RWS-Wozep bird radar in Luchterduinen wind farm

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WAARDEN BURG Ecology

we consult nature.

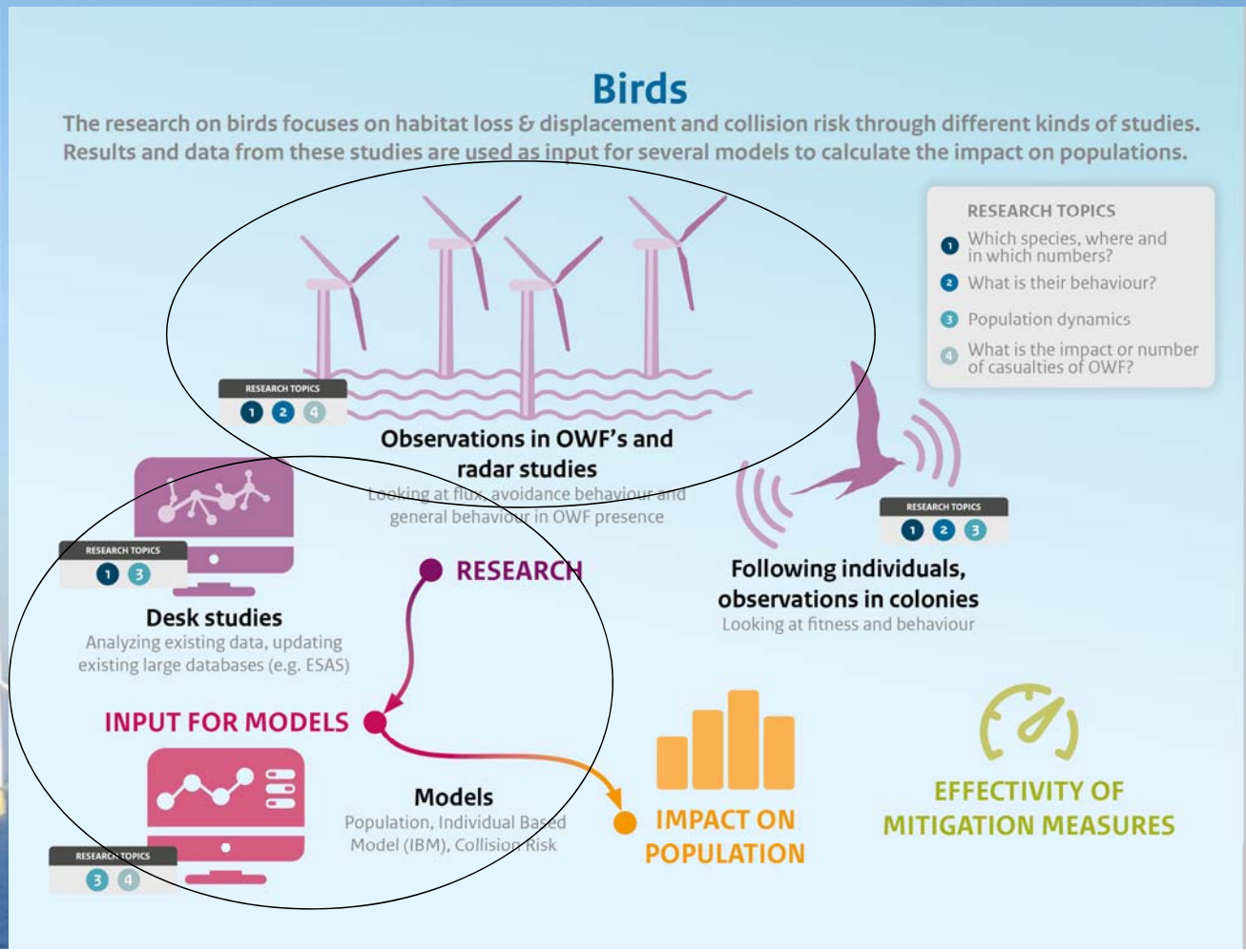
Wozep: Filling knowledge gaps

WOZEP
DUTCH GOVERNMENTAL OFFSHORE WIND ECOLOGICAL PROGRAMME

Species-specific fluxes of seabirds

Flight- and avoidance behaviour

Predicting collisions and population-level effects



Main questions RWS project

- Species-specific flux of seabirds per altitude class
- Seabird flight behaviour inside and outside wind farms
  (flight speed and -height)
- Season- and species-specific macro- and meso-avoidance

Goal:

Improvement of the Band model (Collision Risk Model) parameters

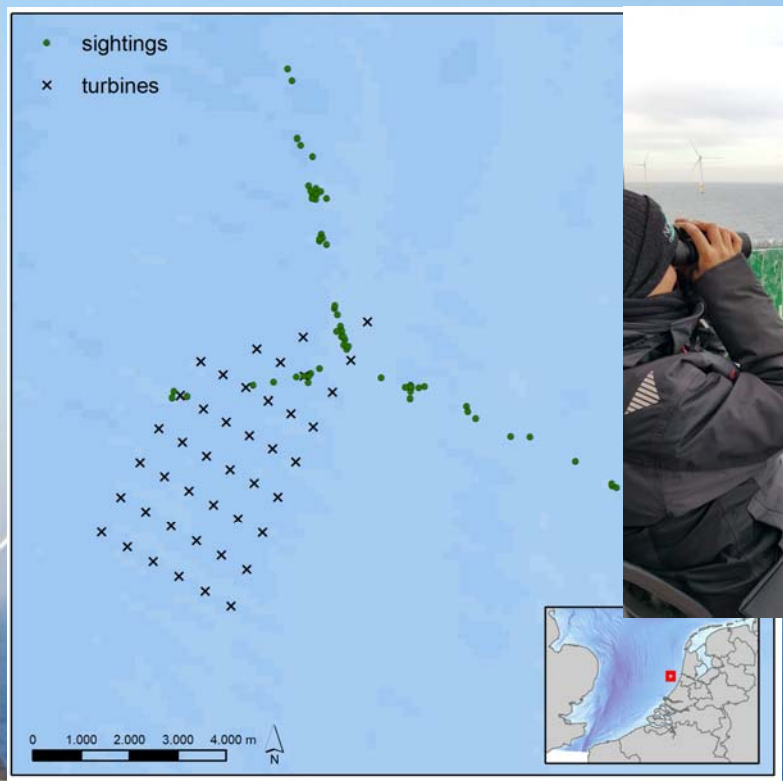
Research questions and methods

1. Species-specific	Species composition: visual observations Flux per altitude: radar measurements
2. Measuring species-specific flight height (flux per altitude class)	Tagging radar tracks, visual and LRF observations
3. Measuring species-specific flight speed	Tagging radar tracks
4. Measuring nocturnal activity	Radar measurements
5. Season- and species-specific macro- and meso-avoidance	Radar measurements and visual observations
6. Effect of fishing vessels	Tagging radar tracks and visual observations

