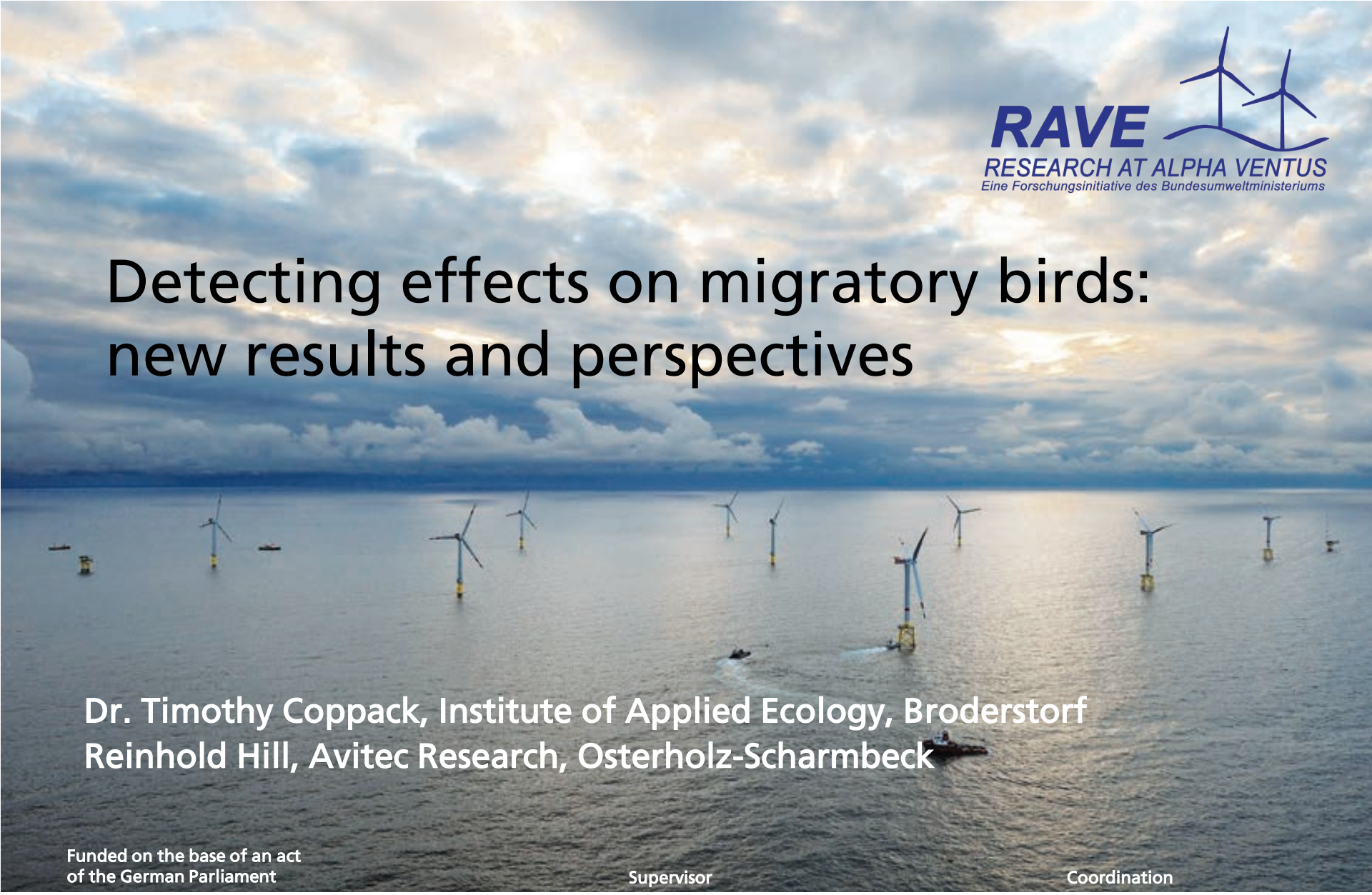


RAVE
RESEARCH AT ALPHA VENTUS
Eine Forschungsinitiative des Bundesumweltministeriums

Detecting effects on migratory birds: new results and perspectives

Dr. Timothy Coppack, Institute of Applied Ecology, Broderstorf
Reinhold Hill, Avitec Research, Osterholz-Scharmbeck

Funded on the base of an act of the German Parliament

Supervisor

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

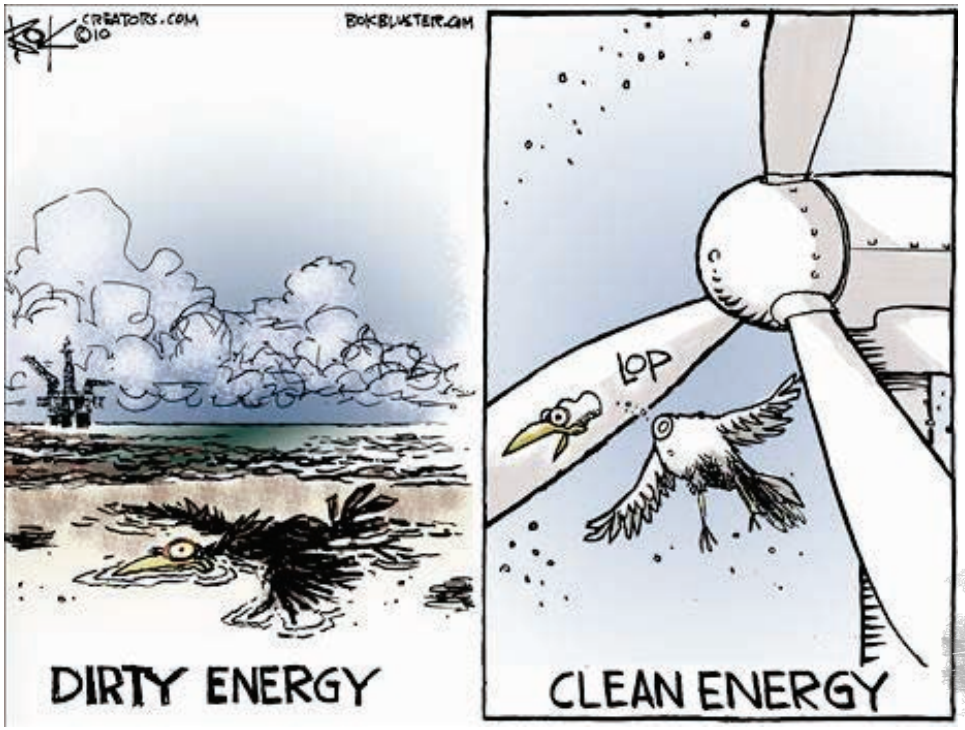
Projektträger Jülich Forschungszentrum Jülich

