Seabird displacement evidence at an offshore wind farm in the Belgian part of the North Sea

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Displacement Workshop (Perth, 6 May 2015)

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Monitoring seabird displacement: methods

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Monitoring seabird displacement: methods

Ship-based seabird surveys according to the internationally applied ESAS methodology (Tasker, 1984)

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Monitoring seabird displacement: BACI set-up

Before

impact

control

After

impact

control

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Monitoring seabird displacement: monitoring route

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Monitoring seabird displacement: data modeling

Statistical challenges inherent to 'seabirds at sea' data

- Auto-correlation in time and space
  > aggregation of transect data to day totals per control/impact area

- Overdispersion
  > use of a negative binomial distribution

- High proportion of zero counts
  > accounting for zero-inflation

(ZI)NB modelling

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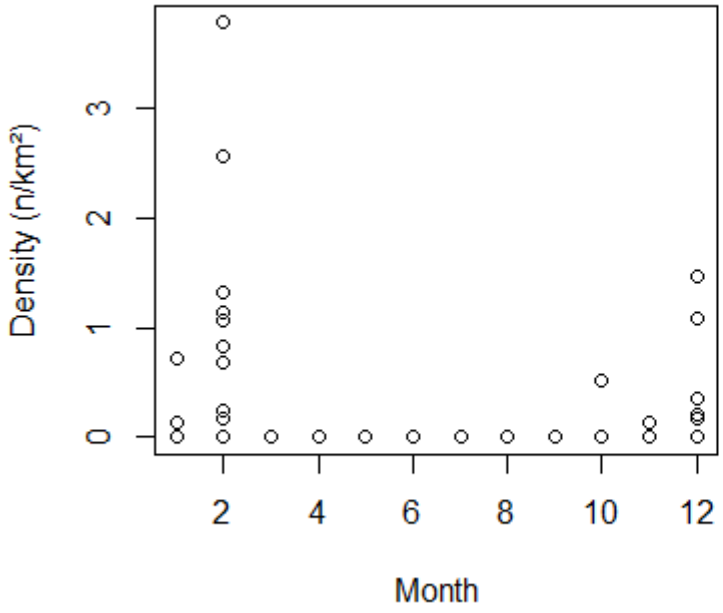
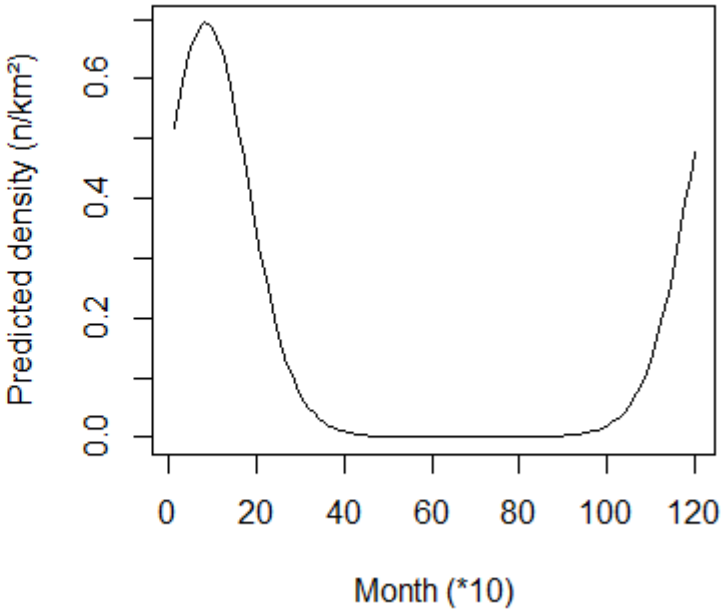
Monitoring seabird displacement: data modeling

Seasonal variation modelled by a cyclic sine curve:

Razorbill (12 month period → 2 degrees of freedom)





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Monitoring seabird displacement: data modeling

Despite these efforts, power to detect decreases in seabird abundance remains rather low…

Based on reference data collected at the nearby Thorntonbank, a power of 90% to detect a decrease in numbers of 50% is reached no earlier than:

- 8 years after impact for common guillemot
- 10 years after impact for northern gannet
- 10 – 15 years for lesser black-backed gull, black-legged kittiwake, sandwich tern, common tern & razorbill
- More than 15 years for northern fulmar, little gull, common, herring & great black-backed gull

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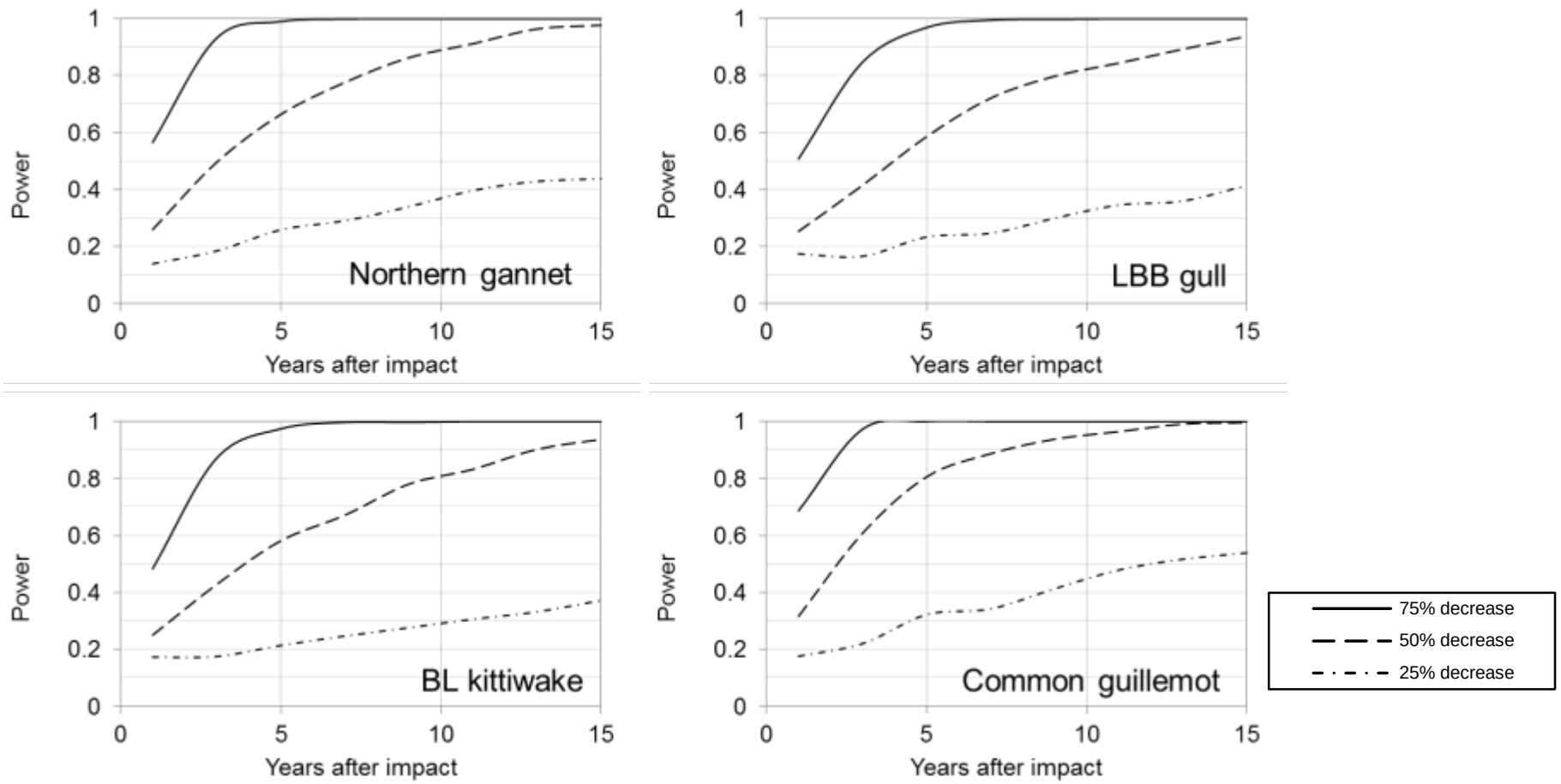
Monitoring seabird displacement: data modeling



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Monitoring seabird displacement: results

