a.rose@bioconsult-sh.de

Ongoing effects of the offshore wind farm *alpha ventus* on harbour porpoises

a.schubert@bioconsult-sh.de

Armin Rose[1)], Alexander Schubert[1)], Martin Laczny[2)], Werner Piper[2)], Georg Nehls[1)], Ansgar Diederichs[1)]

[1)] BioConsult SH, Schobüller Str. 36, D-25813 Husum, Germany
[2)] IfAÖ, Gotenstraße 4, D-20097 Hamburg, Germany

INTRODUCTION

During a 5-years study (2008-2013) it was looked at effects on harbour porpoises (*Phocoena phocoena*) during the operational phase of the first offshore wind farm (OWF) in German Waters, alpha ventus. This small OWF consisting of 12 turbines was built in the Southern North Sea in 2009 (Figure 1).

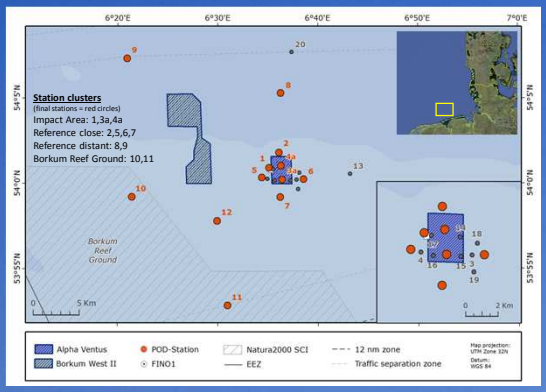

Figure 1: Study area in the German Bight (North Sea) with T-POD/C-POD stations between 2008 and 2013 (12 positions at a time: red circles: final positions in 2013; st. 12 not analysed here; grey circles: former positions, shifted during the project); blue rectangle: OWF alpha ventus (built in 2009); green grey area: OWF Borkum West II (built in 2011/2012).

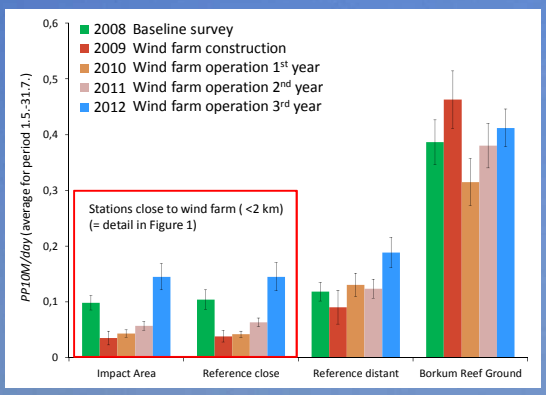

Figure 2: Average PP10M/day values per POD station cluster and project year (with confidence intervals) during a seasonally comparable period spanning ramming activities in the construction phase (15.5.-31.7.).

Table 1: BACIP effect (paired form of Before-After Control-Impact analysis) of 2008 (Before) vs 2009-2012 (After) daily harbour porpoise detection rates, based on pairwise comparisons between data of 49 calendary days in spring/summer of the respective years with Borkum Reef Ground as Control and Impact Area as Impact.

Comparison of years	BACIP effect (%*PP10M/day*, median)
2009 vs 2008	-10.6
2010 vs 2008	-9.6
2011 vs 2008	-4,4
2012 vs 2008	-1.6

METHODS

Porpoise activity in the study area was monitored by acoustic porpoise detectors (T-PODs & C-PODs) at 12 stations positioned at different distances to the wind farm area and assigned to one of four station clusters (Figure 1).

RESULTS AND DISCUSSION

Daily POD detection rates (*PP10M/day*) of harbour porpoises were lowered in the proximity of OWF alpha ventus (detail in Figure 1: stations up to 2 km distance from the OWF area) for two more years after construction works. The rates for the station clusters Impact Area and Reference close gradually increased after the construction phase in 2009, until values of the Baseline survey were reached again or even exceeded in 2012 (Figure 2). This pattern was not found at more distant station clusters Reference distant and Borkum Reef Ground.

BACIP analysis (Table 1) indicated decreasing differences between Impact Area (Impact) and Borkum Reef Ground (Control) over the years, when comparing data of the construction and operation phase (After: 2009-2012) to the baseline survey (Before: 2008).

Lower daily detection rates close to the OWF area in 2010 and 2011 might have been caused by enhanced ship traffic due to extended maintenance works in these years. Higher values in 2012 might be due an increasing 'reef effect', as organisms start to grow on the turbine foundations, eventually increasing the stock of potential prey of harbour porpoises.

CONCLUSIONS

Enhanced ship traffic due to extended maintenance works potentially reduces harbour porpoise activities for the years of such activities in a close range around OWF areas.

Such short-range effects of potentially long-term maintenance works are to be distinguished from short-term but more far-reaching ramming effects.

Acknowledgements: This study was funded by DOTI; background photo: Anja Behrens.