

„Are harbour porpoises (*Phocoena phocoena*) displaced from operating wind turbines?"

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INTRODUCTION

The expansion of renewable energy production goes along with rapid construction of offshore wind farms in European waters. It could be shown that offshore wind farm areas are still used by harbor porpoises during operation. Nevertheless, concern still exists about potential displacement effects from the near vicinity of operational turbines during high wind speed when noise emissions are greatest.

METHODOLOGY

We studied the presence of harbour porpoises, measured as porpoise positive ten minutes per day (pp10m/day) in the vicinity of 5MW wind turbines in the first German offshore wind farm alpha ventus by means of static acoustic data-loggers (C-PODs).

Comparison of two areas (Figure 1):

- 3 PODs in the wind farm (0.5 - 1km distance from the next turbine)
- 5 Pods in reference area (in 7.3 - 19.3km distance from next turbine)

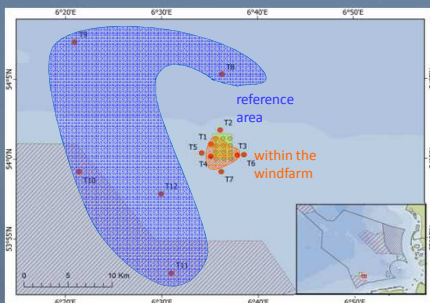


Figure 1: Study area with POD-stations (red dots) within the reference area (blue) and windfarm (orange).

Turbine rotor blades will generate aerodynamic noise as they pass through the air, which enters the water via the air or the structure. This noise will increase with rotational velocity of the turbine which is dependent on wind speed.

HYPOTHESIS

If porpoises are displaced by turbine noise, we expect pp10m/day to be negatively correlated with turbine power within the windfarm but not in the reference area.

RESULTS AND DISCUSSION:

Table 1: Results from GLM analysis of the effects of turbine power on porpoise presence where pp10m/day is the dependent variable

Variable	Df	F-values	p-values
Turbine power	1	30.857	0.00
Area	1	31.975	0.00
Month	2	20.224	0.00
Area*Turbine power	1	0.219	0.640

There is no significant effect of the interaction between area and turbine power on pp10m/day (Table 1). Instead, there was a significant positive relationship between porpoise activity and turbine power in both areas (Figure 2). Therefore, the assumption that porpoise activity in the vicinity of the turbines decreases with increasing operation noise is not supported. Therefore, at least at the distances we studied, porpoise presence does not seem to be negatively affected by turbine noise.

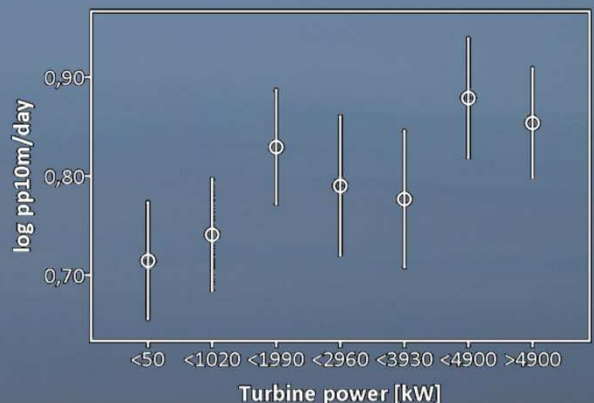


Figure 2: Error bars of porpoise activity (pp10m/day) and turbine power

CONCLUSION

Our results do not provide any evidence that harbour porpoises are deterred from operating wind turbines due to noise emission.