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Monitoring seabird displacement:

Results OWF footprint area

	Impact area (OWF + 0.5 km)		Impact area (OWF + 3 km)		Buffer area (0.5 - 3 km)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Northern fulmar	-16.62	0.987	-17.20	0.986	-16.49	0.987
Northern gannet	**-1.92**	0.000***	**-1.53**	0.000***	**-1.16**	0.003**
Great skua	-16.21	0.995	-16.95	0.994	-16.25	0.995
Little gull	-1.15	0.270	-0.13	0.891	0.31	0.730
Common gull	1.91	0.155	1.19	0.332	-0.27	0.805
Lesser black-backed gull	**1.66**	0.012*	**2.71**	0.000***	**2.71**	0.000***
Herring gull	**2.25**	0.001***	0.89	0.201	0.37	0.580
Great black-backed gull	0.38	0.419	0.42	0.310	0.48	0.293
Black-legged kittiwake	0.04	0.930	0.25	0.527	0.47	0.255
Common guillemot	**-1.23**	0.000***	**-0.94**	0.000***	**-0.75**	0.007**
Razorbill	**-1.01**	0.031*	**-0.76**	0.080.	-0.39	0.378

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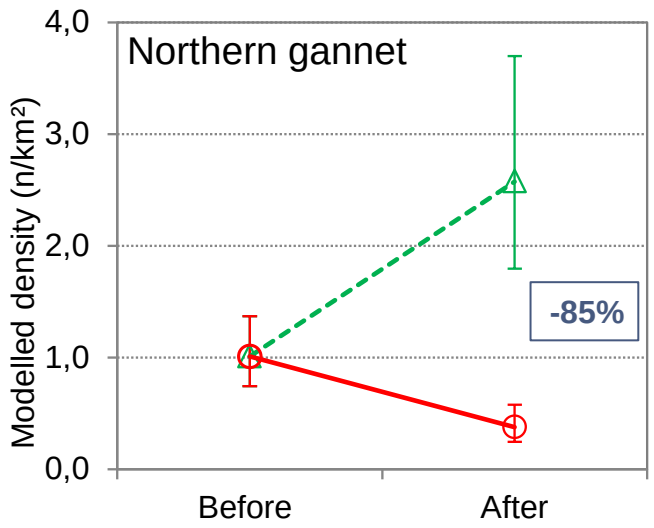
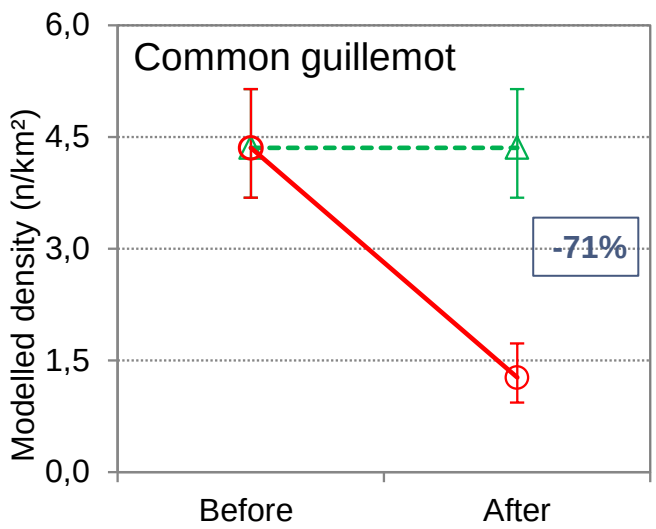
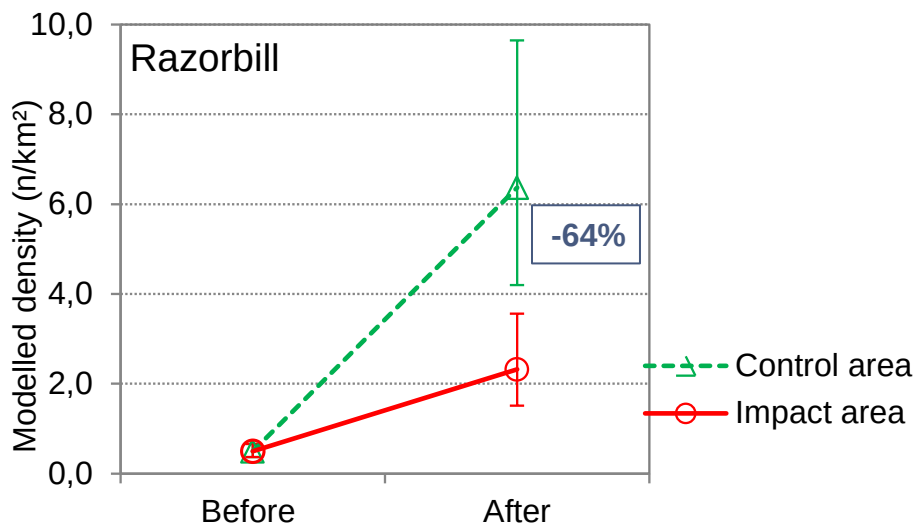
Monitoring seabird displacement:

Results OWF footprint area



SIGNIFICANT AVOIDANCE EFFECTS





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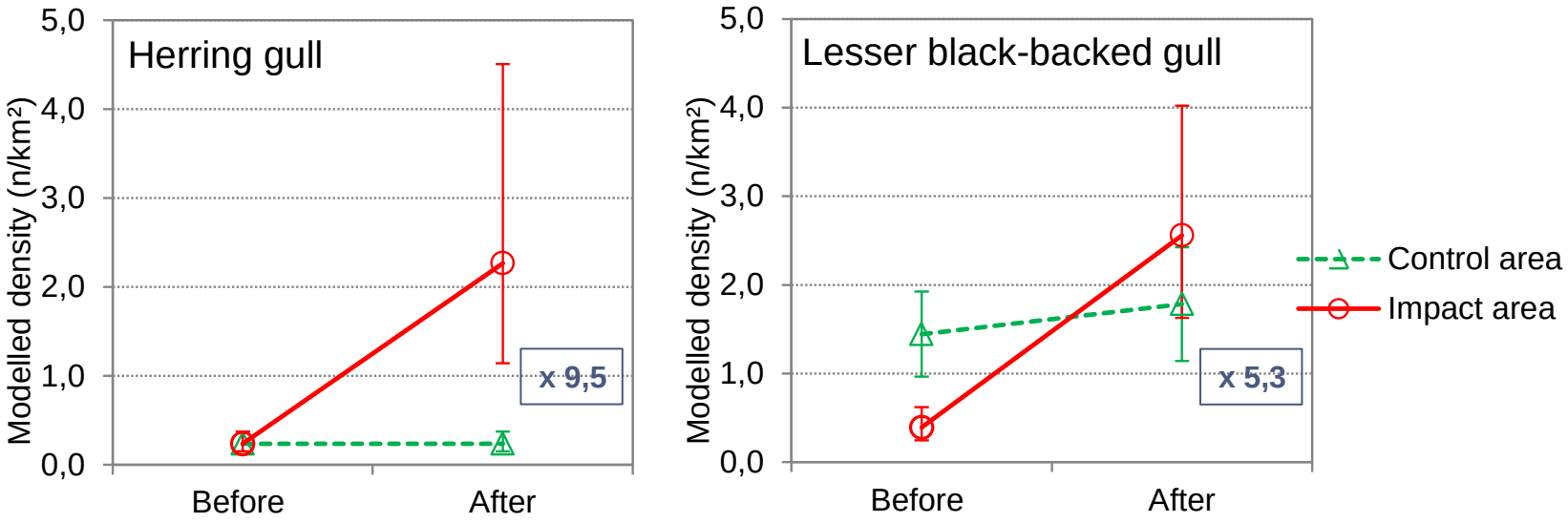
Monitoring seabird displacement:
Results OWF footprint area

SIGNIFICANT ATTRACTION EFFECTS



... leading to an estimated of
1000 collision victims (mostly gulls) per year
once all Belgian OWFs will be operational!!