1. Species-specific bird fluxes in Luchterduinen

visual observations

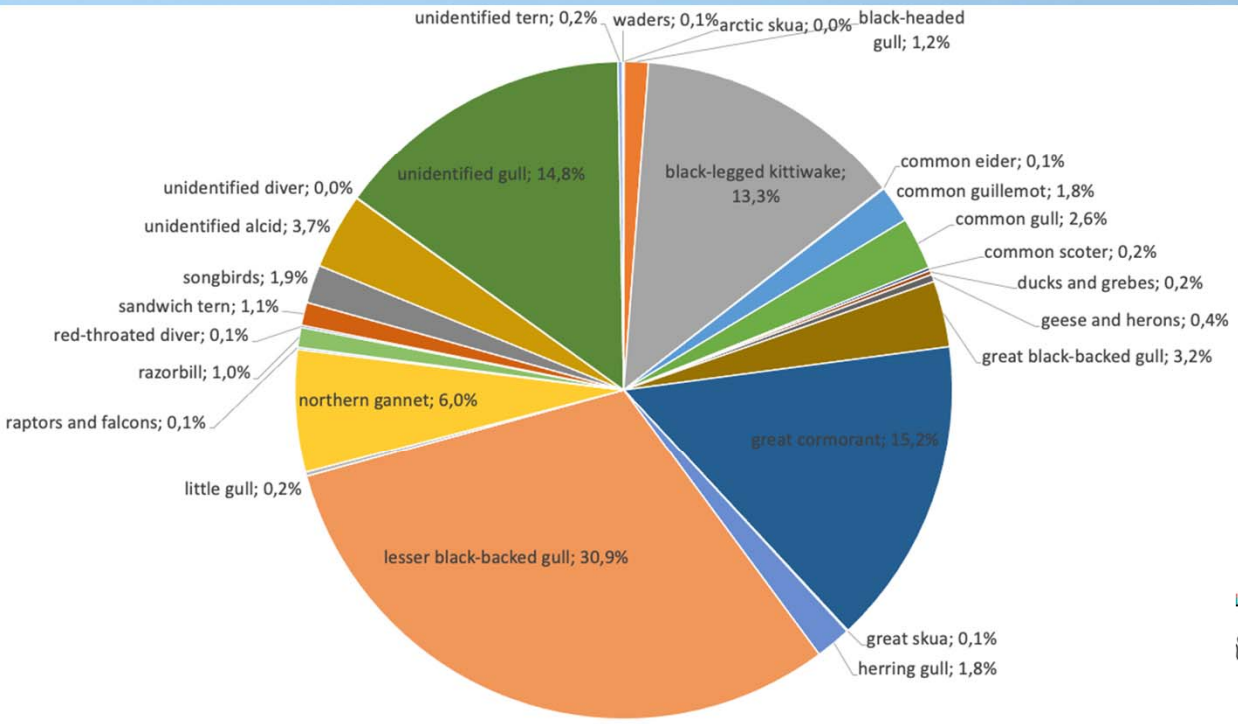
radar measurements

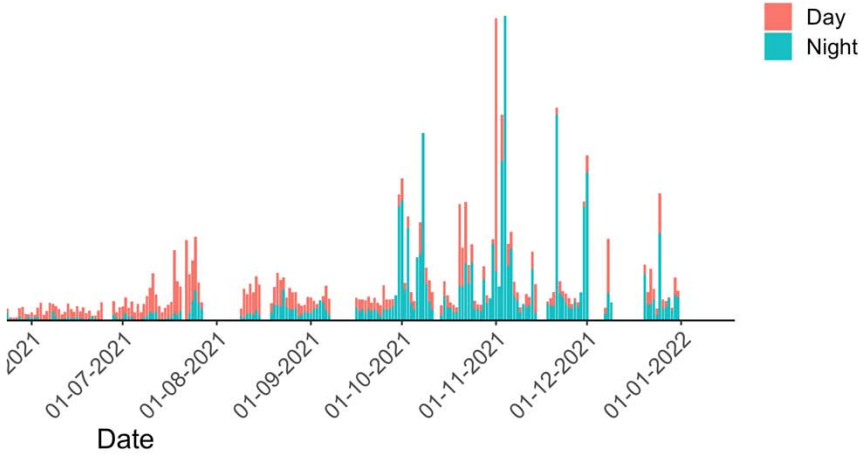


1. Species-specific bird fluxes in Luchterduinen

visual observations

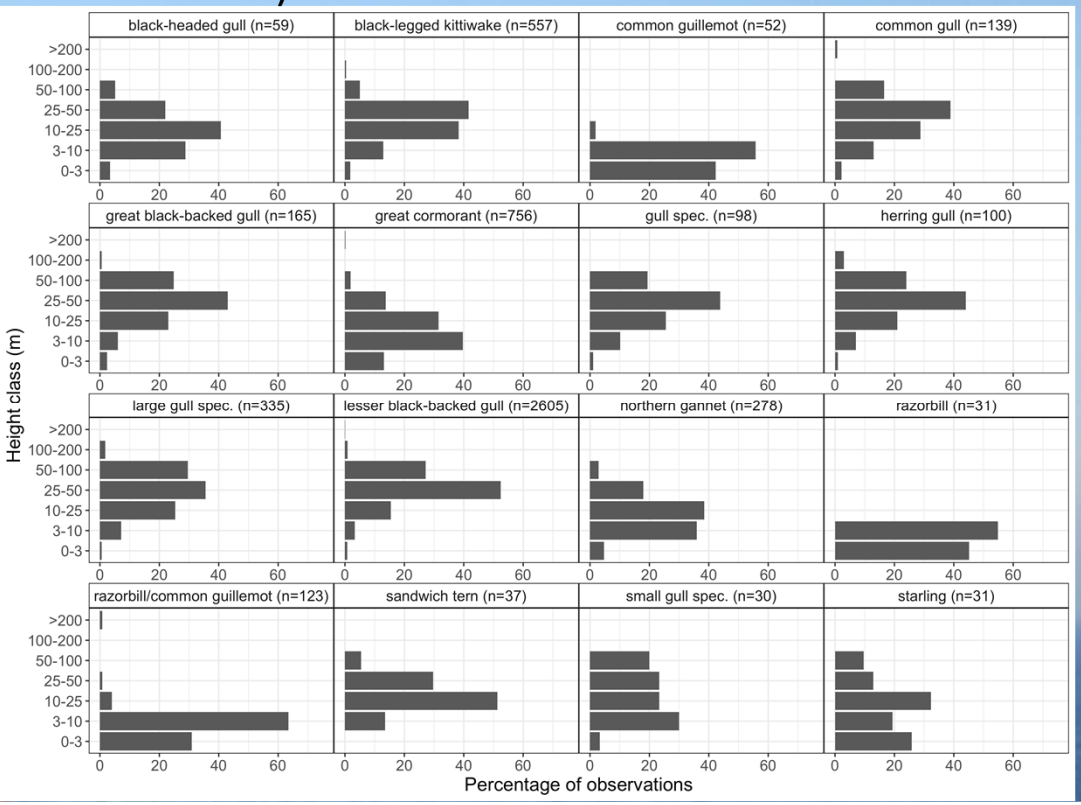
radar measurements



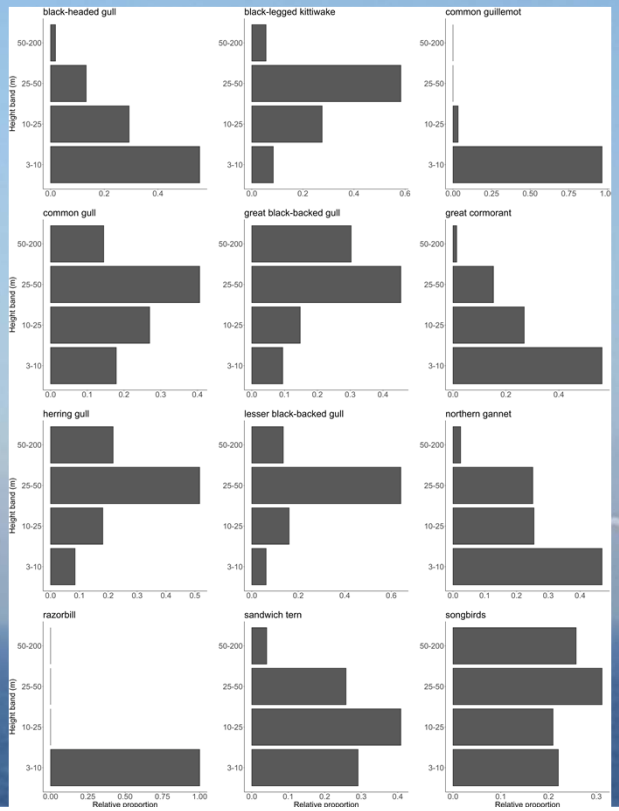


2. Species-specific flight height and fluxes

Observed flight heights
(visual observations, LRF measurements, tagged radar tracks)



