

# MASTER OF SCIENCE IN OCEANOGRAPHY

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## ASSESSING THE PERFORMANCE OF OMNI-DIRECTIONAL RECEIVERS FOR PASSIVE ACOUSTIC DETECTION OF VOCALIZING ODONTOCETES: INITIAL ANALYSIS

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The purpose of this study was to evaluate the performance of inexpensive, passive, omni-directional receivers as a means to detect vocalizing Odontocetes using conditional statistics. To evaluate and predict performance, it was necessary to establish probability of detection as a function of: a) signal to noise ratio or range at a given source level, and b) probability of false alarm. For this purpose, a model of the probability distribution function of the detector output was derived from experimental data. For the experiment a series of short duration digital recordings of selected odontocete vocalizations were broadcast underwater from a moving platform. The vocalizations were monitored and digitally recorded at a stationary underwater array consisting of three vertically distributed hydrophones. Over a period of three days, several hundred iterations of each signal – with the transmitter at ranges varying from 300 meters to 12000 meters – were recorded. A monitoring hydrophone (co-located with the transmitter) was used to monitor the signal source level. The raw data was fed to two “automatic detectors” consisting of different data processing routines developed in MATLAB<sup>®</sup>. The output of each detector was subjected to statistical analysis. Other factors also considered in the analysis were: signal used, range, and wind (as a proxy indicator of noise generated by surface wave action). A statistical test was employed to systematically find a best fit probability distribution function model of detector output. From this empirical model, detector performance was estimated.

**KEYWORDS:** Acoustics, Passive Detection, Marine Mammal, Odontocete, Omni-directional Hydrophone