Coordination

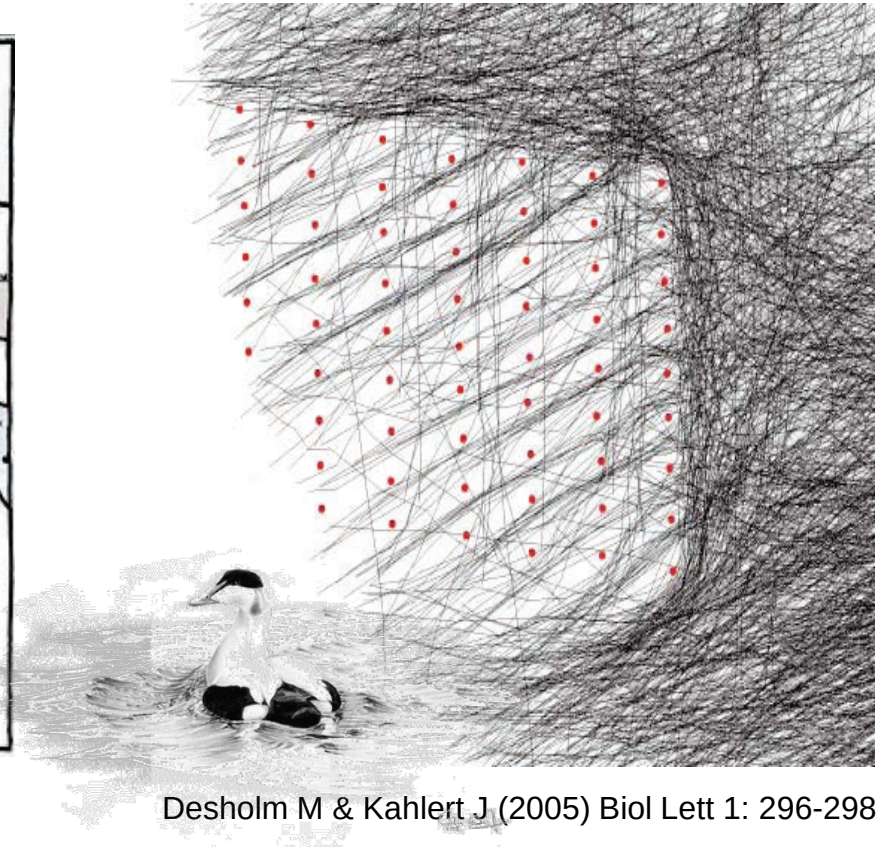
Fraunhofer IWES

Migratory birds and wind turbines

The risk of collision



Barriers to movement

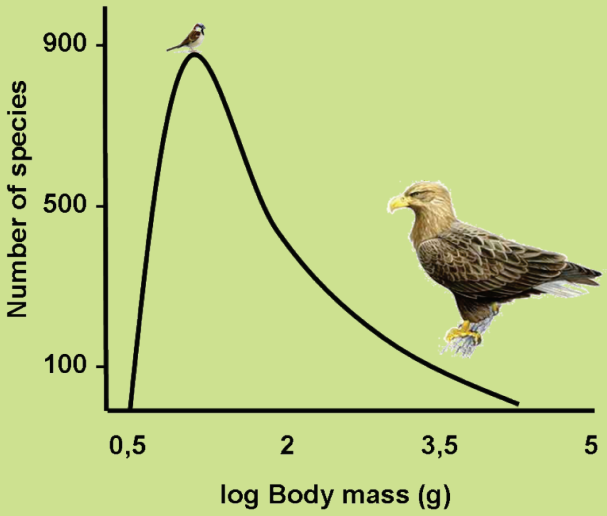


Desholm M & Kahlert J (2005) Biol Lett 1: 296-298

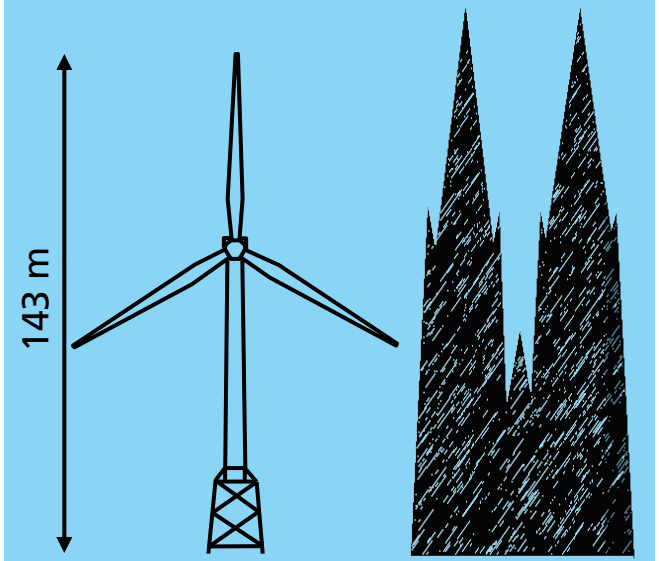
Studying migratory birds and wind turbines: 3 Challenges

(1) Species diversity

Heligoland Island: 426 species



(2) Size and dimension



(3) Nocturnality

ca. 2/3 of all migrants

Blackburn TM & Gaston K (1994)

