Turning Tides - the importance of a high-energy tidal area in Northern Norway for both harbour porpoises and humans

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Introduction

The strong tidal current of Rystraumen (69.55°N 18.73°E) is used as a shipping lane to and from Tromsø, has a strong recreational value, and is also a potential site for the placement of tidal plants to generate marine renewable energy. The area is also presently under consideration for the establishment of a marine reserve. In addition, harbour porpoises (*Phocoena phocoena*) occur here in the highest densities found in Northern Norway.

Aim of this study is to research and acquire baseline data on the abundance and occurrence of harbour porpoises and identify potential conflicts with current of future human use at this site.

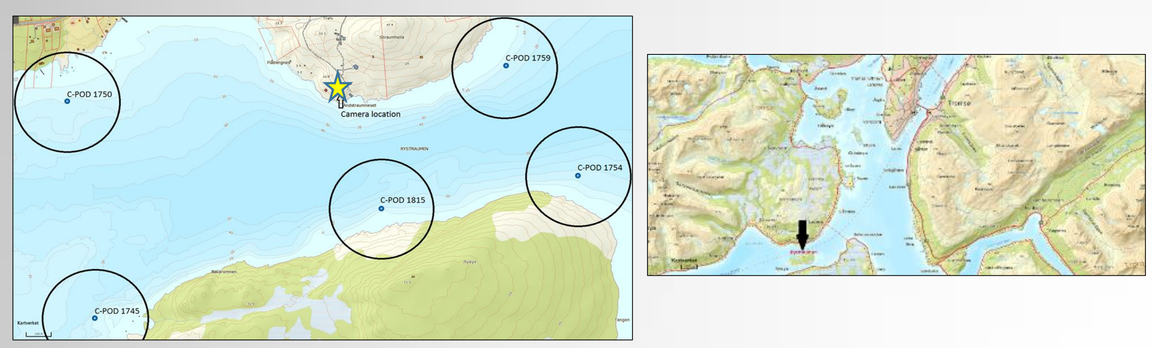

Fig. 1 Study site in Rystraumen. The five circles indicate the positions of the C-PODs and their approximate recording range for harbour porpoise of 200m. The star indicates the position from which the visual observations took place. ***Taken from: Norgeskart.no***

Methods

Two methods to monitor the presence/occurrence of porpoises were applied:

1. passive acoustic monitoring (PAM) using 5 C-PODs (devices recording echolocation clicks from small cetaceans) placed out of the shipping lane at about 5 m below the surface in waters not deeper than 20 meters in and around Rystraumen, between Hella on Kvaløya and the island Ryøya (fig. 1).
2. visual land-based observations from Hella overlooking the width of the fjord (yellow star fig.1) using a camera and reticular triangulation system and a number of calibration points on shore to track harbour porpoise movements.

Fig. 2 From left to right: a harbour porpoise in Rystraumen, a C-POD and the camera system used to track harbour porpoises from the observation point. ***Photos: R. Smit***

Results

Both methods show that porpoises use the study area regularly on a daily basis, as well as throughout all diurnal and tidal cycles (fig 3,5).

The strong tidal current caused an increase in flow noise which caused the signal to noise ratio to be too low for reliable detection of porpoises on the C-POD. Visual observations occurring simultaneous indicate that porpoises were still present, but that they were not recorded during that time (fig 4). The pauses in recording were regular throughout the study period and thus the acoustic data could still be analysed for overall patterns. The results indicate a strong diurnal pattern of porpoise occurrence, with most animals being present during the night time (fig 5). The visual data showed that the mean group size for the observed porpoise groups was 1.46, with most groups consisting of single animals (fig 6).

