

Towards a model for the redistribution of harbour porpoises (*Phocoena phocoena*) due to pile driving in Belgian waters

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In 2011 the offshore wind farm at the Thorntonbank, Belgian waters, entered its second phase, with the piling of 49 jacket foundations for 48 wind turbines and an offshore high voltage substation. As pile driving is known to generate high underwater sound levels, it is important to assess its impacts on cetaceans, which depend on the emission and reception of sound for foraging, spatial orientation and social interactions. We investigated the effects on the harbour porpoise (*Phocoena phocoena*), the most common cetacean in Belgian waters, by performing standardised visual aerial line transect surveys before and during the piling phase. One week before piling started, harbour porpoises were very common, with average densities of more than 2 animals.km². One week into the piling phase changes in density and spatial distribution clearly suggested harbour porpoise displacement due to behavioural responses elicited by repeated, relatively short piling events.

We developed a model of the expected redistribution of harbour porpoises after disturbance due to pile driving and applied it to data on harbour porpoise density distribution prior to the start of piling. Model results of changes in density and distribution showed good agreement with observations. This approach should be considered a first step towards a future prediction of the effect of piling on harbour porpoises' distribution.