Two ways of how to collect data offshore

Ship-based surveys

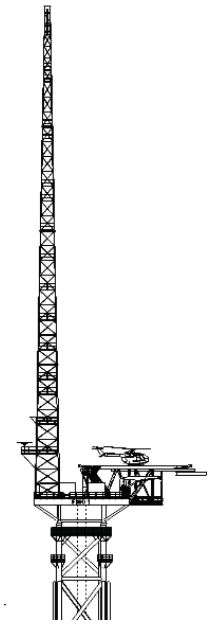
lots of space, little time

StUK 3

Station-based observations

lots of time, little space

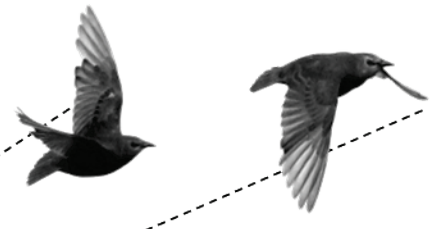
FINO

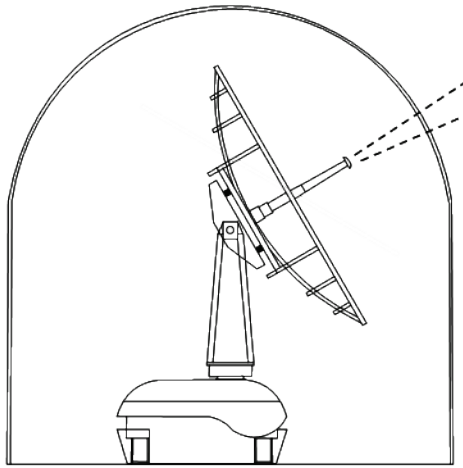


Dedicated Bird Radar “BirdScan” on FINO 1

Dedicated Bird Radar "BirdScan" on FINO 1

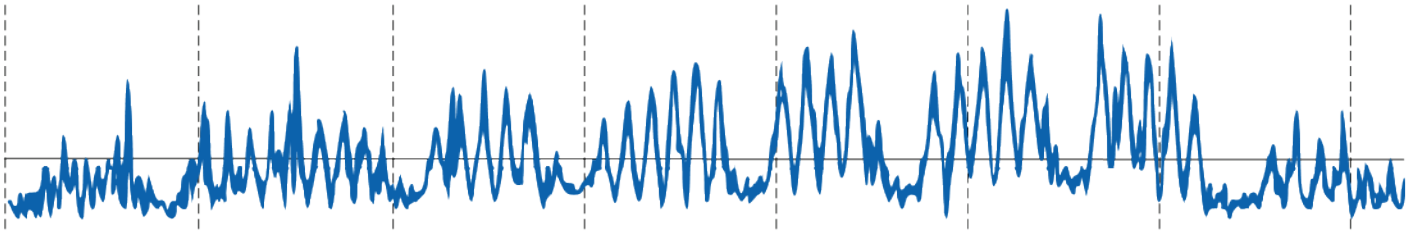
Fixed Pencil Beam Radar





Advantages

- Specific echo signatures of non-passerines, passerines, insects
- Defined detection volume (as compared to marine surveillance radar)