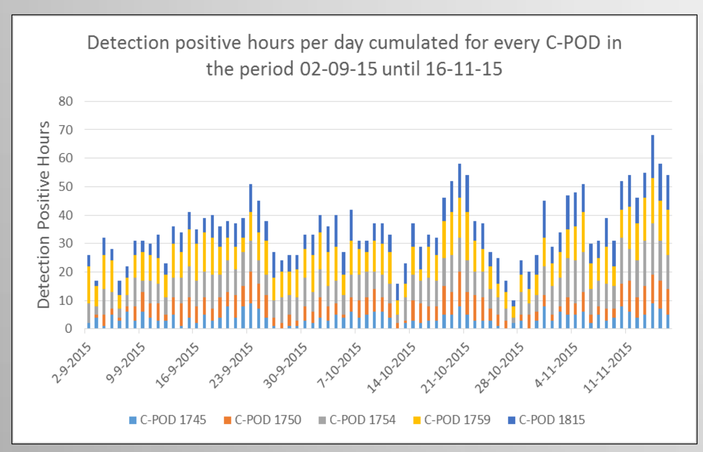

Fig. 3 Number of hours in which porpoises were detected per day for all 5 C-PODs.

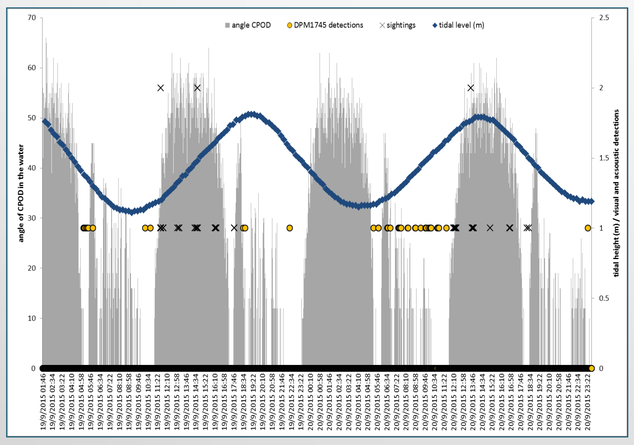

Fig. 4 Relationship between angle in water and recording ability of C-POD

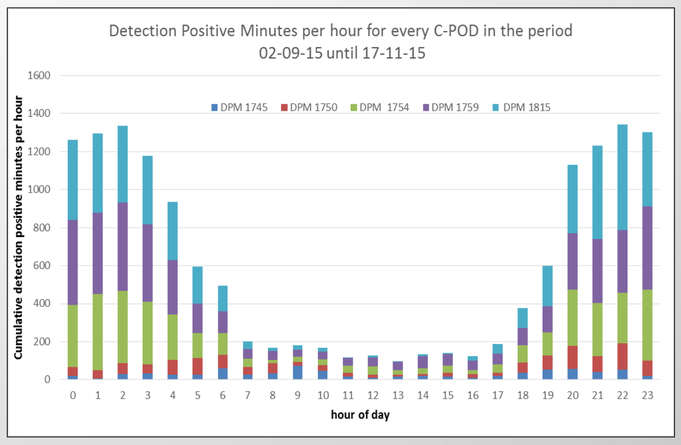

Fig. 5 Diurnal pattern of acoustic detections for all five C-PODs over the three months monitored

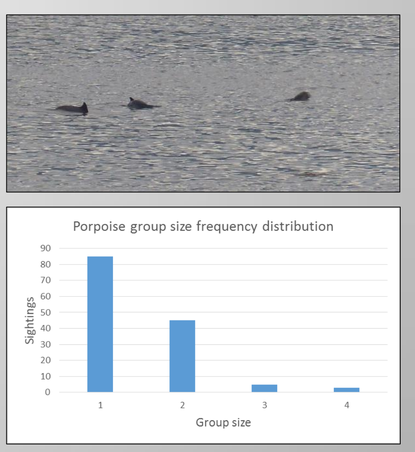

Fig. 6 Group sizes of harbour porpoises (above photo of three porpoises)

Conclusions

- **Harbour porpoises used the area of Rystraumen extensively, most likely for feeding.**
- **They showed a strong diurnal pattern with most porpoises being recorded when the sun was down. This could be caused by prey availability or possibly to avoid human activity in the area during daytime.**
- **Acoustic monitoring directly in a high energy tidal stream has limitations when the current strength most likely masks porpoise acoustic activity. The combination of visual and acoustic observations allows for the collection of complementary data.**
- **Future work will investigate the feeding behaviour as recorded by the C-PODs, to calculate the detection function for the CPODs and to analyse the porpoise movements based on the visual data in more detail.**

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