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Monitoring seabird displacement:

Results OWF buffer area

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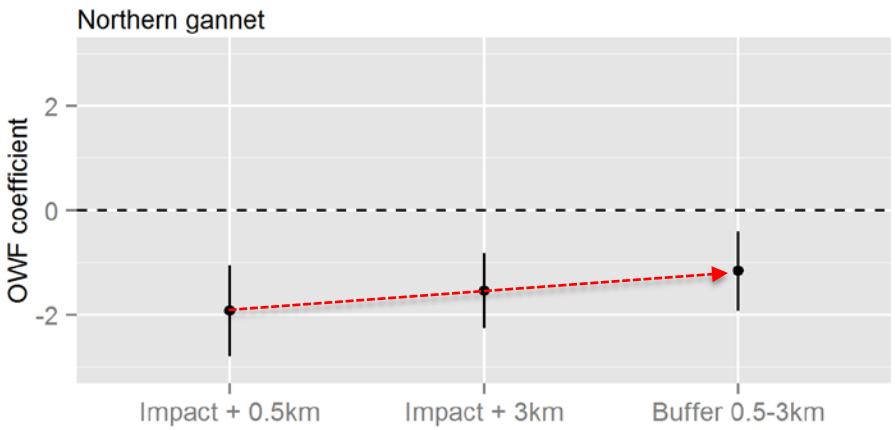
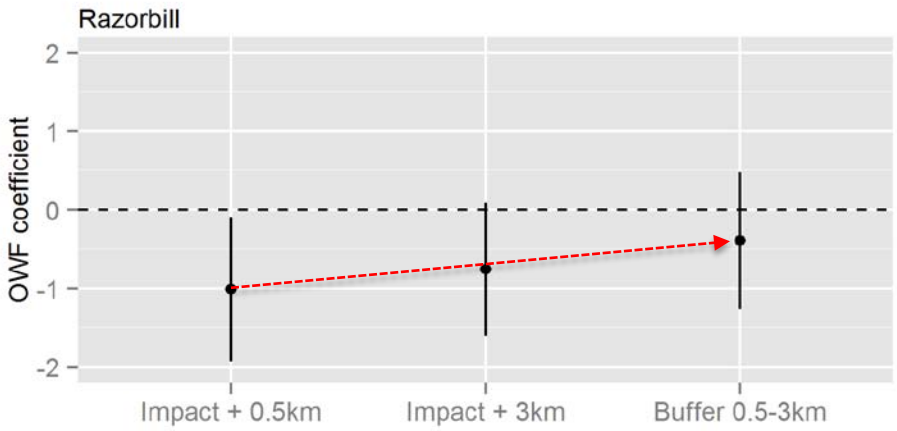
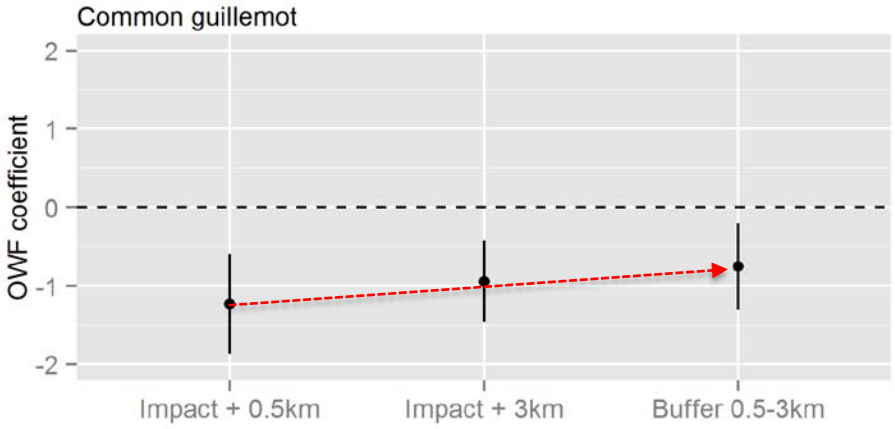
Monitoring seabird displacement:
Results OWF buffer area







All avoidance effects clearly decreasing with distance!

→ Seperate analyses for 0.5-2.5 & 2.5-4.5 buffer zones?

→ BAG analysis?