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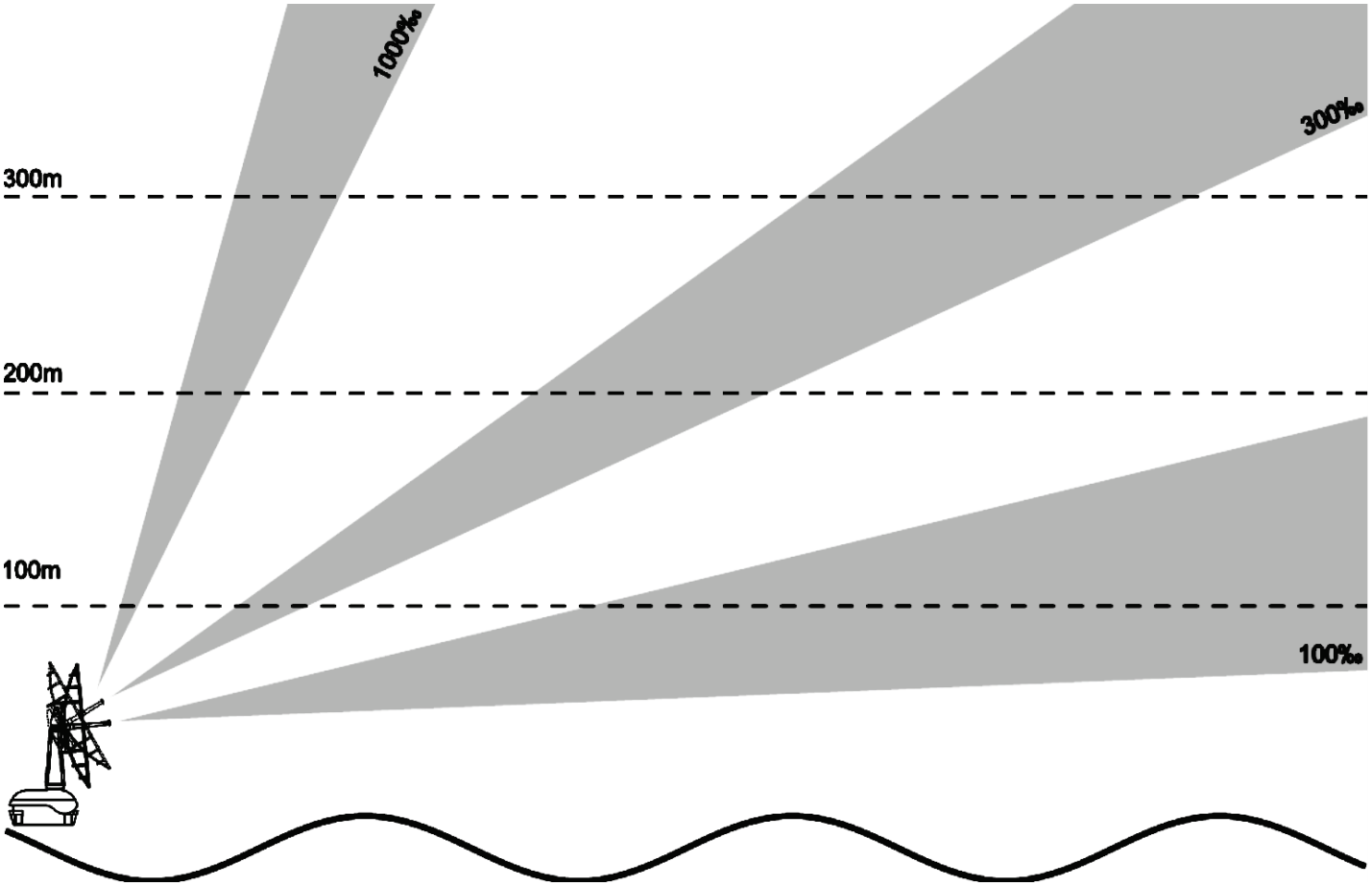
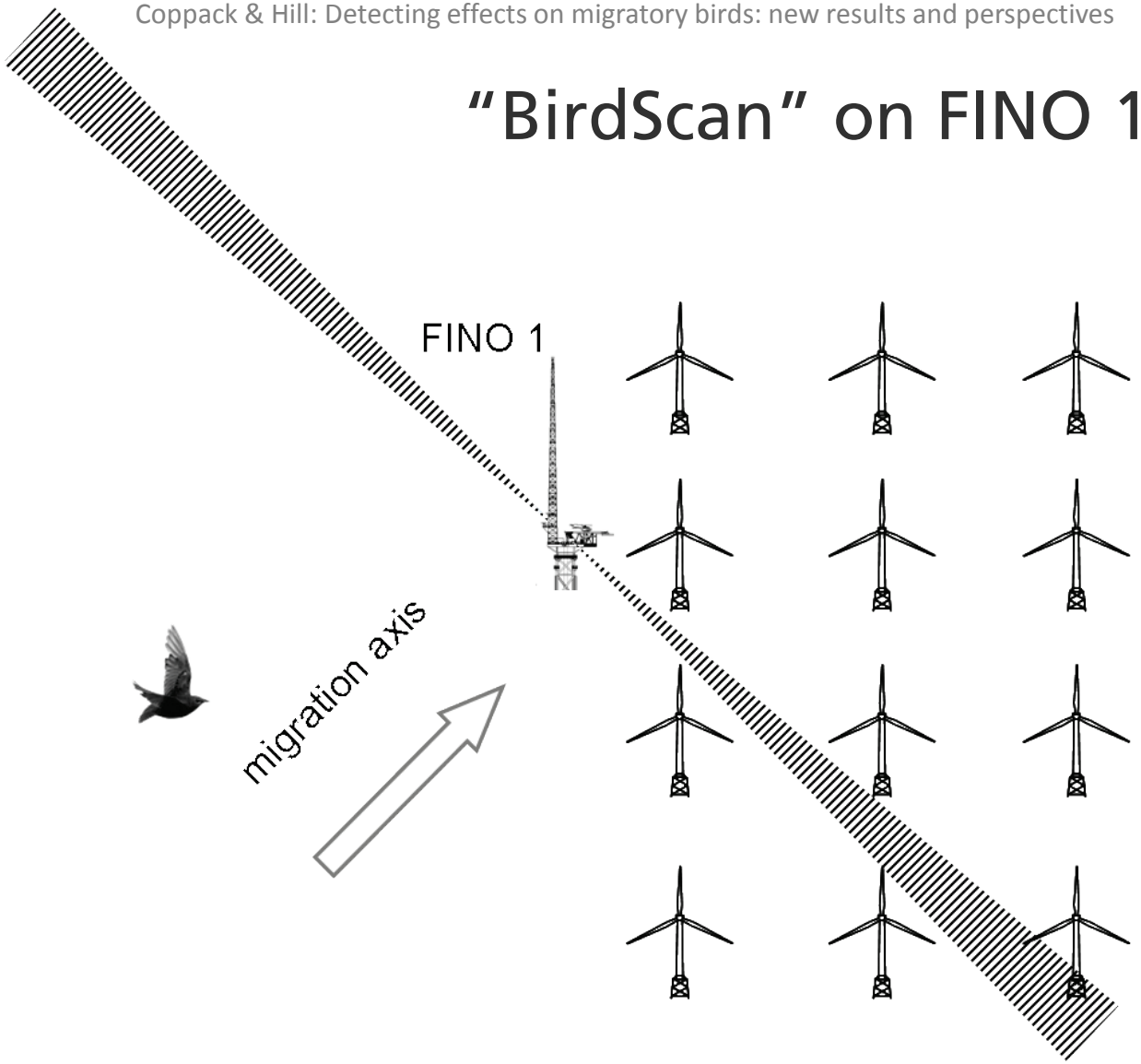
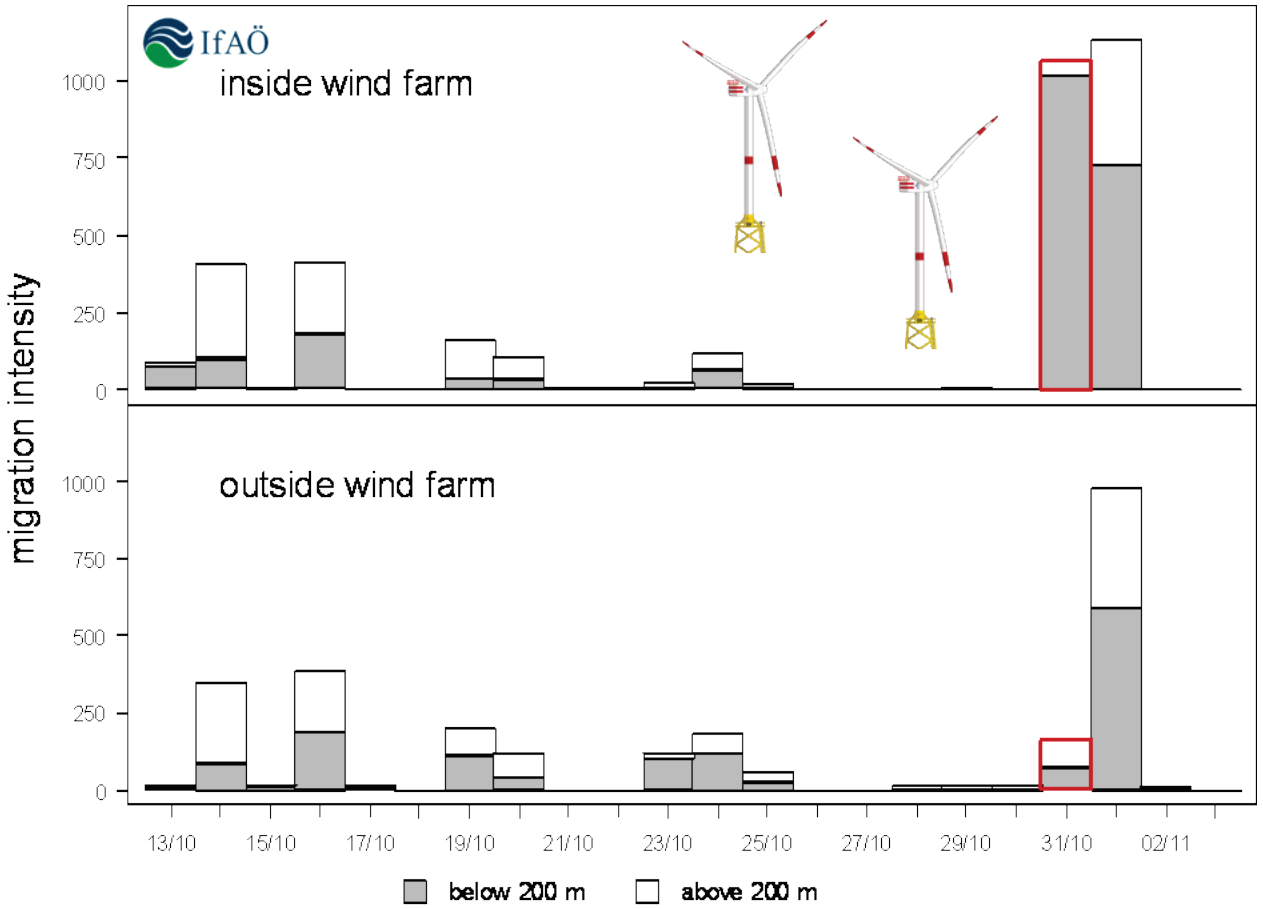
"BirdScan" on FINO 1