Combined with radar altitude profiles



Applicability of results

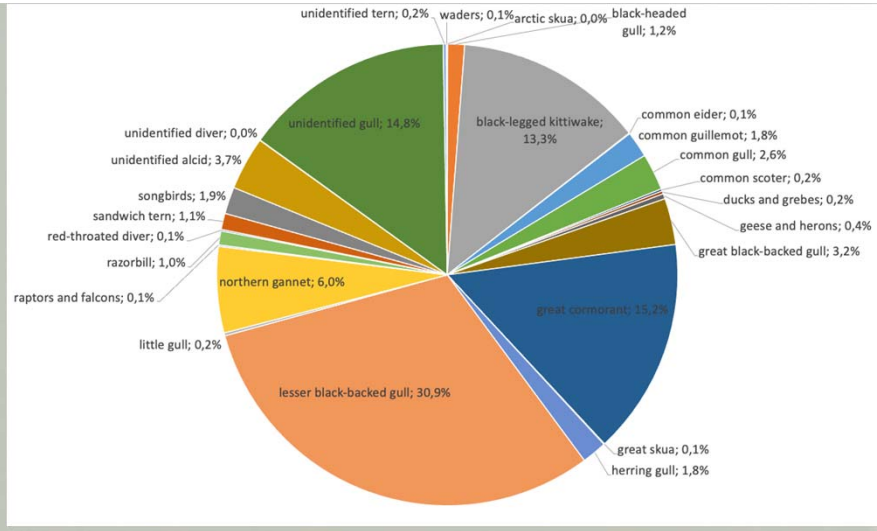
1. Species-specific flux

2. Measuring species-specific flight height (flux per altitude class)

3. Measuring species-specific flight speed

4. Measuring nocturnal activity

5. Season- and species-specific macro- and meso-avoidance



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Applicability of results

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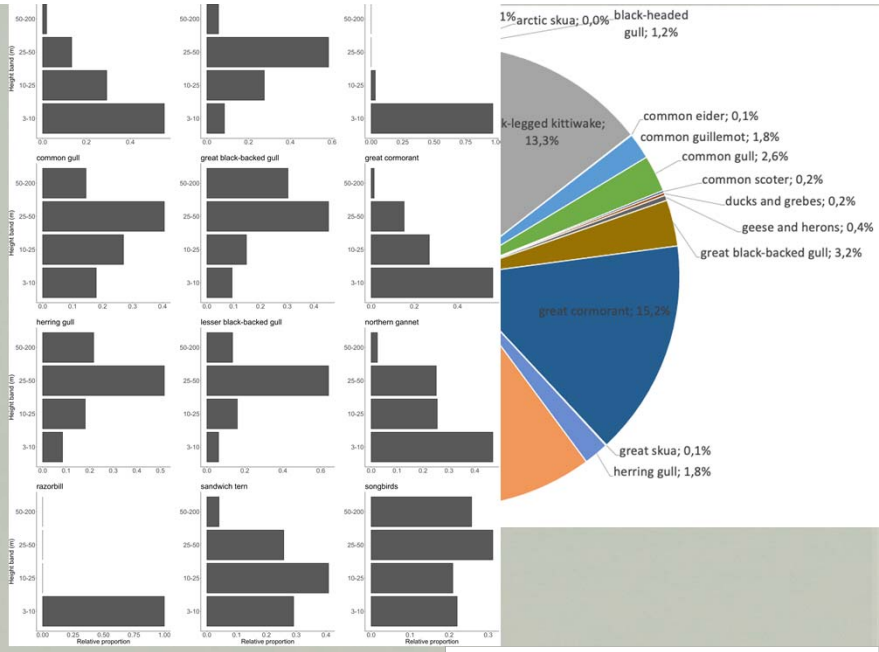
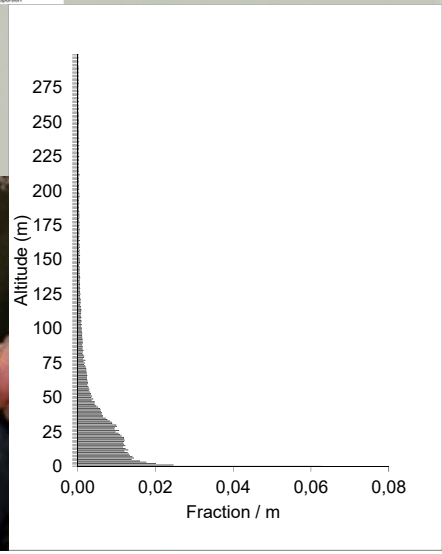
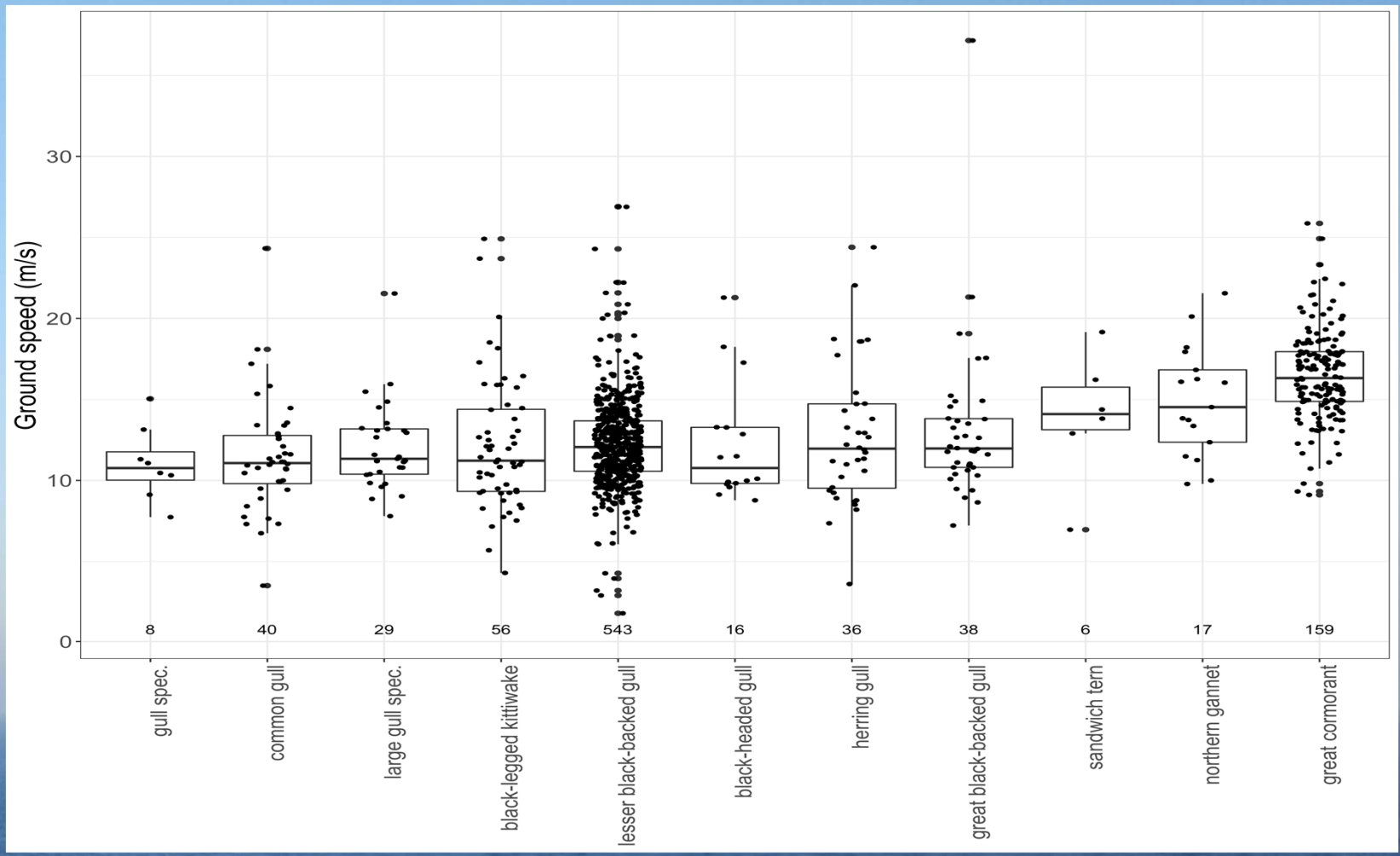


Bird tracking with GPS



3. Flight speed



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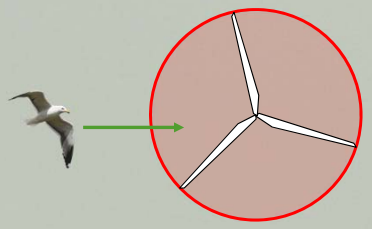

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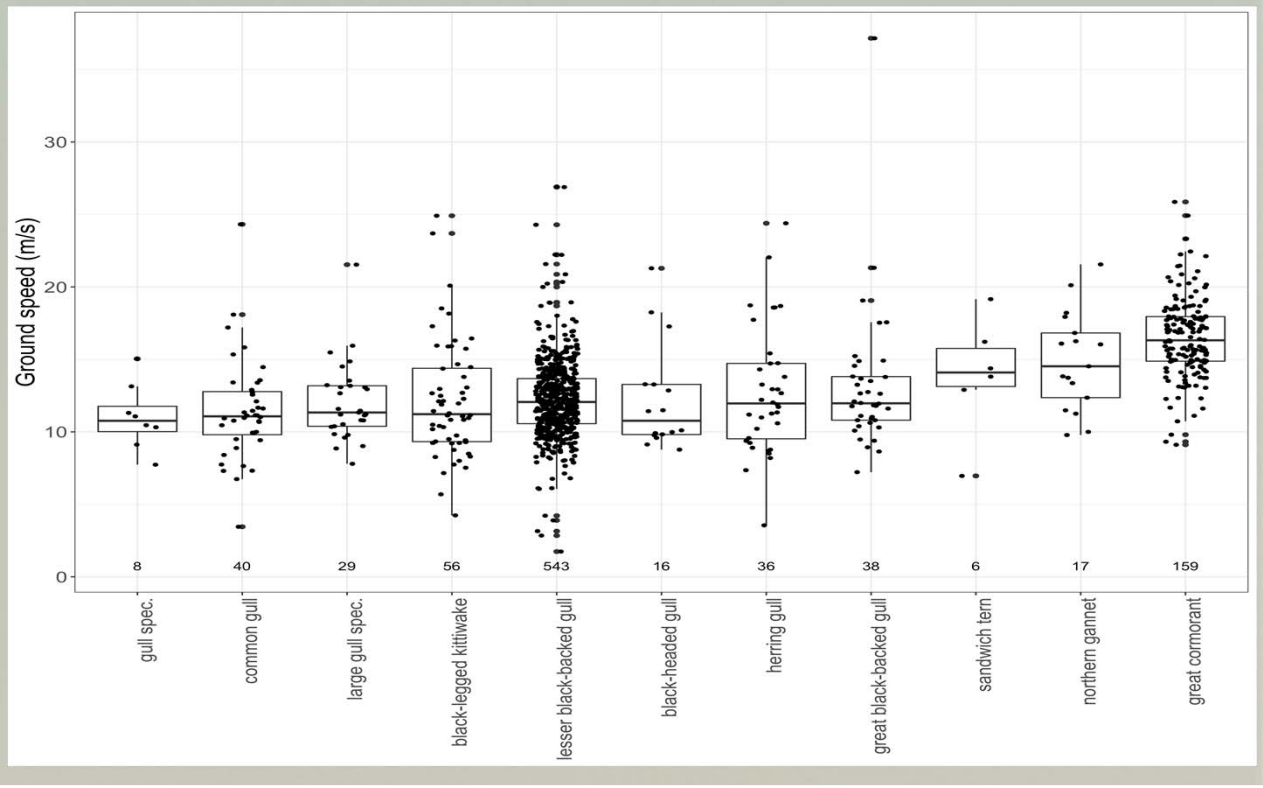

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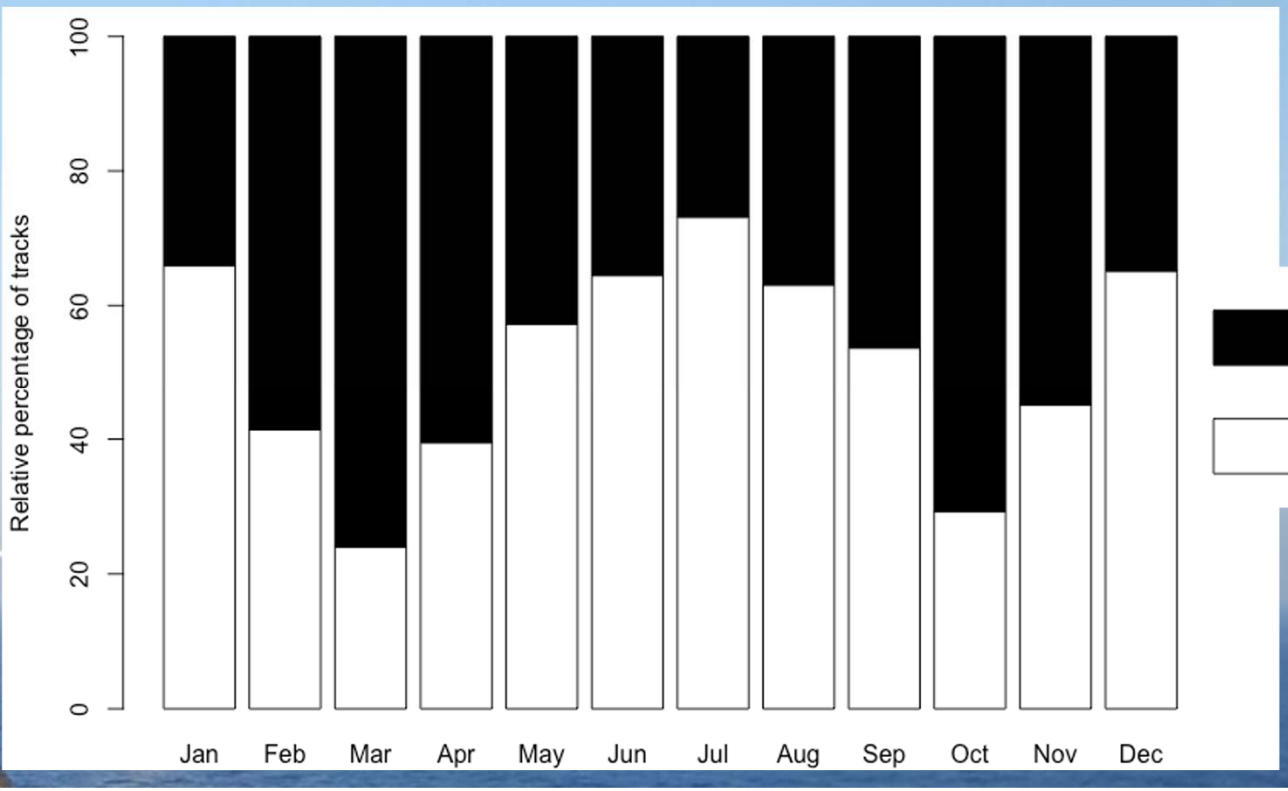
3. Nocturnal activity

