

# Harbour porpoise offshore wind farm studies in the Netherlands

*What do we know of pile driving effects?*

Amsterdam 18 October 2012, Steve Geelhoed



# Research in the Netherlands

- OWEZ & PAWP
- Shortlist Masterplan Wind



# Research in the Netherlands

## OWEZ and PAWP

- Passive acoustic monitoring during operational phase in owf's and reference areas

	Distance from coast (km)	Water depth (m)	Area (km <sup>2</sup> )	Number of turbines	Nominal capacity per turbine (MW)	Study Period
<b>OWEZ<sup>1</sup></b>	13-18	18-20	40	36	3	Jun 2007-Apr 2009
<b>PAWP<sup>2</sup></b>	23	19-24	14	60	2	Sep 2009-Sep 2010

- No difference between owf and reference areas, or higher acoustic activity of porpoises in owf than in references

1. Scheidat M, Tougaard J, Brasseur S, Carstensen J, Polanen Petel T van, Teilmann J & Reijnders P, 2011. Harbour porpoises (*Phocoena phocoena*) and wind farms: a case study in the Dutch North Sea. *Environ Res Lett* 6: 1-10.
2. Polanen Petel van T, Geelhoed S & Meesters E, in prep. Harbour porpoise occurrence in relation to the Prinses Amaliawindpark. IMARES Report number C177/10.

# Research in the Netherlands

## Shortlist Masterplan Wind

'Monitoring the Ecological Impact of Offshore Wind Farms on the Dutch Continental Shelf' 2010-2011

### 1. SEAMARCO TTS experiments

- Male harbour porpoise exposed to continuous noise and to playback of pile driving sounds
- TTS (-10 dB) after 120 min exposure to continuous noise
- No behavioural changes due to continuous noise
- No TTS as a result from the pile driving sounds
- Behavioural changes due to pile driving sounds

Kastelein RA, 2011 Temporary hearing threshold shifts and recovery in a harbor porpoise and two harbor seals after exposure to continuous noise and playbacks of pile driving sounds. SEAMARCO Ref: 2011/01

# Research in the Netherlands

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'Monitoring the Ecological Impact of Offshore Wind Farms on the Dutch Continental Shelf' 2010-2011

## 2. Aerial surveys harbour porpoises DCS

### ■ Complete surveys DCS:

July 2010	26000 porpoises (0.44 n/km <sup>2</sup> )
Oct/Nov 2010	30000 porpoises (0.51 n/km <sup>2</sup> )
Mar 2011	86000 porpoises (1.44 n/km <sup>2</sup> )

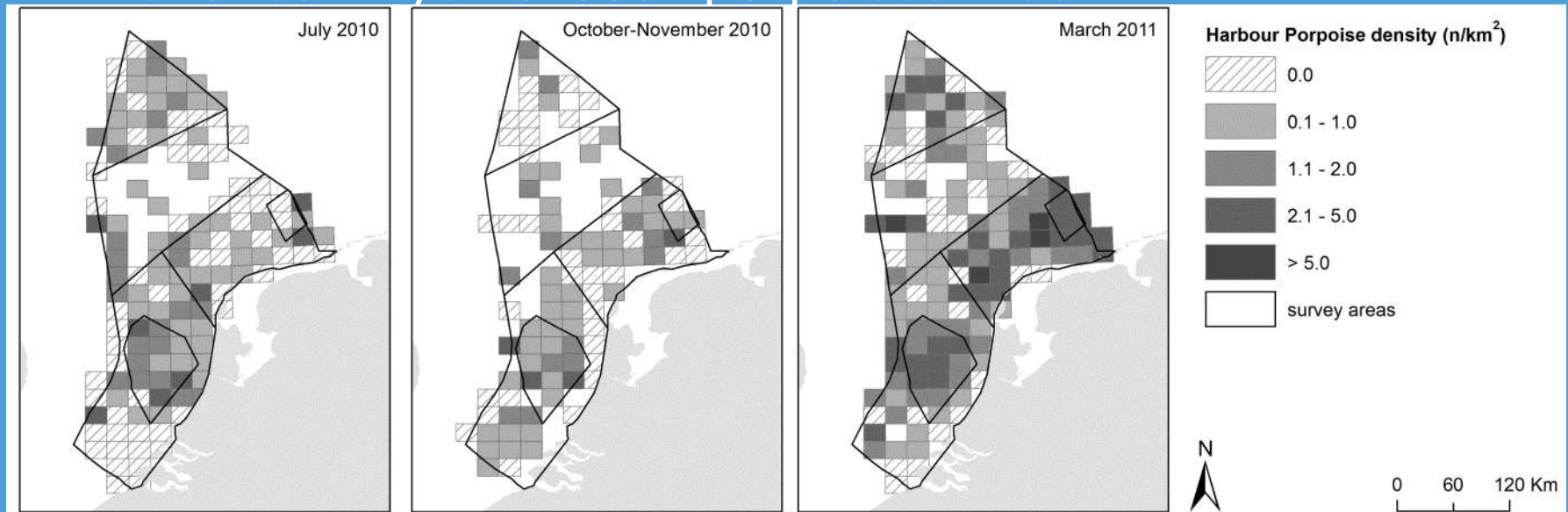
Geelhoed S, Scheidat M, Aarts G, van Bemmelen R, Janinhoff N, Verdaat H & Witte R, 2011. Shortlist Masterplan Wind Aerial surveys of harbour porpoises on the Dutch Continental Shelf. IMARES Report number C103/11.