"BirdScan" on FINO 1



November 1 2010: mass migration with accumulation of birds inside wind farm



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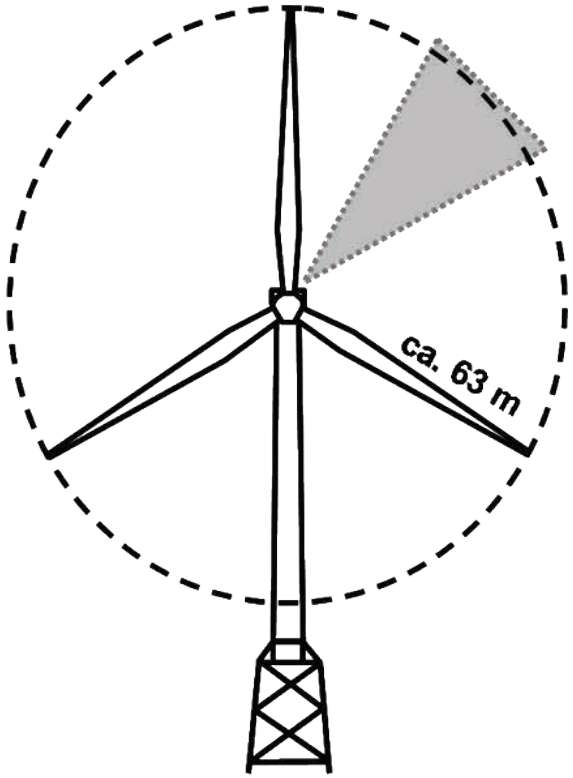
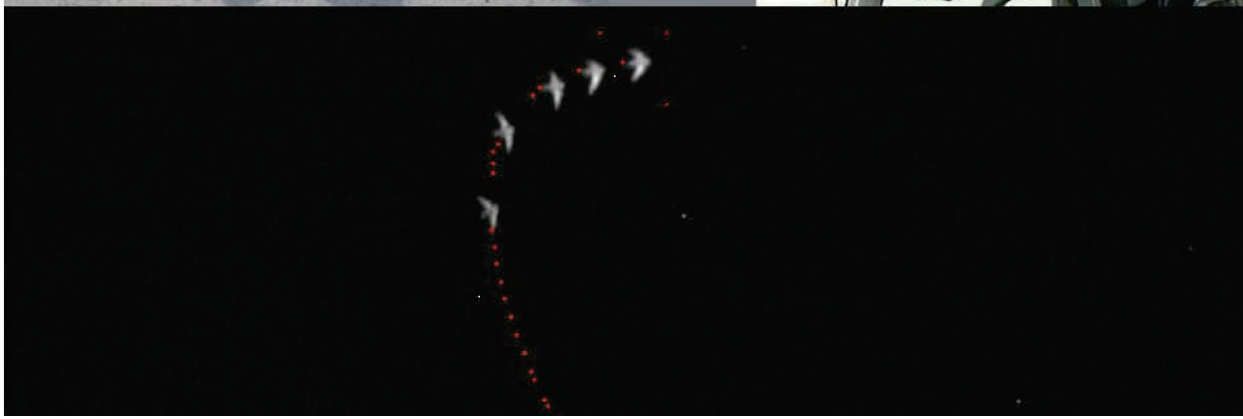
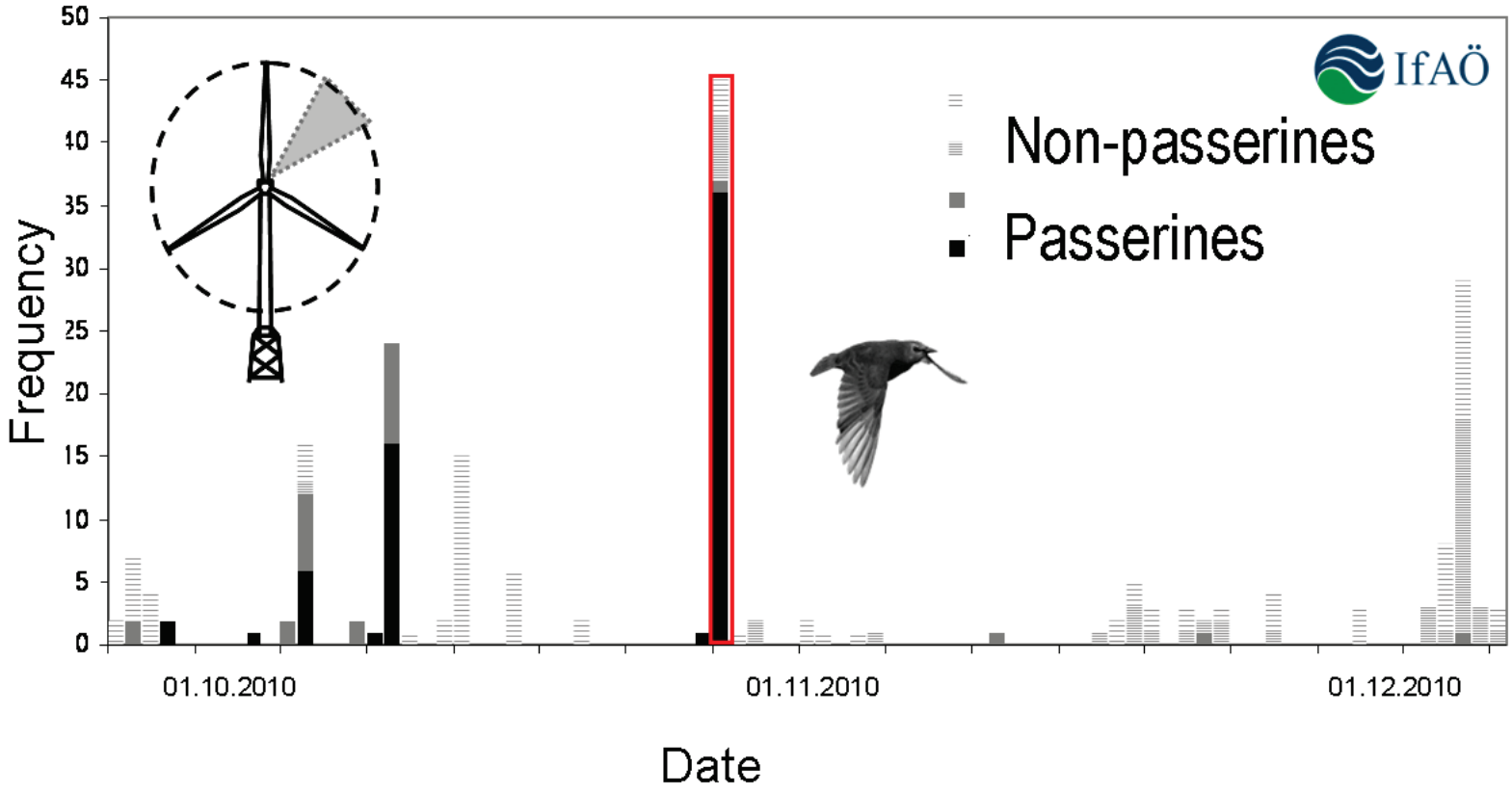
Visual automatic recording system “VARS”