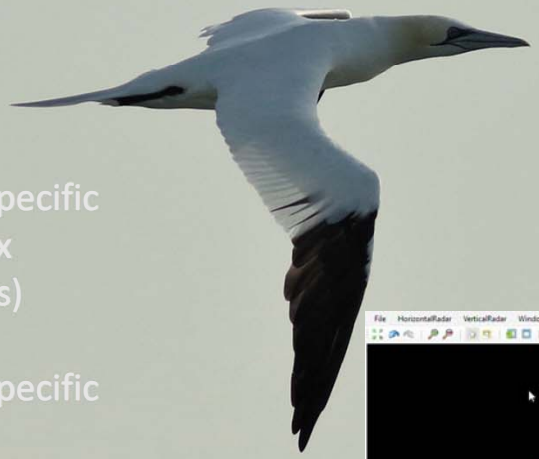
Fractions of radar tracks



63-73% of the tracks during daytime
= 27-37% nocturnal activity
of local birds

33-49% nocturnal migration in
spring and autumn

Applicability of results



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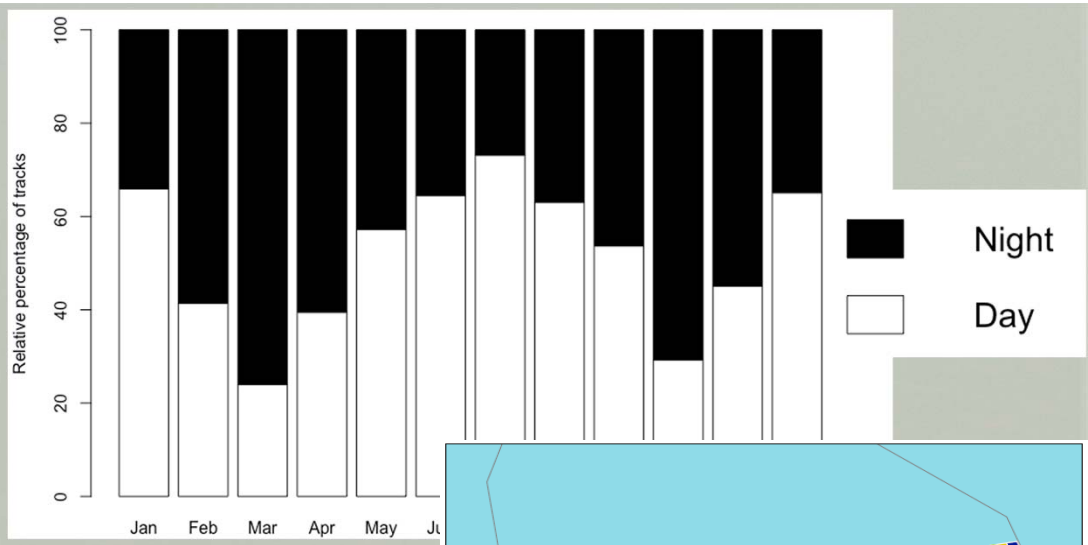

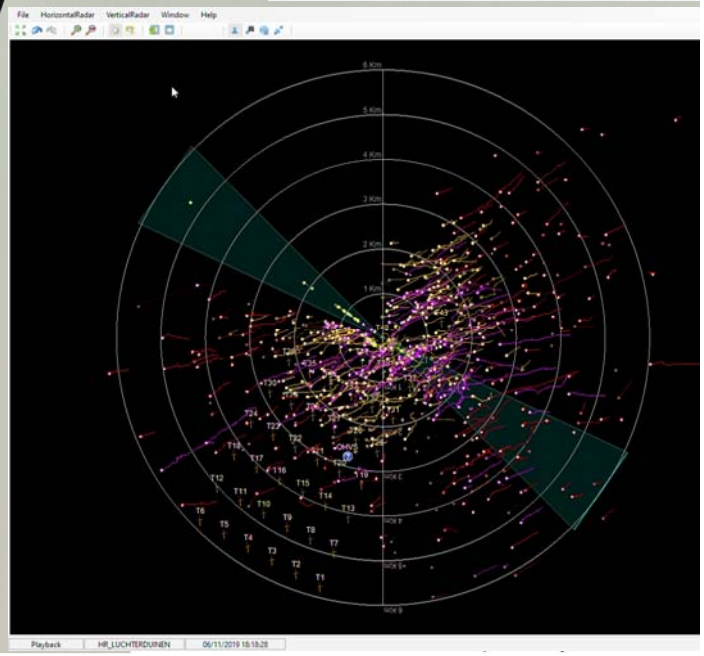

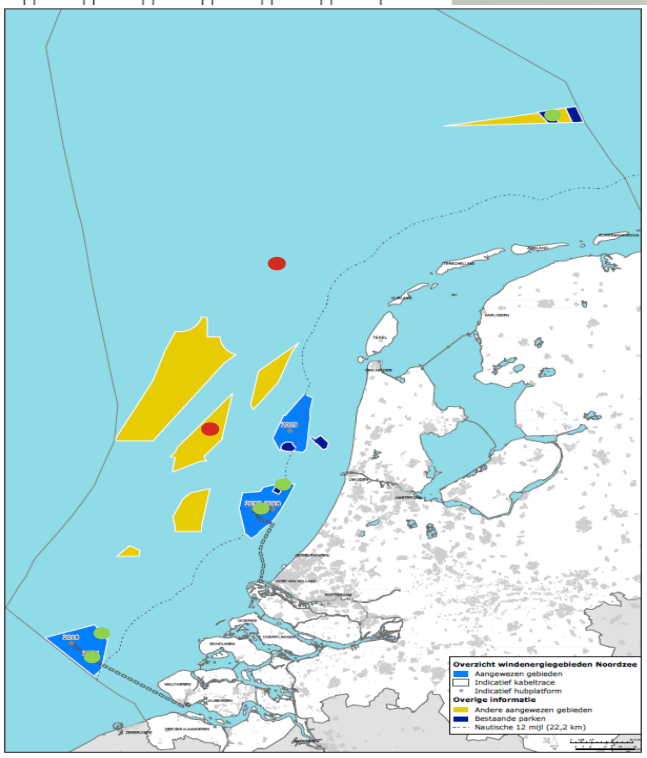

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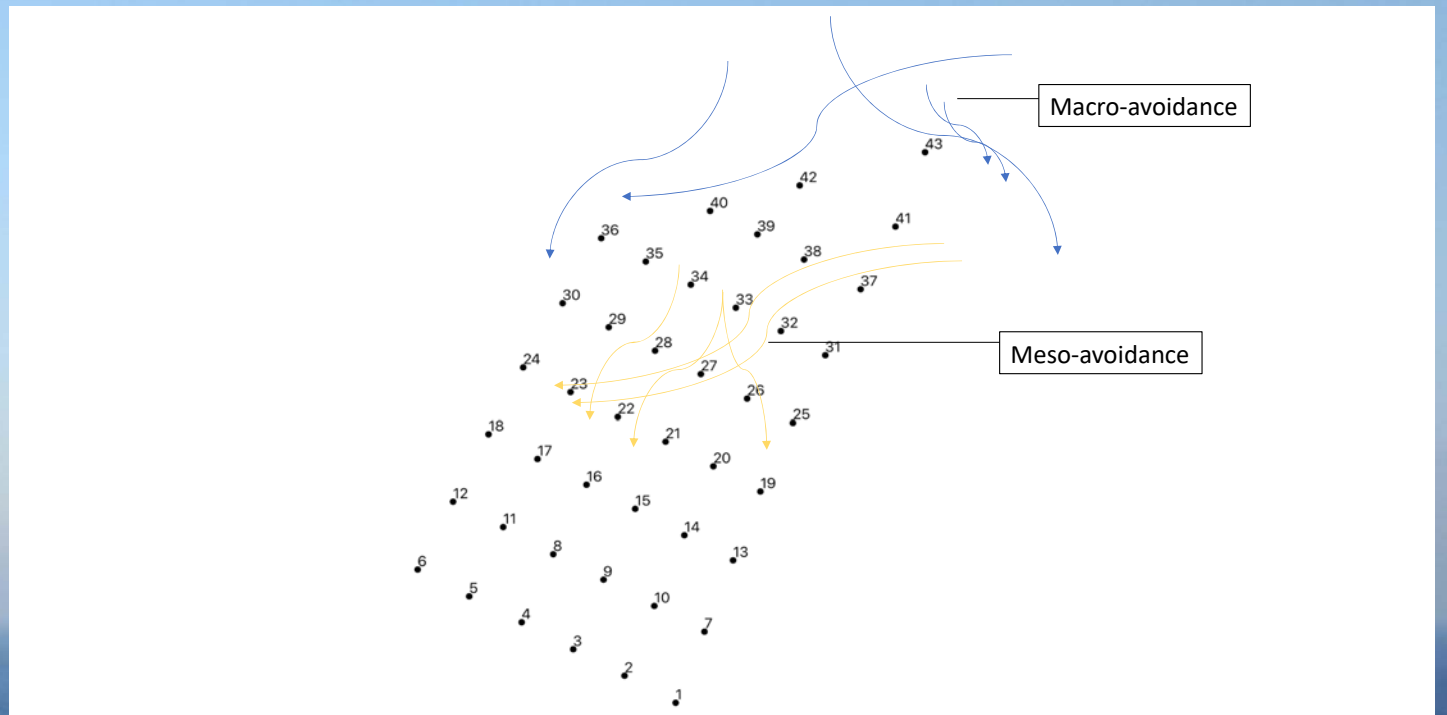
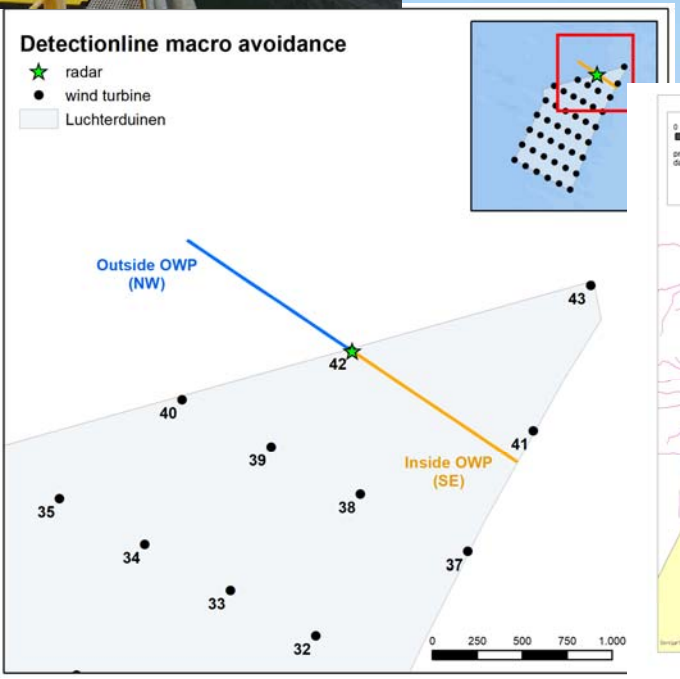
4. Measuring avoidance

