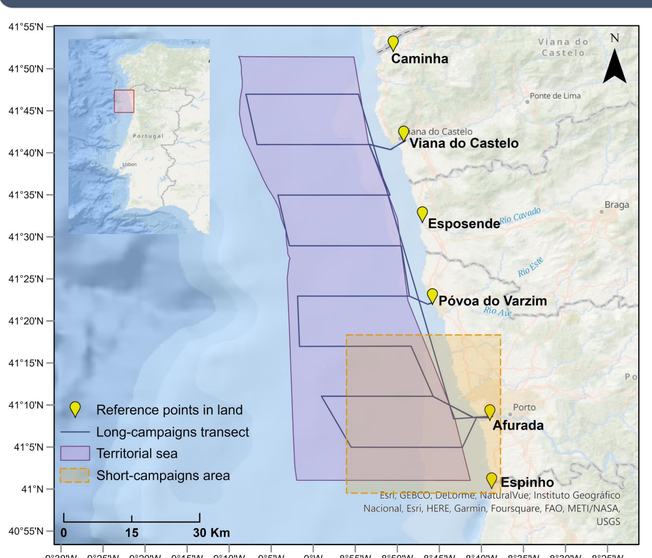

Fig.1- Study area in dedicated at-sea surveys in the Northern Portguese Coast, from Espinho to Caminha up to 10 nautical miles from coast

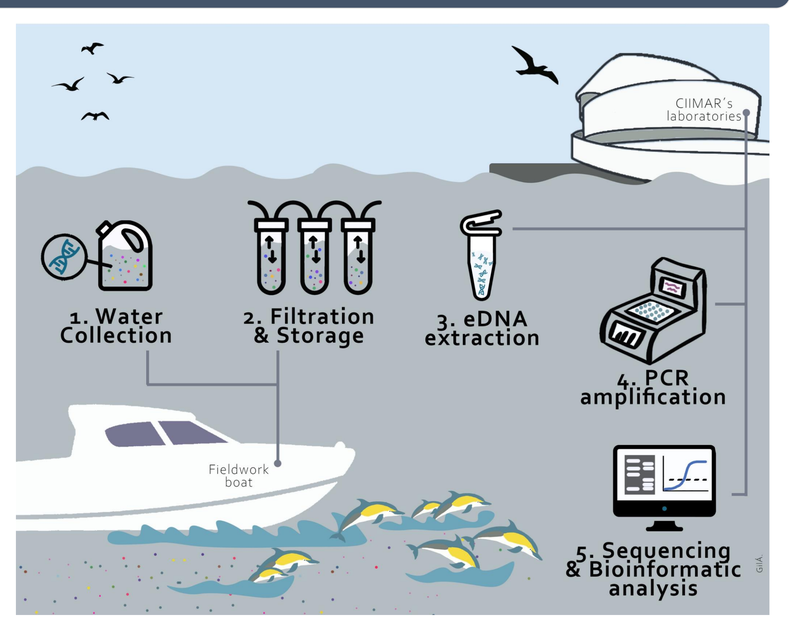

Fig.2- eDNA methodology steps applied for marine mammals monitoring

Results

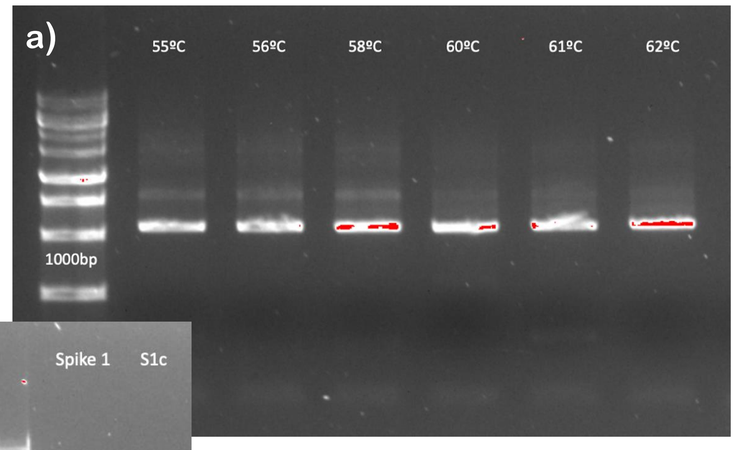

Fig.5- PCR optimization tests using TAQ Phusion polymerase in positive control samples: a) best annealing temperature (62ºC); b) DNA detection in diluted samples (S1c=5,83ng/µL)