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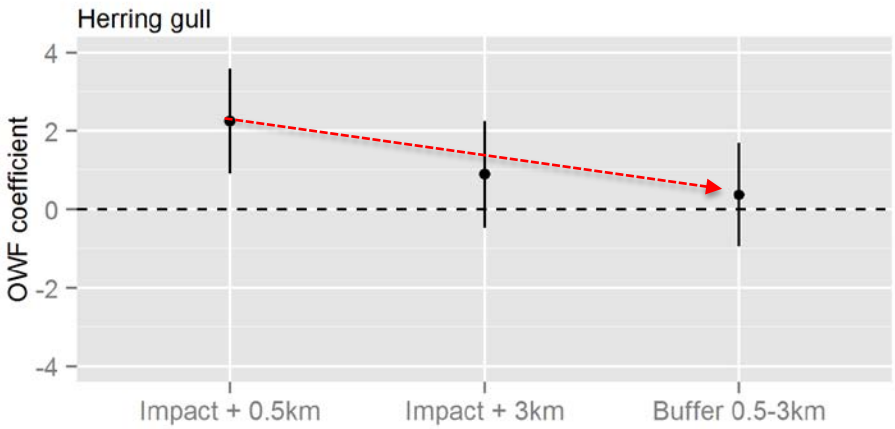
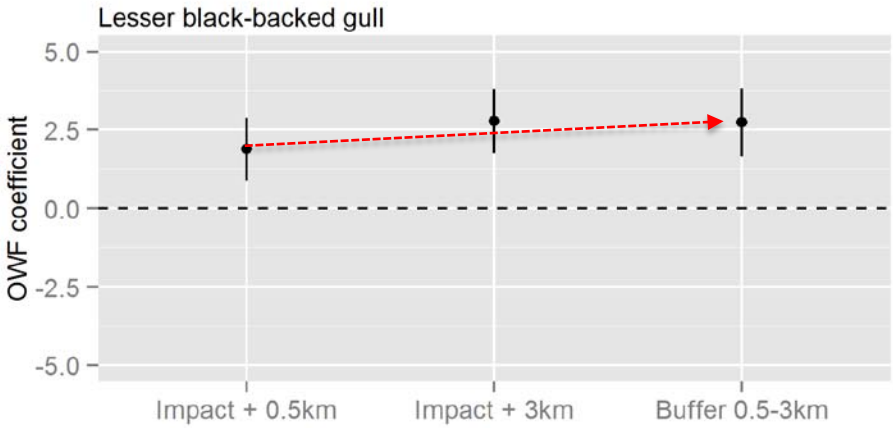
Monitoring seabird displacement:

Results OWF buffer area

Decreasing attraction effect…





Yet increasing attraction effect…

→ Hard to explain, possible artefact??

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Coming up in spring 2016…

- Results for the Bligh Bank OWF after 5 years of post-impact monitoring (yet no major changes in conclusions are expected)
- First results for the Thorntonbank OWF after 3 year of post-impact monitoring
  - → Allowing comparison in displacement effects between sites
  - → Including a number of nearshore species (little gull, Sandwich tern & common tern)
  - → OWF at Thorntonbank characterised by jacket foundations with even more resting and feeding opportunities compared to standard monopile foundations

- Model refinement and further accounting for temporal variability through inclusion of multi-covariate distance sampling and testing for the effect of tidal state on seabird numbers

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Further reading…

Hydrobiologia theme number “Offshore wind farm impacts”

- Vanermen N., Onkelinx T., Courtens W., Van de walle M., Verstraete H. & Stienen E.W.M. (2014). Seabird avoidance and attraction at an offshore wind farm in the Belgian part of the North Sea. Hydrobiologia, doi: 0.1007/s10750-014-2088-x.

- Vanermen N., Onkelinx T., Verschelde P., Courtens W., Van de walle M., Verstraete H. & Stienen E.W.M. (2015). Assessing seabird displacement effects at offshore wind farms: power ranges of a monitoring and data handling protocol. Hydrobiologia, doi: 10.1007/s10750-014-2156-2.

- Brabant R.*, Vanermen N.*, Stienen E.W.M. & Degraer S. (2015). Towards a cumulative collision risk assessment of local and migrating birds in North Sea offshore wind farms. Hydrobiologia, doi: 10.1007/s10750-015-2224-2. (*shared authorship)

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THANK YOU FOR YOUR ATTENTION!

Any questions?

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