# Research in the Netherlands

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# Research in the Netherlands: conclusions (1)

- No studies on effect of pile driving at sea

Seamarco:

- No TTS measured during piling sounds (peak level 139 dB re 1  $\mu$ Pa)
- Behavioural changes during piling sounds



# Research in the Netherlands: conclusions (2)

## IMARES:

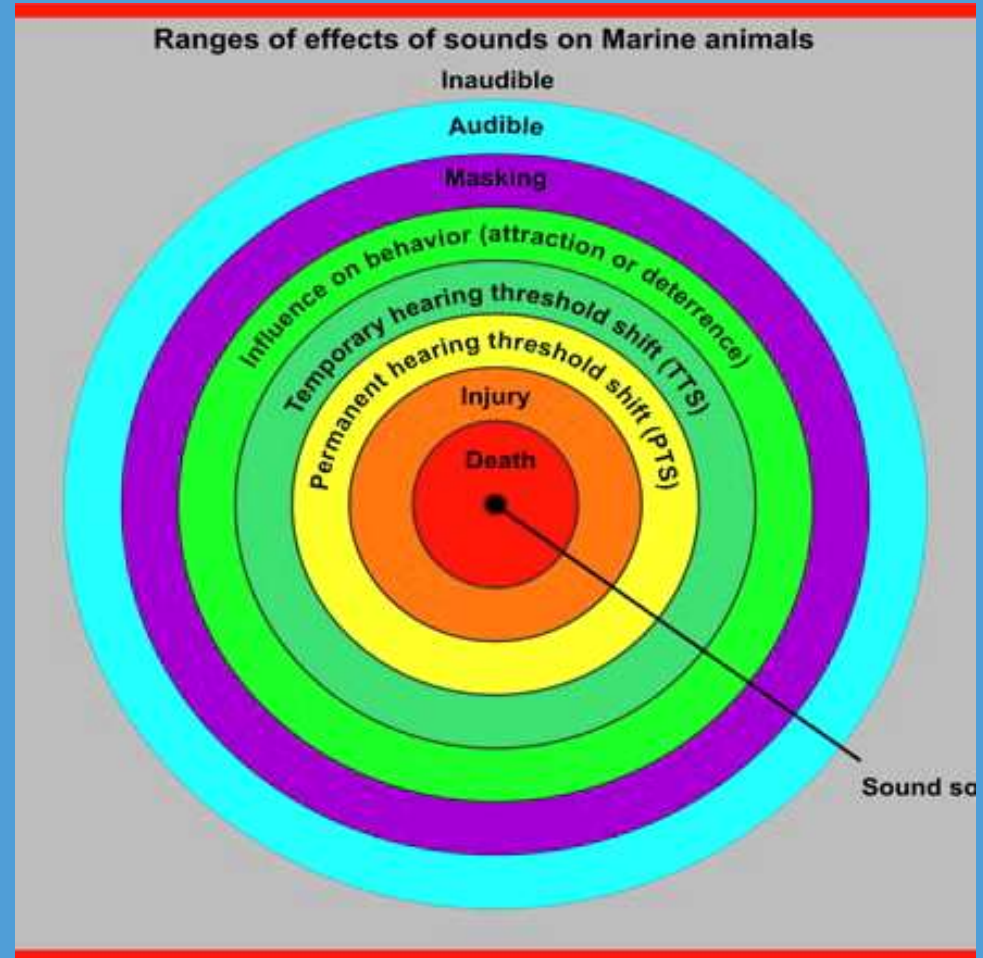
- After construction porpoises present in OWEZ and PAWP
- Porpoises widely distributed in DCS





# Research abroad: conclusions

- PTS till 1 km (Brandt et al 2009)
- TTS at SEL 164.3 dB re 1  $\mu$ Pa (Lucke et al, 2009)
- Most porpoises leave area around piling source (radius ca 20 km)
- Porpoises return after cessation of piling (1-3 days)



# Implications

- How many porpoises are **theoretically** affected?