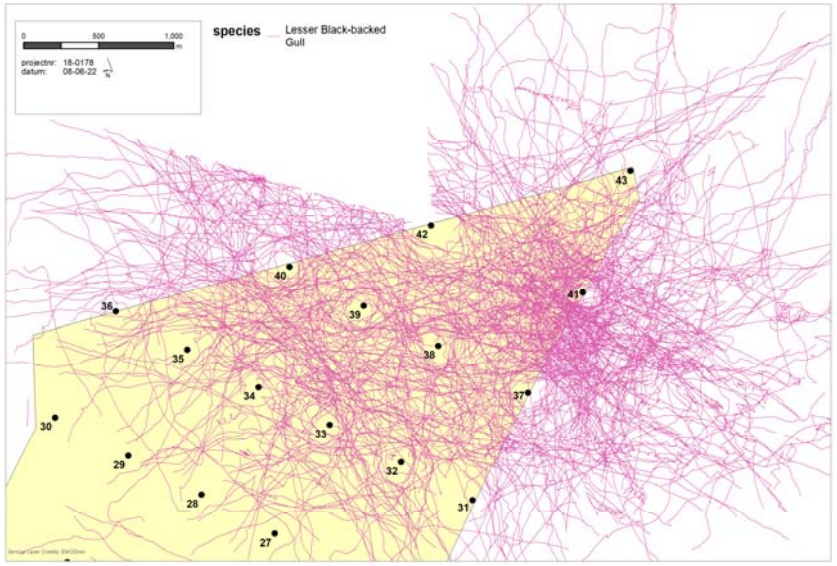


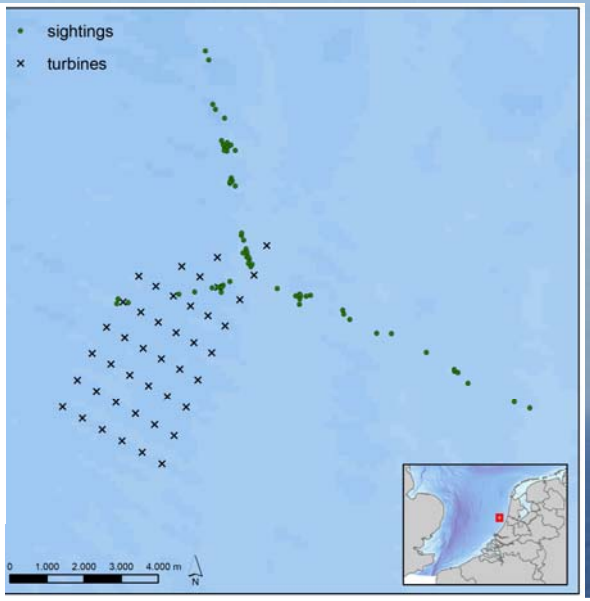
4. Macro-avoidance

radar measurements

visual observations





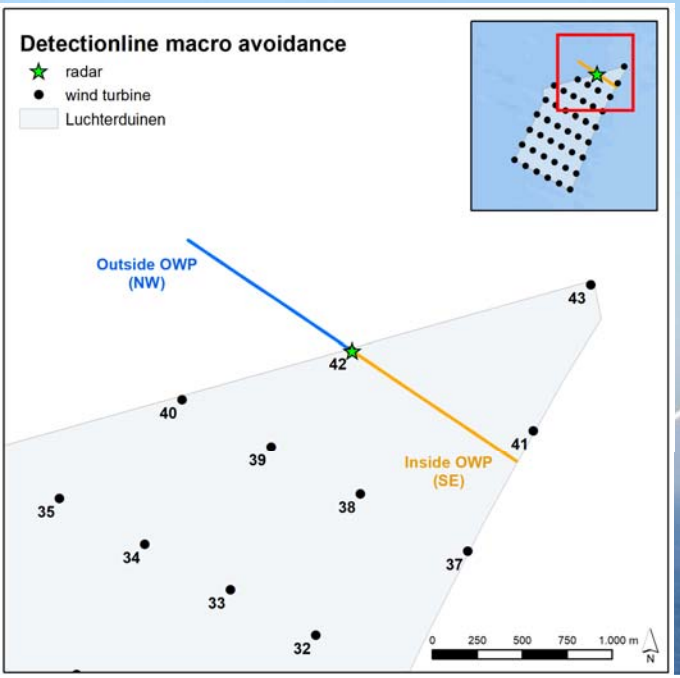


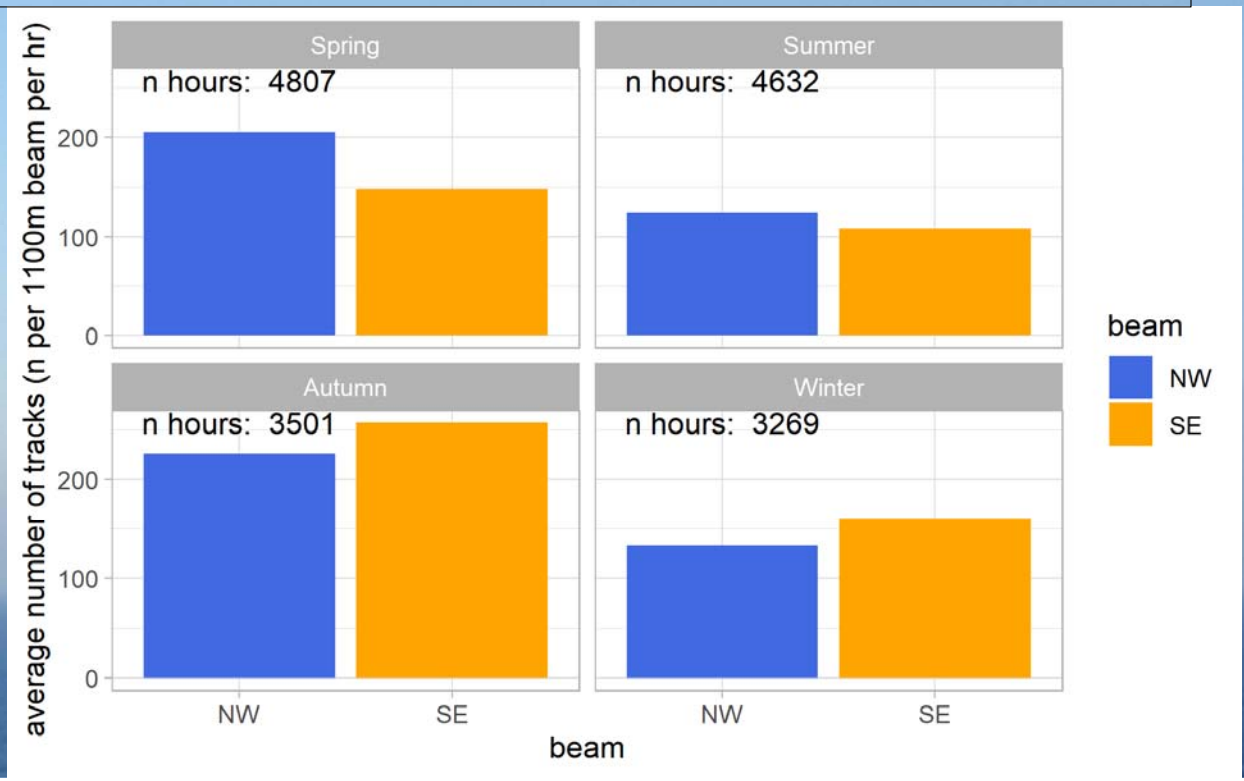
4. Macro-avoidance

radar measurements

not species-specific

10% lower MTR inside the wind farm than outside



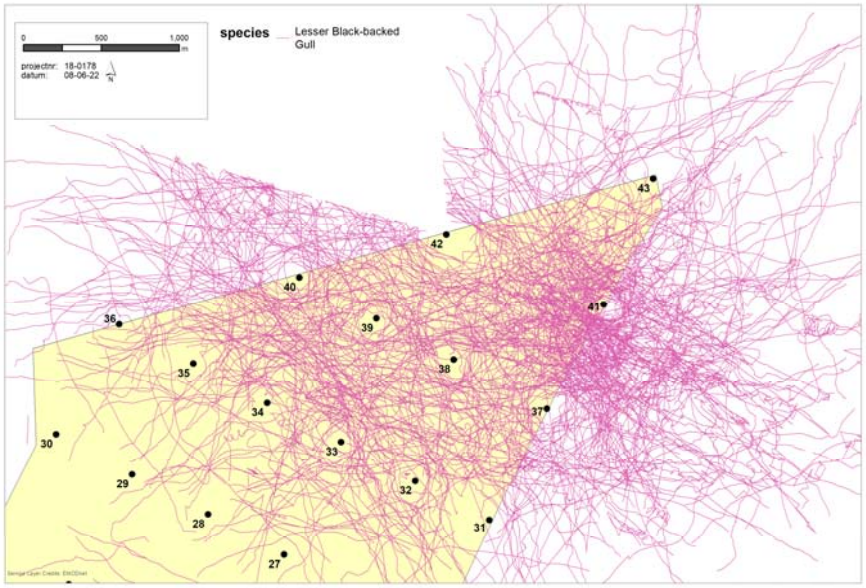


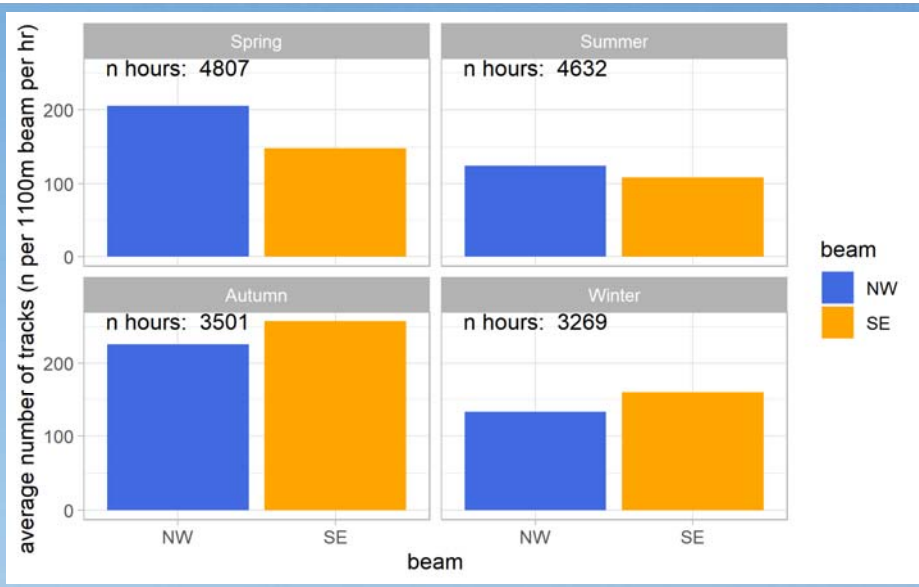