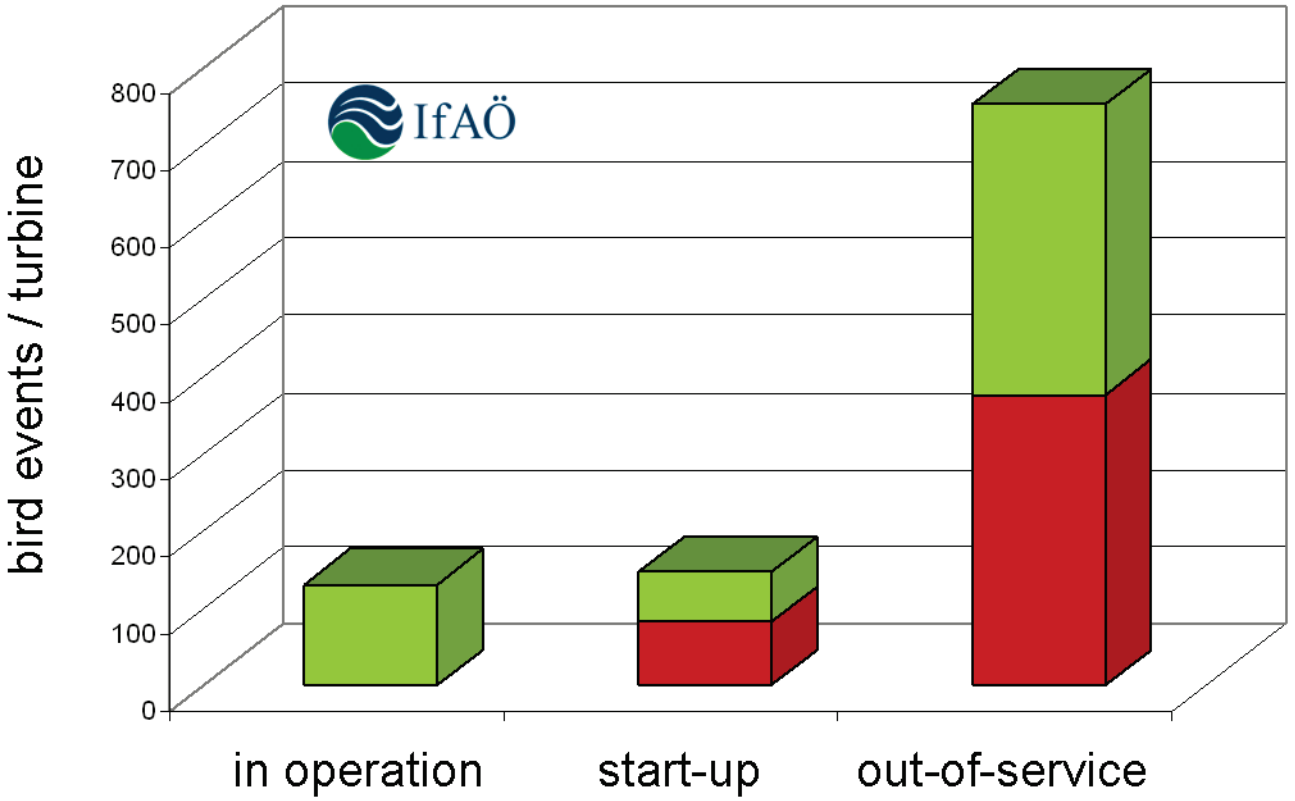


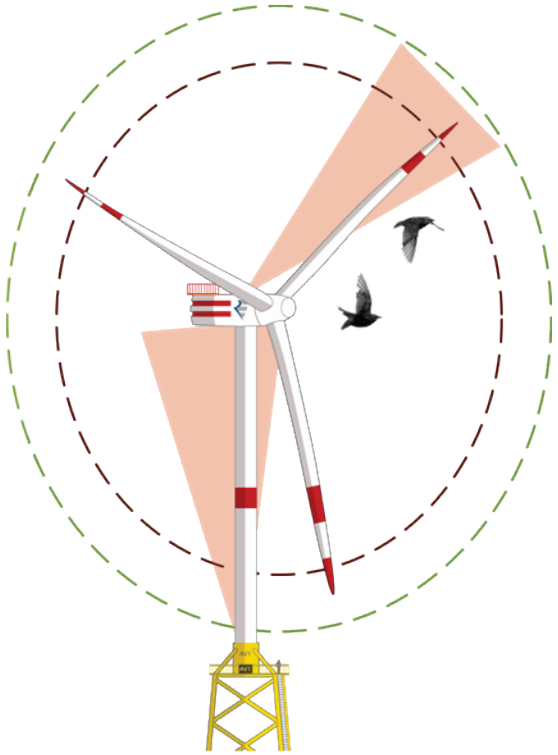


November 1 2010: mass migration with accumulation of birds near turbine



First evidence for a “scarecrow effect”





[Sep 27 2010 – Dec 16 2010]

Conclusions and further demands

1. We need a deeper understanding of the relative contribution of phototactic vs displacement effects of running turbines to overall collision risk.

2. As more and more offshore wind farms are installed, we need to shift methodology away from sporadic ship-based surveys (currently implemented in StUK 3) to **station-based long-term studies** at representative wind farms.

3. At the same time, we need to reduce among-site variation in methods in order to generate comparable data over larger temporal and spatial scales (e.g., weather radar).


FINO 2
18.05.10
IfAÖ

Offshore bird migration

Predisposition:

genetic determination for times of migratory restlessness (species or population specific)

Weather:

Weather conditions affect diurnal and annual migration behaviour, as well as migratory routes.