	PTS	Behavioural change
Mar	4.5	1809.6
Jul	1.4	552.9
Oct/Nov	1.6	640.9



# Guidelines

	USE OF ACOUSTIC DETERRENT DEVICES REQUIRED DURING PILE DRIVING	MARINE MAMMAL OBSERVERS REQUIRED BEFORE AND DURING PILE DRIVING	SEASONAL RESTRICTIONS FOR PILE DRIVING	SOFT START – RAMP UP PROCEDURE FOR PILE DRIVING	OFFSHORE WINDFARMS IN NATURA 2000 AREAS ALLOWED?	EXAMPLES OF OTHER GUIDELINES
Belgium	Yes, taken up in the permit	No	Yes, but only in the advice: no piling between 1 January and 30 April	Yes, taken up in the permit, and not standardized	Not <i>a priori</i> forbidden, but currently no NATURA 2000 areas are considered for windenergy production	
Denmark	Yes	No	Currently not	Yes, but not standardized	Yes, conditions apply	
Germany	Yes	No	Currently not	Yes	No, since the establishment of marine spatial planning regulations	Noise limitation from 750 m from the piling onwards: 160 dB SEL and 190 dB SPL*
The Netherlands	Yes, general guideline	No	Yes, no piling between 1 January and 1 July		Not <i>a priori</i> forbidden	There cannot be more than one construction activity in which piles are driven ongoing at any time
United Kingdom	Case by case basis as a condition of the consent	Yes, and/or real-time acoustic monitoring	Yes, in relation to spawning fish (some of which are prey items)	Yes	Not <i>a priori</i> forbidden	Depending on work being undertaken, requirement for a monitoring zone prior to piling. The size of which is defined by the area over which injury may occur

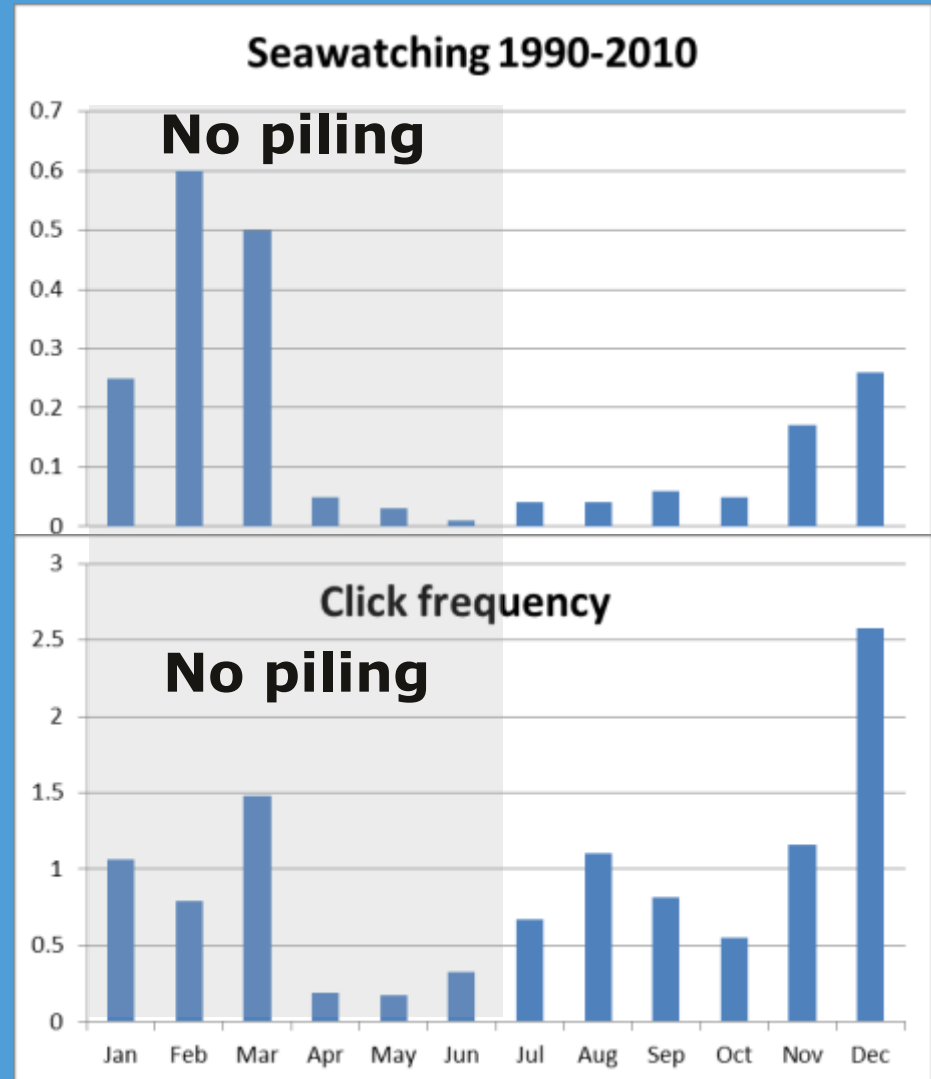
ICES WGMME 2010. Report of the ICES Working group on Marine Mammal Ecology. 12-15 April 2010. Horta, Azores

# Guidelines

## The Netherlands

- No piling 1 Jan-1 Jul
- No simultaneous piling at two or more sites

	PTS	Behavioural change
Mar	4.5	1809.6
Jul	1.4	552.9
Oct/Nov	1.6	640.9



# Questions

- Is there a problem?
- Is the knowledge sufficient to regulate pile driving?
- Do you have any questions?



# Contact info



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