4. Macro-avoidance

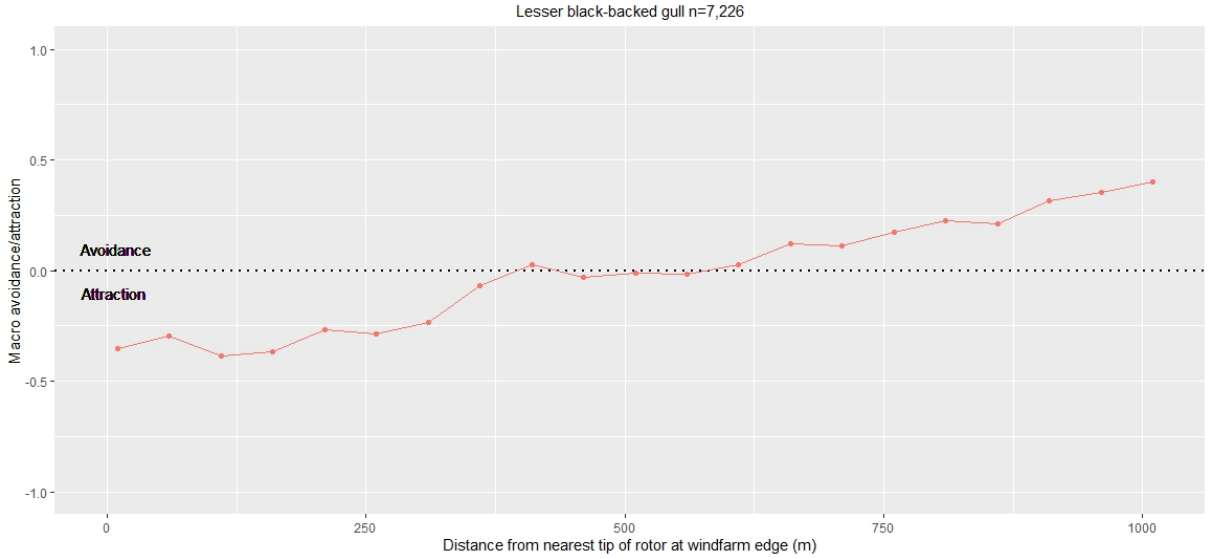
radar measurements

species-specific

low sample size





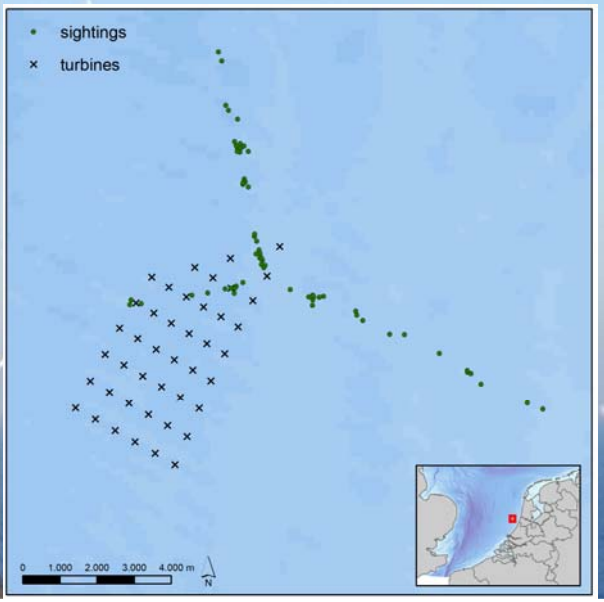


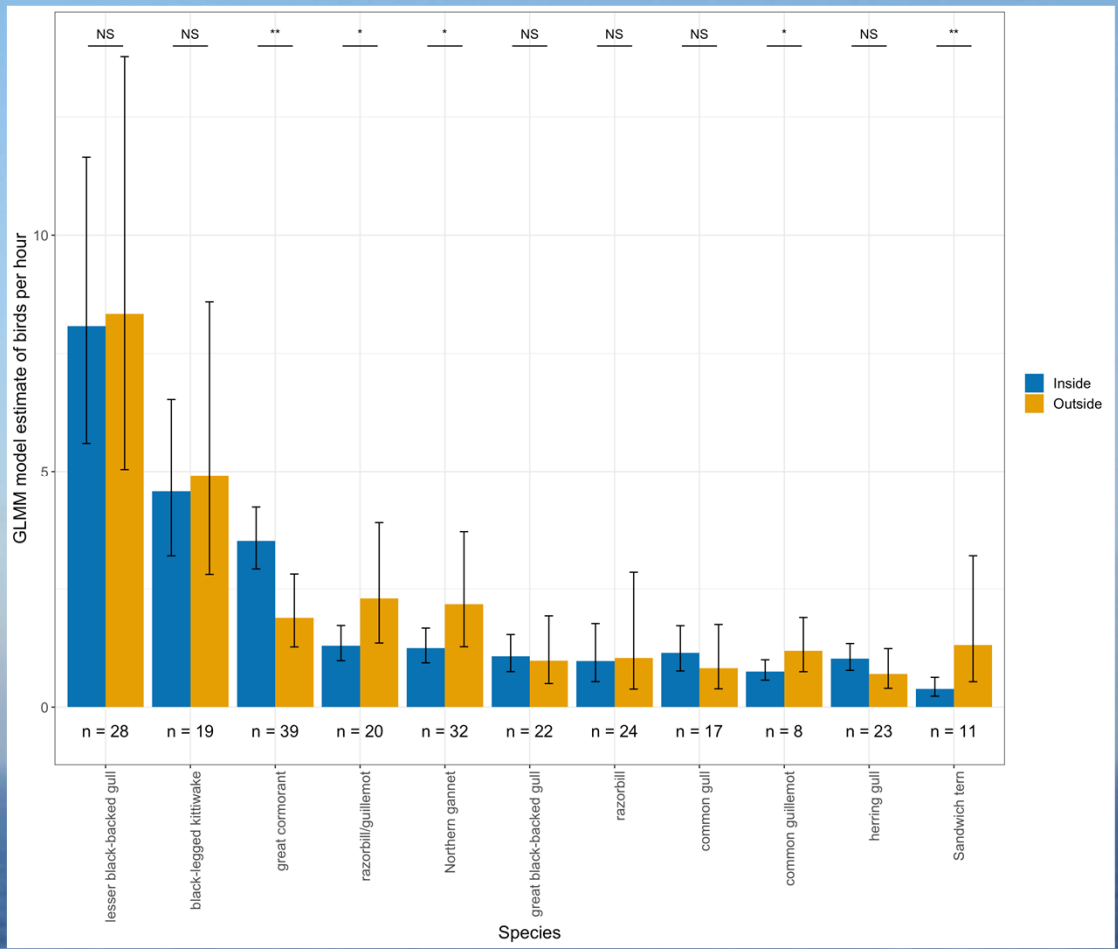
4. Macro-avoidance

visual observations

species-specific

larger sample size



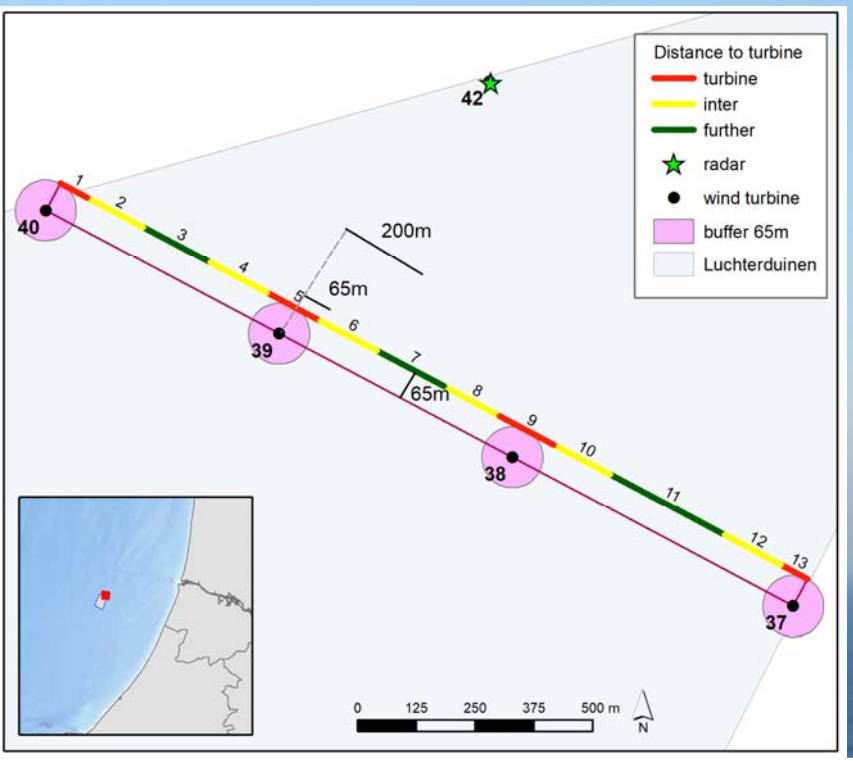


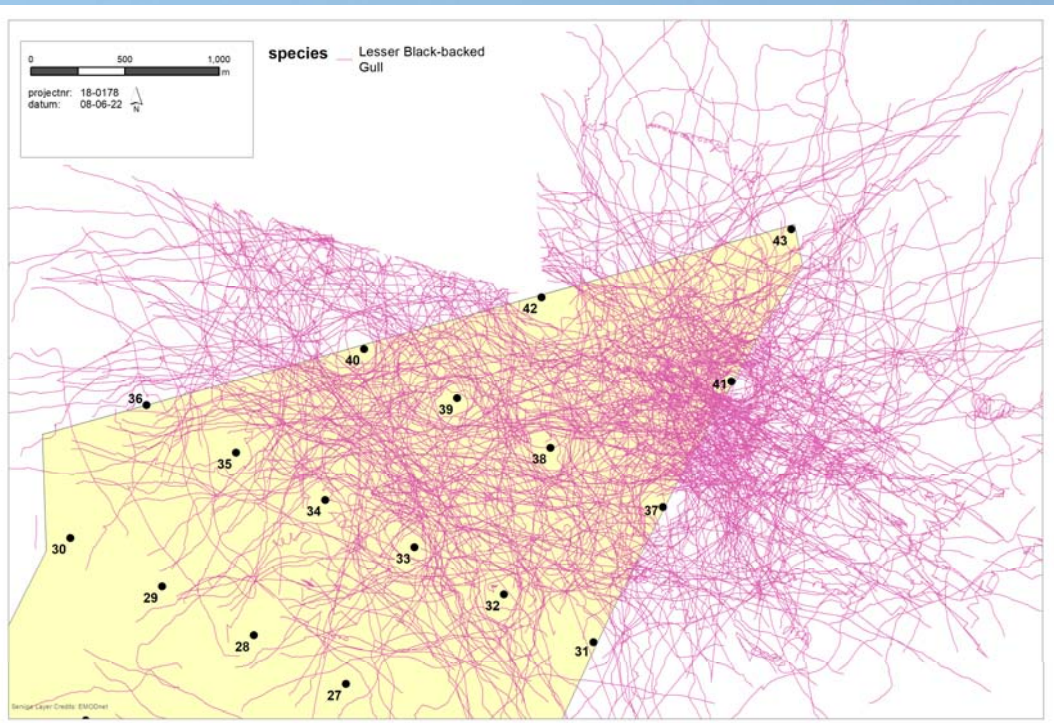
4. Meso-avoidance

radar measurements