Result:

There is enormous variability in daily and annual intensities and species composition of migrating birds - within and between years

Non-continuous studies therefore face special difficulties.

Before-after-comparisons are hardly explicable in a causal way.

Methods of detection

Radar systems:
vertical & horizontal

Intensity, time of day, flight-height profiles, phenology

(heading), species spectra

Acoustic systems:
Microphone

Species spectra (at night + limited), phenology

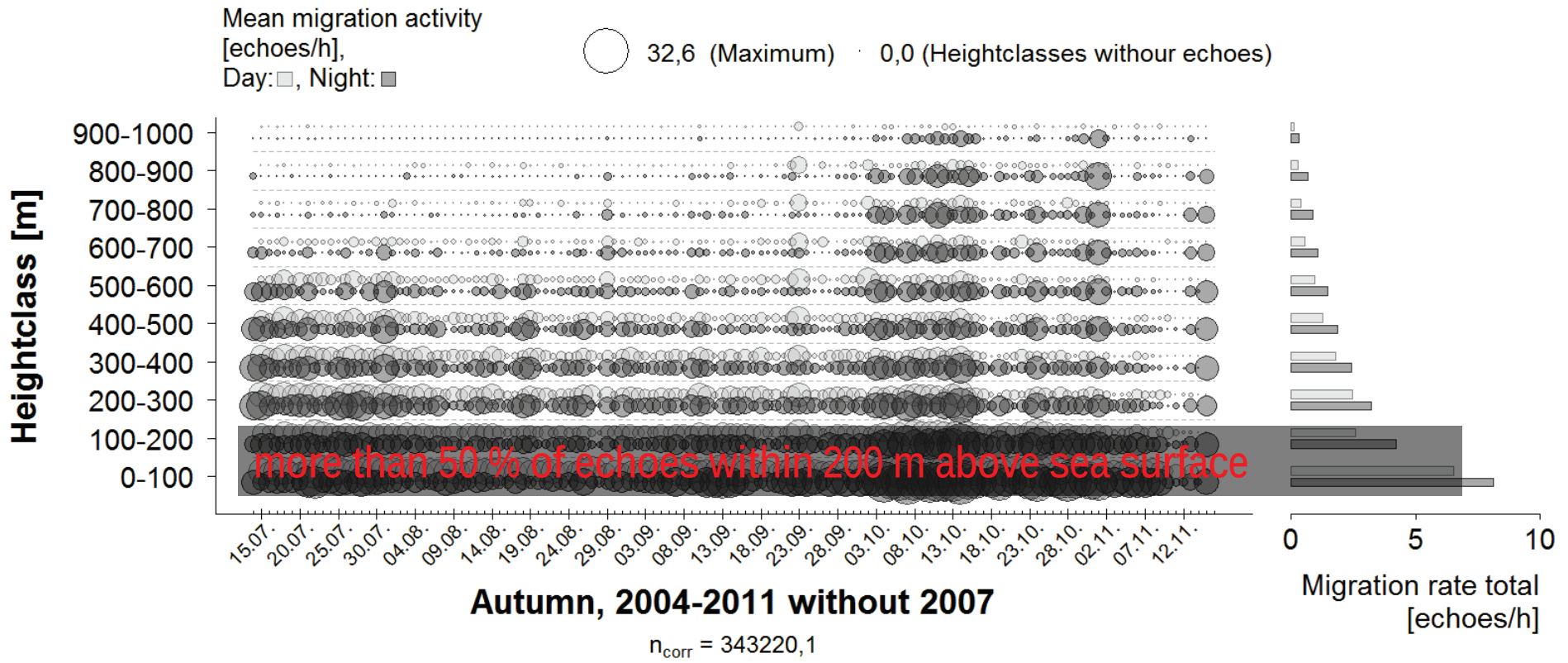
Intensity, heading, flight-height profiles, (time of night)

