



Exploring magneto- and/or electroreception in the harbour porpoise (*Phocoena phocoena*): a pilot study

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1. BACKGROUND

- Harbour porpoises face more offshore wind farms.
- Energy generated offshore is transmitted to land via alternating current (AC) subsea power cables (50 Hz).
- These cables generate electromagnetic fields (EMFs).
- Several marine species have shown behavioural responses to anthropogenic EMFs.

2. KNOWLEDGE GAP

Do harbour porpoises show behavioural responses to anthropogenic EMF, providing indications for magneto- and/or electroreception?

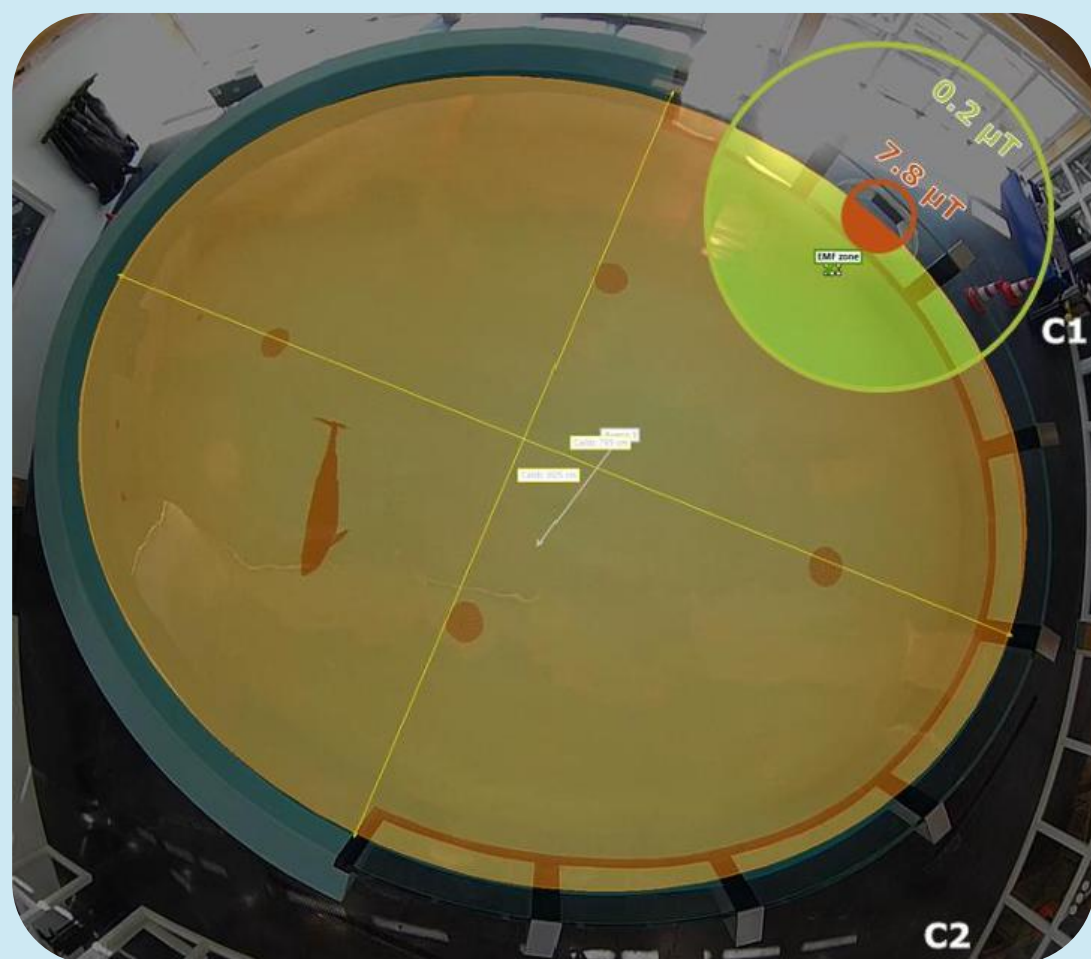


Fig. 1 Top-view of the basin, including the EMF exposure zone (yellow)

3. METHODS

- Behavioural pilot experiment exposing a harbour porpoise to an AC EMF (7-8 μ T RMS at 25 cm from the window).
- Animal was monitored for 15 min (5 min/phase: pre/test/post).
- Data analysis was performed using EthoVision XT 17.5.
- (Co-)variables included a.o. EMF exposure, time of day, temperature, salinity, background μ T, background noise, week number, and corner observer.
- A repeated-measure design was used in which the same individual was tested multiple times. Separate linear models were run using R version 4.2.3.



Fig. 2 Experimental set-up showing the custom-built EMF generator (WaterProof B.V.) next to the glass wall.

4. RESULTS

- No significant deviations regarding breathing rate, first latency to approach, total duration and frequency of occurrence within the test zone could be detected.
- We warrant caution when interpreting results, as only one animal was tested (n=14 trials) under a low (7-8 μ T) and local (25 from window) EMF.

5. NEXT STEPS

- Increase sample size and test (higher) AC exposure.
- Test direct current (DC) exposure.
- Measure the EEG response during exposure.
- Morphological and anatomical investigations of magneto- and electrosensory features.

Table 1. EMF measured on-site using Narda ELT-400

Distance (cm)	Field strength (μ T)
0	14.2
20	10.8
30	7.8
70	1.85
100	0.8
150	0.2

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Ethical statement - SOS Dolfijn has an exemption from the Dutch Nature Conservation Act (Ref: 1460027230155). In addition, a study application form (SOS-2024-17435-01) was evaluated by our Animal Welfare Body. All animals in the rehabilitation centre of SOS Dolfijn receive dedicated veterinary medical care. The EMF trials were conducted during the final phase of the rehabilitation, ensuring that the animal did not have to stay longer in the rescue centre than necessary for its recovery.