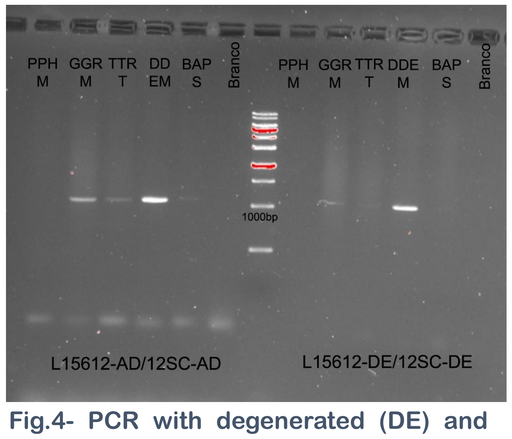

Fig.4- PCR with degenerated (DE) and adapted (AD) primers developed from the original primer set from Zerbini *et al.*, 2007

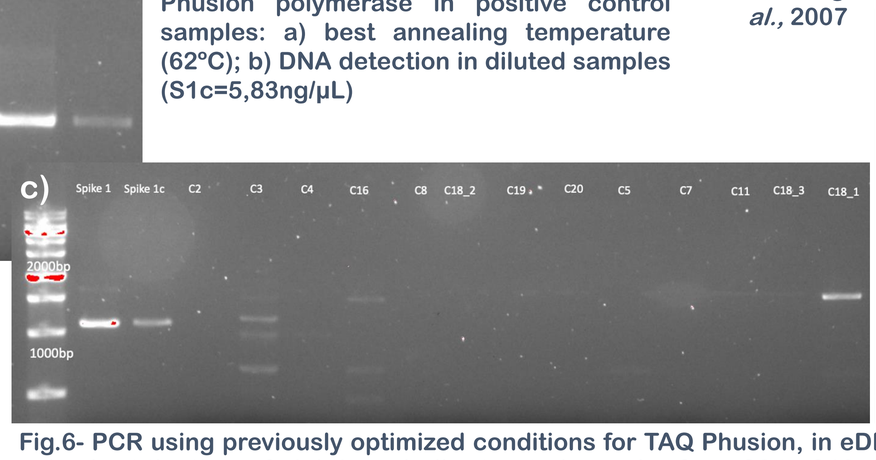

Fig.6- PCR using previously optimized conditions for TAQ Phusion, in eDNA samples collected near the animals at the time of sighting: c) all extracted samples from C2 to C18_1; d) PCR repetition for positive detections

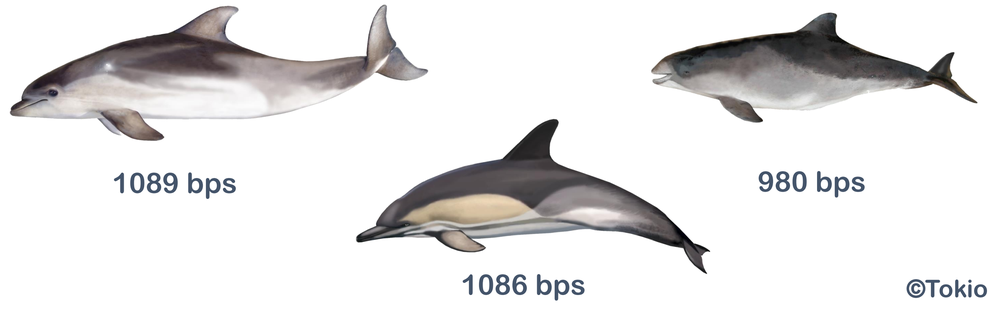

Fig.3- Target amplicon sizes for each of the target species, using the L15812/12SC primer sets, retrieved from Zerbini *et al.*, 2007 [1]

Conclusions

1. Factors like salt water do not seem to inhibit the PCR reaction;
2. We were not yet able to identify cetacean DNA in environmental samples, probably due to low DNA concentration;
3. Although the effectiveness of resorting to eDNA for cetacean monitoring programs remains unclear, these results represent a **step forward** towards that goal.

Acknowledgements

To the NORTE 2020 for the support through the project ATLANTIDA (NORTE 01 0145 FEDER 000040) under the PORTUGAL 2020 Partnership Agreement and through the European Regional Development Fund (ERDF). This work was also awarded with a grant under the Blue Young Talent (BYT) program, funded by Amadeu Dias Foundation.

References

[1] Zerbini AN, Waite JM, Durban JW, LeDuc R, Dahlheim ME, and Wade PR (2007). Estimating abundance of killer whales in the nearshore waters of the Gulf of Alaska and Aleutian Islands using line-transect sampling. Mar Bio 150:1033-1045.