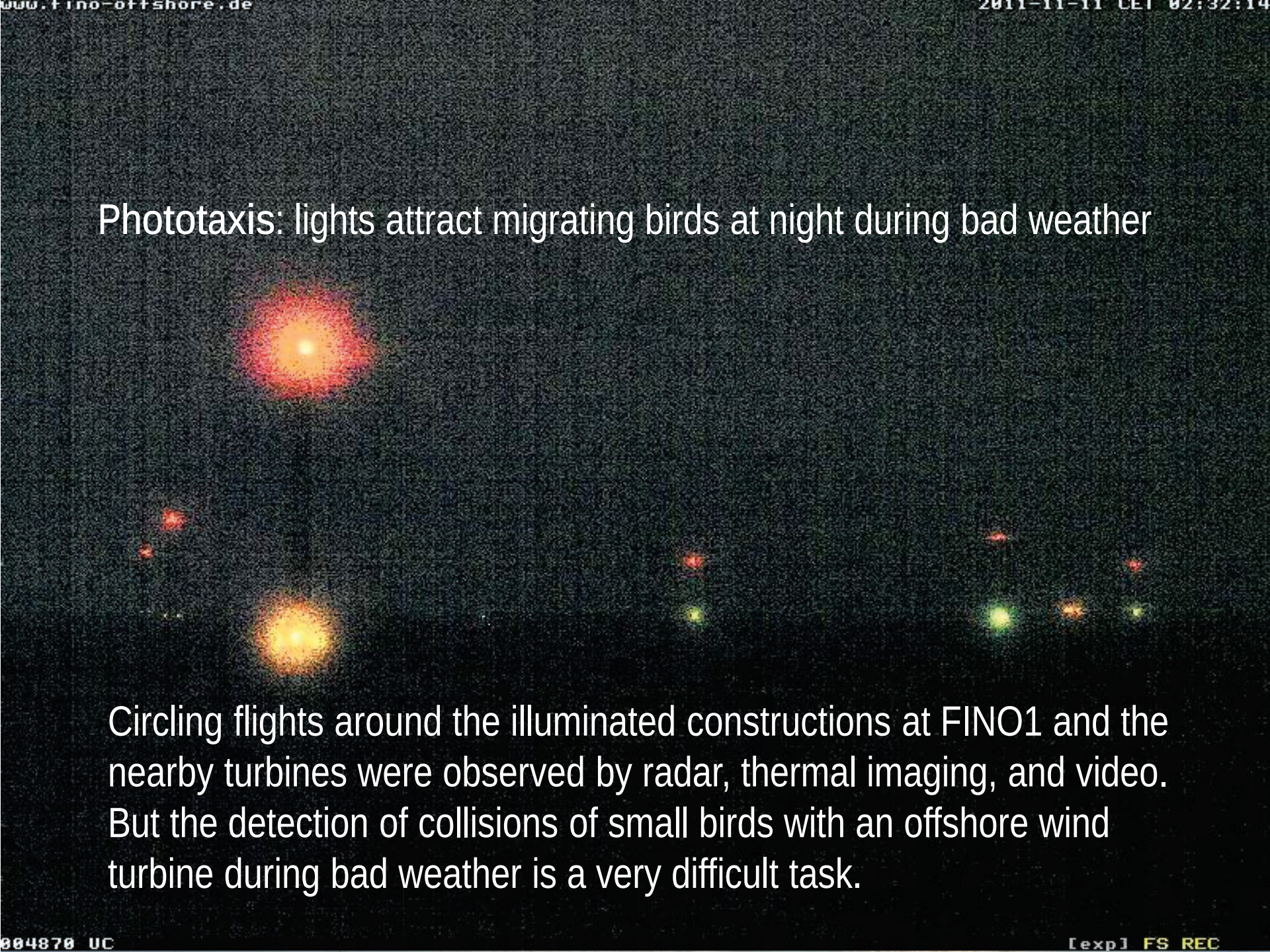
Visual observation:
Seawatch

Species spectra (at day), phenology, intensity, time of day, heading, height

Height profile > 200 m

Results from FINO1





Phototaxis: lights attract migrating birds at night during bad weather

Circling flights around the illuminated constructions at FINO1 and the nearby turbines were observed by radar, thermal imaging, and video. But the detection of collisions of small birds with an offshore wind turbine during bad weather is a very difficult task.

Risk of Collision

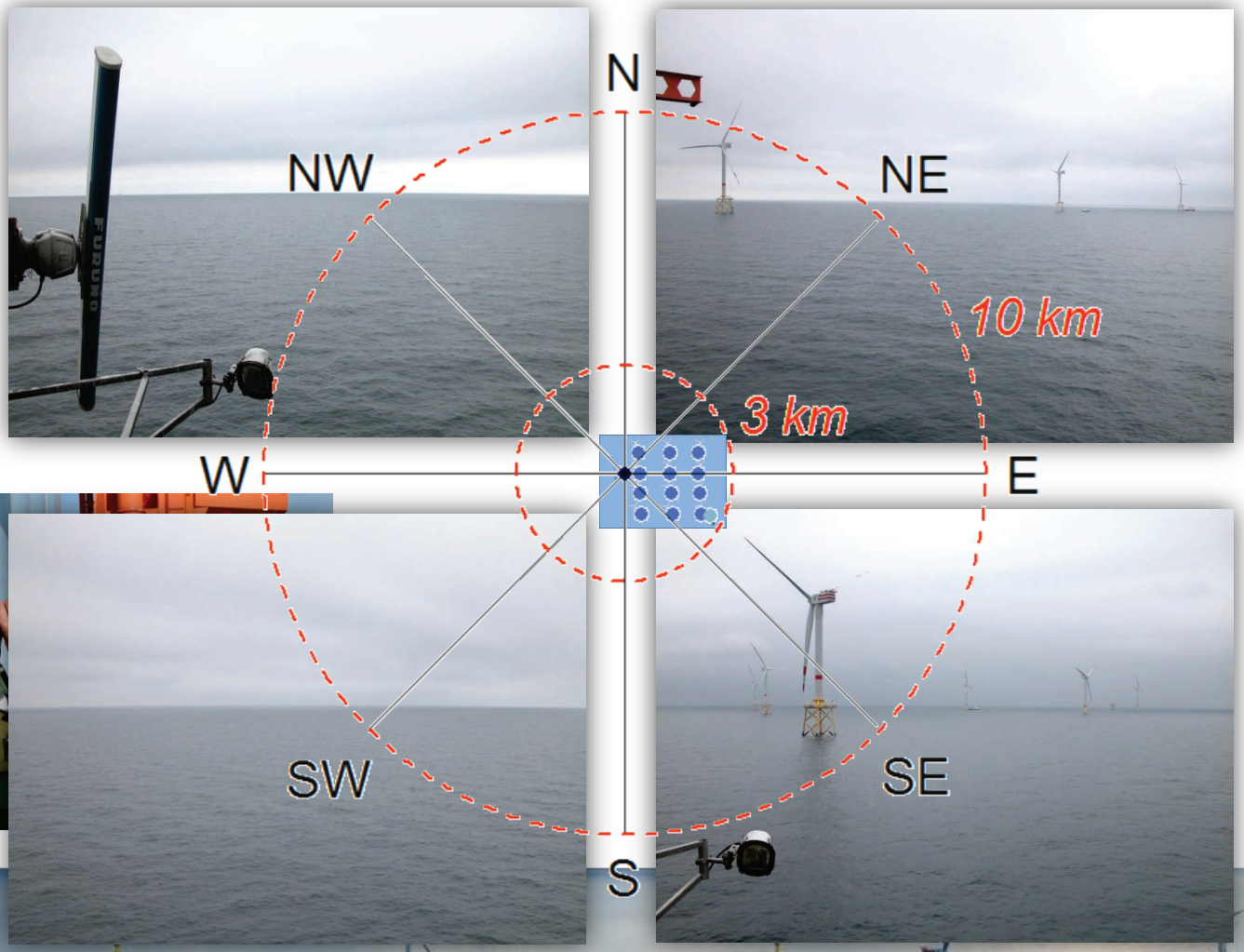
Photo: F.K. Jachmann

Since 2003 (FINO1):

- > 1,000 dead birds found
- 4 mass-collision events with 88-199 casualties
- Predominantly affected: Thrushes
- Risk of collision mainly during night
- The number of casualties blown away by the wind or eaten by gulls is unknown

Avoidance Behaviour

Directions of observation



Avoidance Behaviour

Avian diversity differs strongly depending on observational direction

(ANOVA, $F_{3,60} = 11{,}84$; $p < 0.001$)

Wind farm affected areas are clearly avoided

by migrating birds

(wind farm affected areas = low shares of diversity

Wind farm un-affected areas = high shares of diversity)

Conclusions and Perspectives

- There are still many open questions which can only be answered if we collect more station-based long-term data with advanced methods.

- We need to find a compromise between avian and human safety: (a) fewer lights and lower light intensity or (b) new light qualities to minimized attraction to birds in order to prevent phototaxis and collisions of birds.

- The feasibility of an “early warning system” in order to shut down the turbines in nights of mass migration needs further evaluation.

Thank you

for your attention and to all supporting partners !