Acoustic data reveal the seasonal occurrence of Harbour Porpoise in Puck Bay, Southern Baltic

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Introduction

The harbour porpoise is the only cetacean species present in the Baltic Sea. Although common throughout Northern hemisphere, the Baltic population is considered critically endangered. Knowledge of harbour porpoise presence in Polish waters comes from opportunistic sightings, strandings and voluntarily reported bycatch. To complete these data static acoustic monitoring of harbour porpoises was conducted in the Puck Bay, the Polish region with the highest number of bycatch reports, particularly in autumn and winter (Fig.1).

Monitoring was a part of 'Active protection of harbour porpoises against bycatch' project, conducted by Hel Marine Station, University of Gdansk, Poland. The aim of the project was to determine the efficiency of a pinger barrier to keep porpoises away from the bycatch threat. The project was widely described at former ECS poster sessions*.

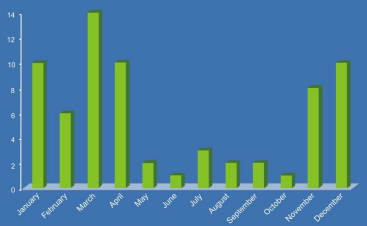


Fig.1 Number of bycatch reports in Puck Bay (1986 - 2009)

Methods

Static acoustic monitoring using C-PODs was conducted for two consecutive study years from 2009 to 2011. 48 devices were placed in two parallel lines that porpoises had to cross when entering or leaving the Bay (Fig.2).

During the second study year, a pinger line was operating between the two POD lines (Fig.2) in order to keep porpoises out of the Puck Bay, an area with a high risk of bycatch.

C-POD data were analyzed for harbour porpoise detections using the Hel1 encounter-classifier in the c-pod.exe software. This classifier was designed specifically for the Puck Bay data to reduce false positives, generated by small boat fisheries, ice noise and sediment transport noise to a very low level.

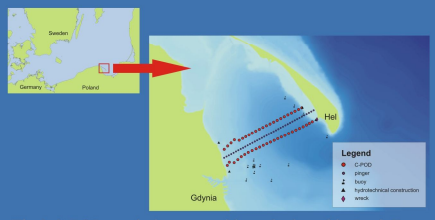
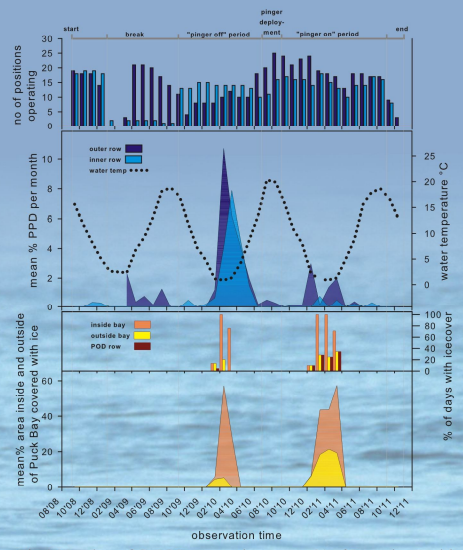


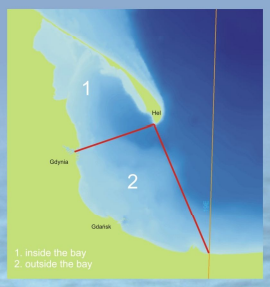
Fig.2 C-PODs and pingers positions deployed in Puck Bay

Results and Discussion

98 of 1099 observation days had porpoise detection and contained 2476 porpoise click trains. Porpoises were detected all year round. However, in both years, more porpoises were detected when the water was cold (Fig.3).

Porpoise presence was detected throughout the whole study period, with the highest level occurring during cold months (January - March), giving a positive correlation with ice presence in the Bay, regardless of whether pinger barrier was present or not. Those results are in line with the seasonality of harbour porpoise bycatch in the Puck Bay region (Fig.1).





Area division adopted for ice cover estimation inside and outside of Puck Bay

Fig.3 Number of C-PODs operating, mean % of Porpoise Positive Days per month combined with water temperature, % of days with ice cover and mean % of area covered inside and outside of Puck Bay during study period.
(Temperature and ice cover data obtained from Swedish Meteorological and Hydrological Institute)

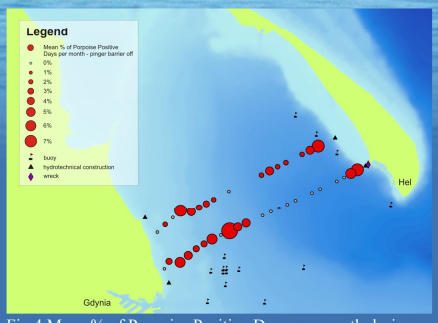


Fig.4 Mean % of Porpoise Positive Days per month during first year of study (pinger off)

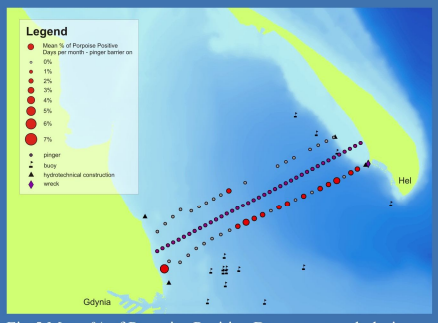


Fig.5 Mean % of Porpoise Positive Days per month during second year of study (pinger on)

Less porpoises were detected in the second study year compared to the first year (Fig.4,5).

This may be caused by the pinger barrier being effective or by the greater and longer ice cover inside and outside Puck Bay in the second year. Natural inter-annual variation in porpoise presence may also be a reason for the lower porpoise density in the second year.

A higher rate of porpoise detection with cold water temperature was also found for the Easterly waters of the German Baltic Sea by Gallus et al., 2012. For the Western part of the German Baltic Sea the pattern differs (Verfuss et al. 2007), with the highest porpoise detection rate occurring in spring and summer at which time, most likely the Belt Sea porpoise population was monitored rather than the Baltic Sea population.

Conclusions

Harbour porpoise presence was detected in low numbers throughout the whole study period.
The highest number of porpoise detections was found during cold months (January-March), which is in line with received bycatch reports in this region.
There is a need to continue monitoring of harbour porpoise occurrence in Puck Bay region to study trends in level and seasonality of habitat use of this critically endangered species in the Baltic Sea

Bibliography:
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Verfuß UK, Honnef CG, Meding A, Dähne M, Mundry R, Benke H;2007; Geographical and seasonal variation of harbour porpoise (Phocoena phocoena) presence in the German Baltic Sea revealed by passive acoustic monitoring; Journal of the Marine Biological Association of the United Kingdom; 87; 165?176

* Local approach to reduce bycatch of harbour porpoise in polish Baltic waters; Kuklik et al.
An analysis of fishery in the Puck Bay from the perspective of reducing bycatch of harbour porpoises; Skóra K et al.