not species-specific

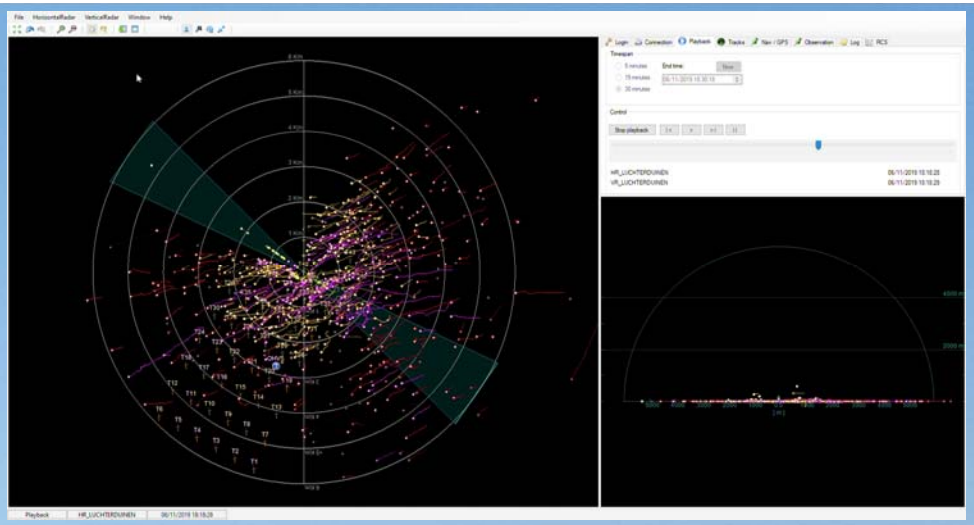
species-specific

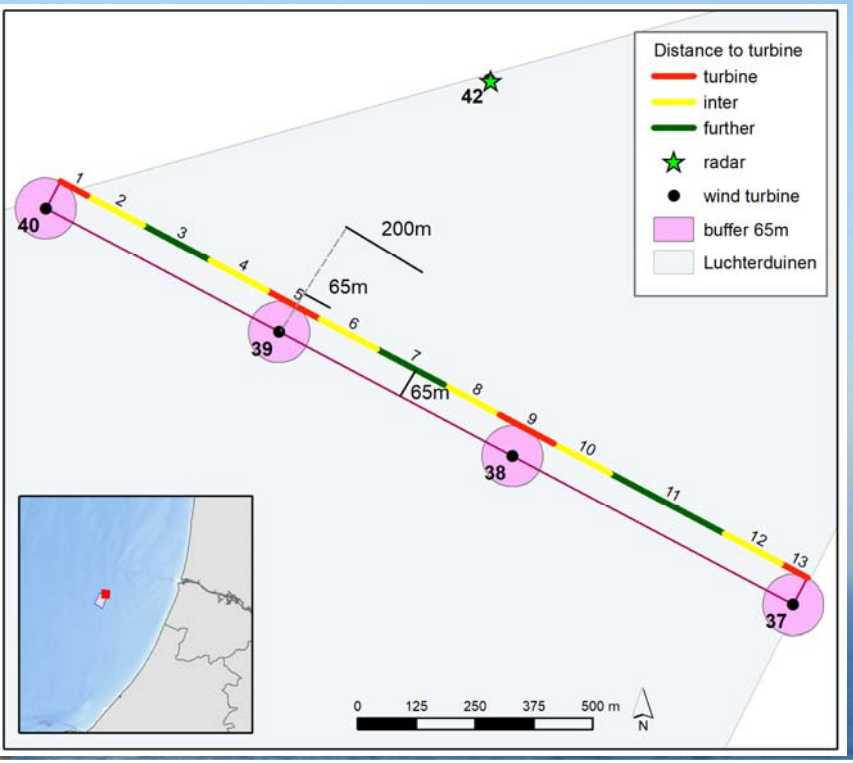




Meso-avoidance

not species-specific but also during the night





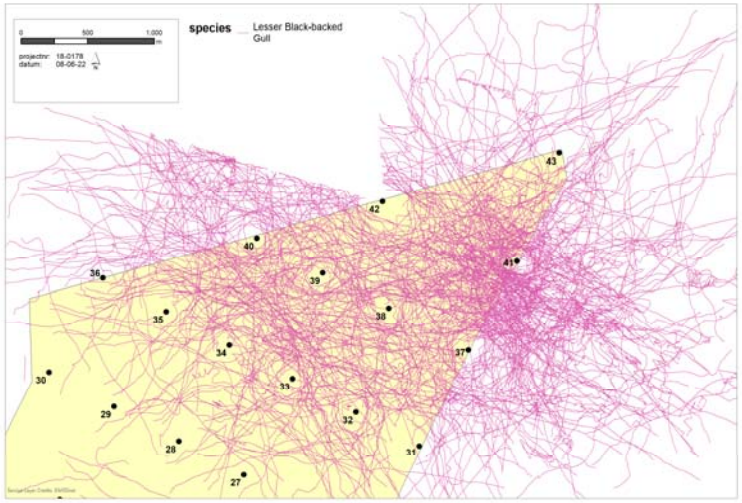
Segment relative to the nearest turbine	length (m)	n tracks	density (n tracks per m per hour)
Turbine segment	390	88,252	0.02303
Inter segment	810	272,561	0.03425
Further segment	600	223,032	0.03783

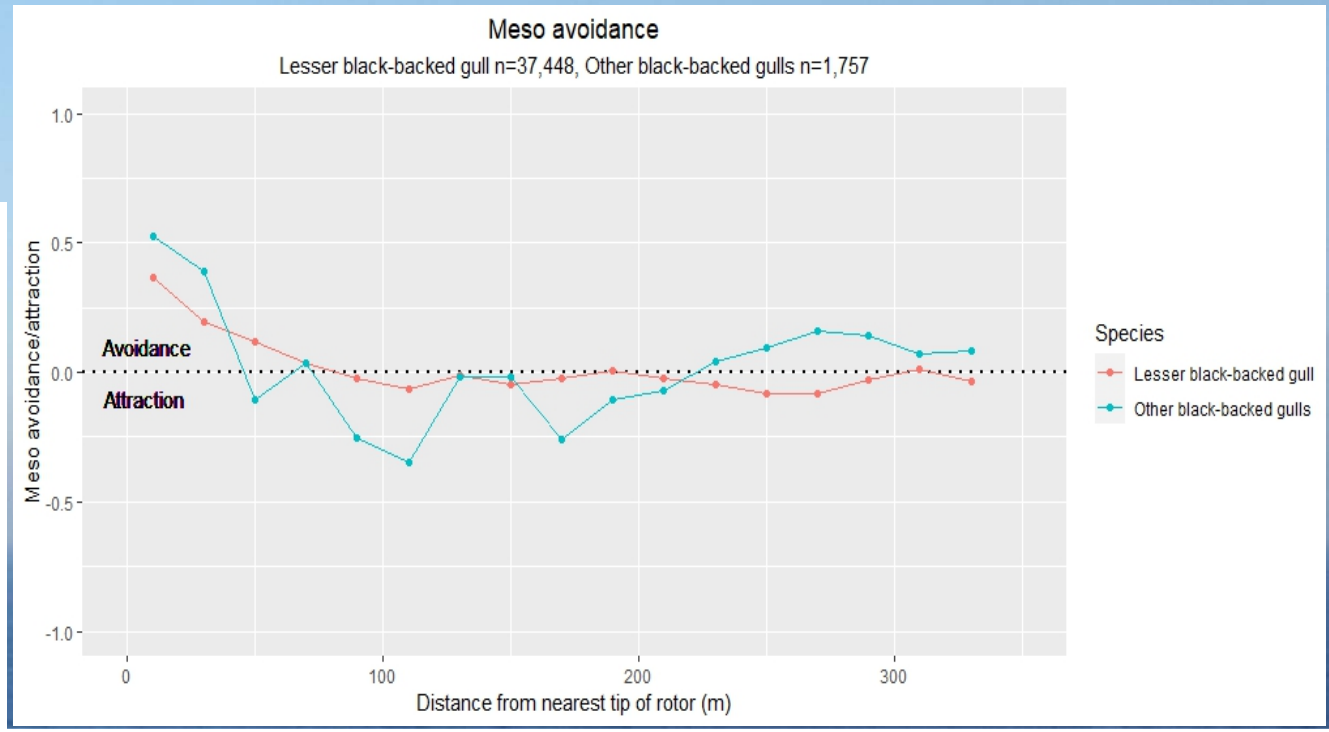
meso-avoidance level:
60% lower intensity close to turbines

Meso-avoidance

- Most gulls fly comfortably in between turbine lines
- Meso-avoidance at distances closer than 50 m from the rotor-swept zone

Horizontal radar measurements

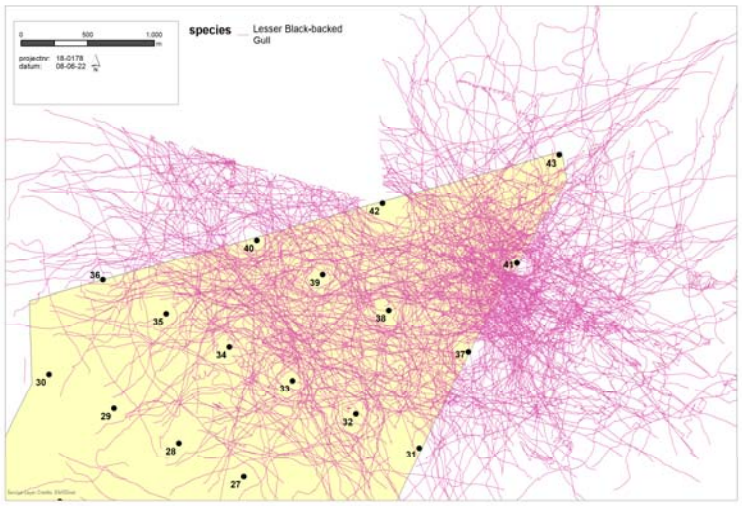


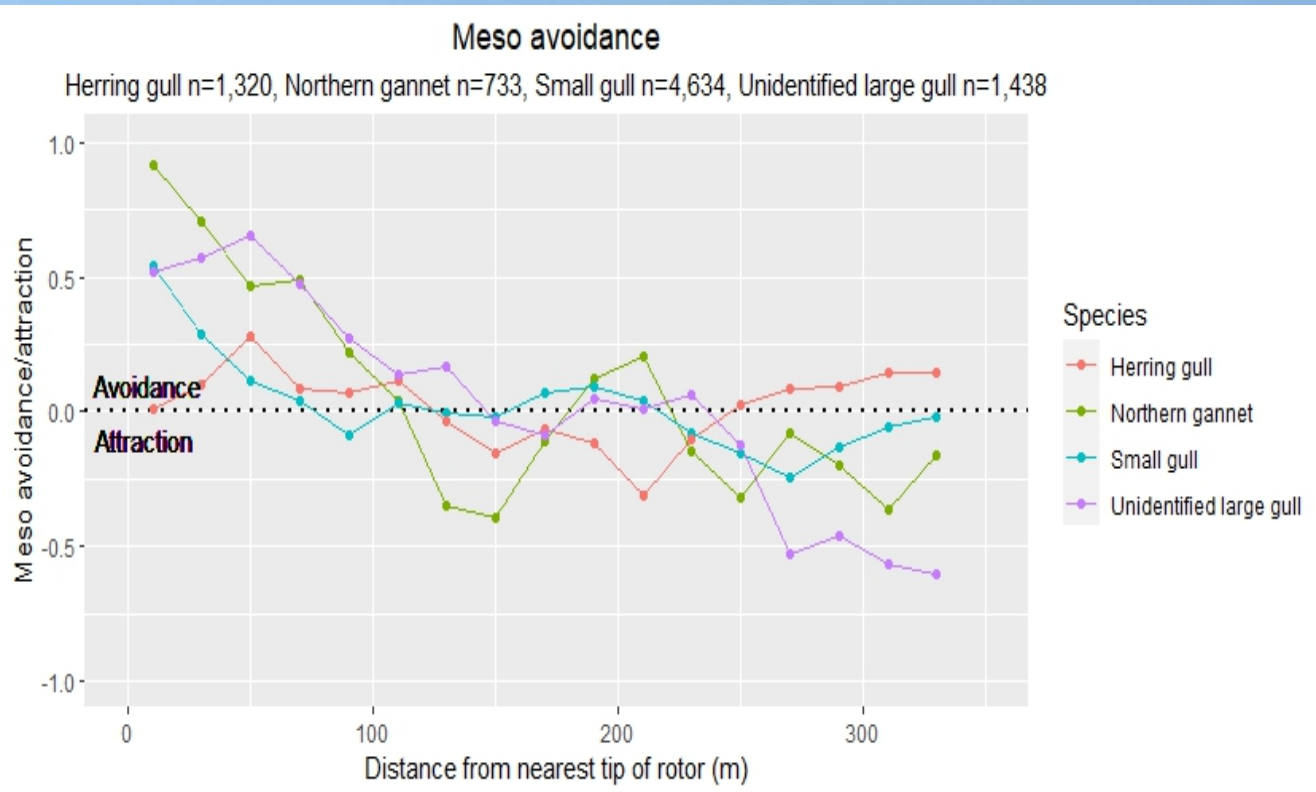


Meso-avoidance

- Most birds within wind farm fly comfortably in between turbine lines
- Meso-avoidance at distances of 50-130 m from the rotor-swept zone

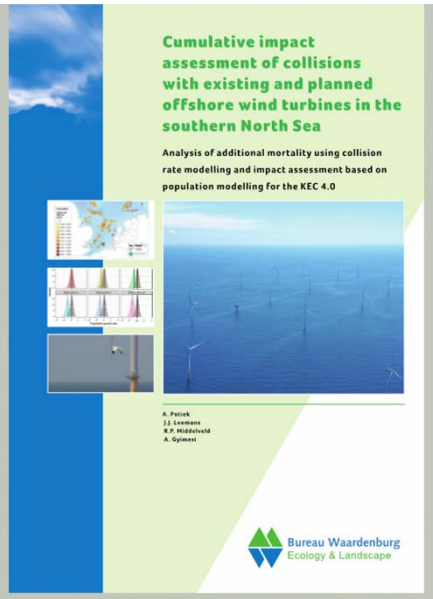
Horizontal radar measurements

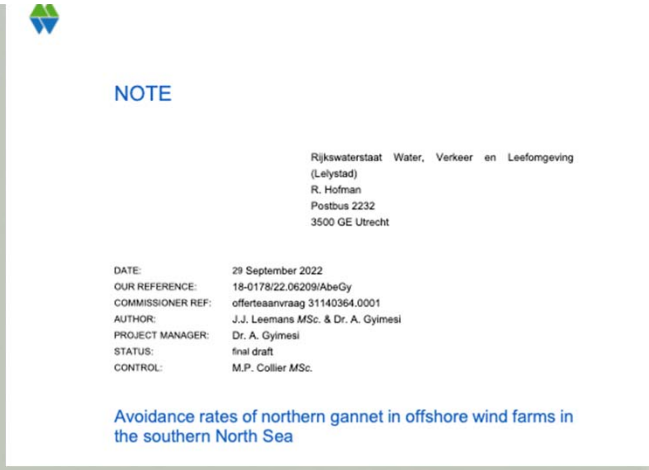




Applicability of results

1. Species-specific fluxes
2. Flight characteristics
3. Avoidance behaviour





NOTE

Rijkswaterstaat Water, Verkeer en Leefomgeving
(Lelystad)
R. Hofman
Postbus 2232
3500 GE Utrecht

DATE: 29 September 2022
OUR REFERENCE: 18-0178/22.06209/AbeGy
COMMISSIONER REF: offerteaanvraag 31140364.0001
AUTHOR: J.J. Leemans *MSc.* & Dr. A. Gyimesi
PROJECT MANAGER: Dr. A. Gyimesi
STATUS: final draft
CONTROL: M.P. Collier *MSc.*

Avoidance rates of northern gannet in offshore wind farms in the southern North Sea

Wozep: Filling knowledge gaps

Improving CRM parameters → Predicting collisions and population-level effects

Species	Macro	Meso - low	Meso - high	Micro	Total - low	Total - high
black-backed gulls	0	0.50	0.75	0.791	0.896	0.948
herring gull	0	0.50	0.75	0.847	0.924	0.962
northern gannet	0.3657	0.90	0.90	-	0.937*	0.937*

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Ecology

Thank you for your attention!

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