Offshore Bird Radar Surveys

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Wind Finland Offshore

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Offshore Wind Farms & Birds

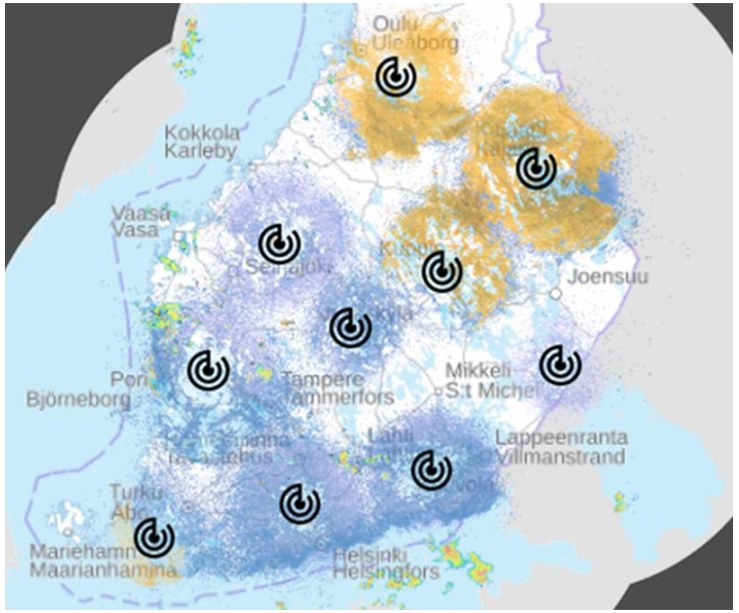
Offshore wind projects can overlap with

- Migratory corridors and resting areas
- Seabird foraging habitats

Potential risks

- Collision mortality
- Displacement effects
- Regulatory delays
- Reputational impact

Image source: Federal Agency for Nature Conservation


Oulu
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Kokkola
Karleby
Vaasa
Vasa
Joensuu
Pori
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Tampere
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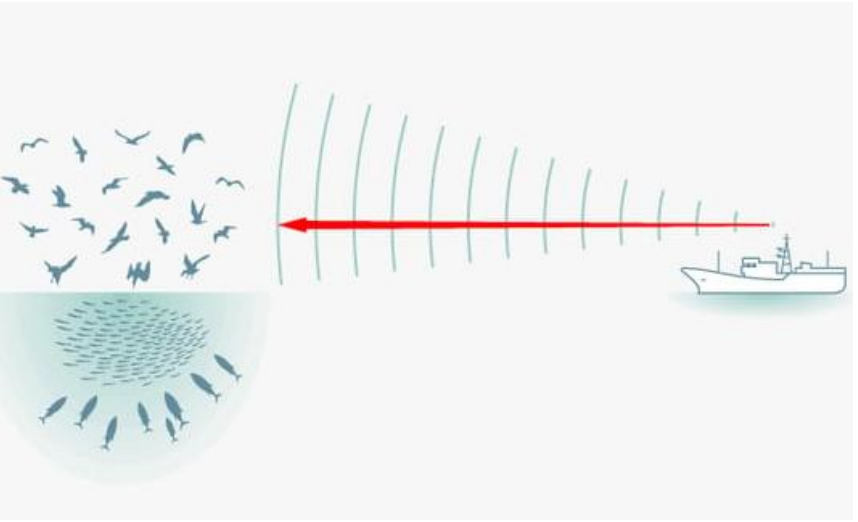
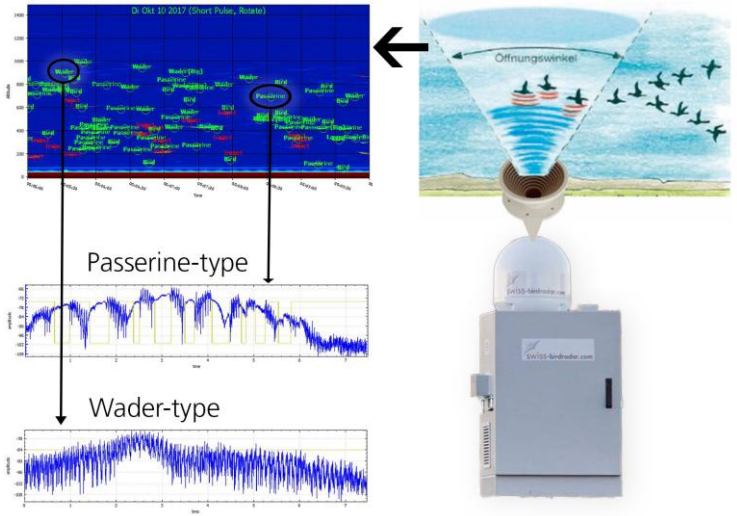
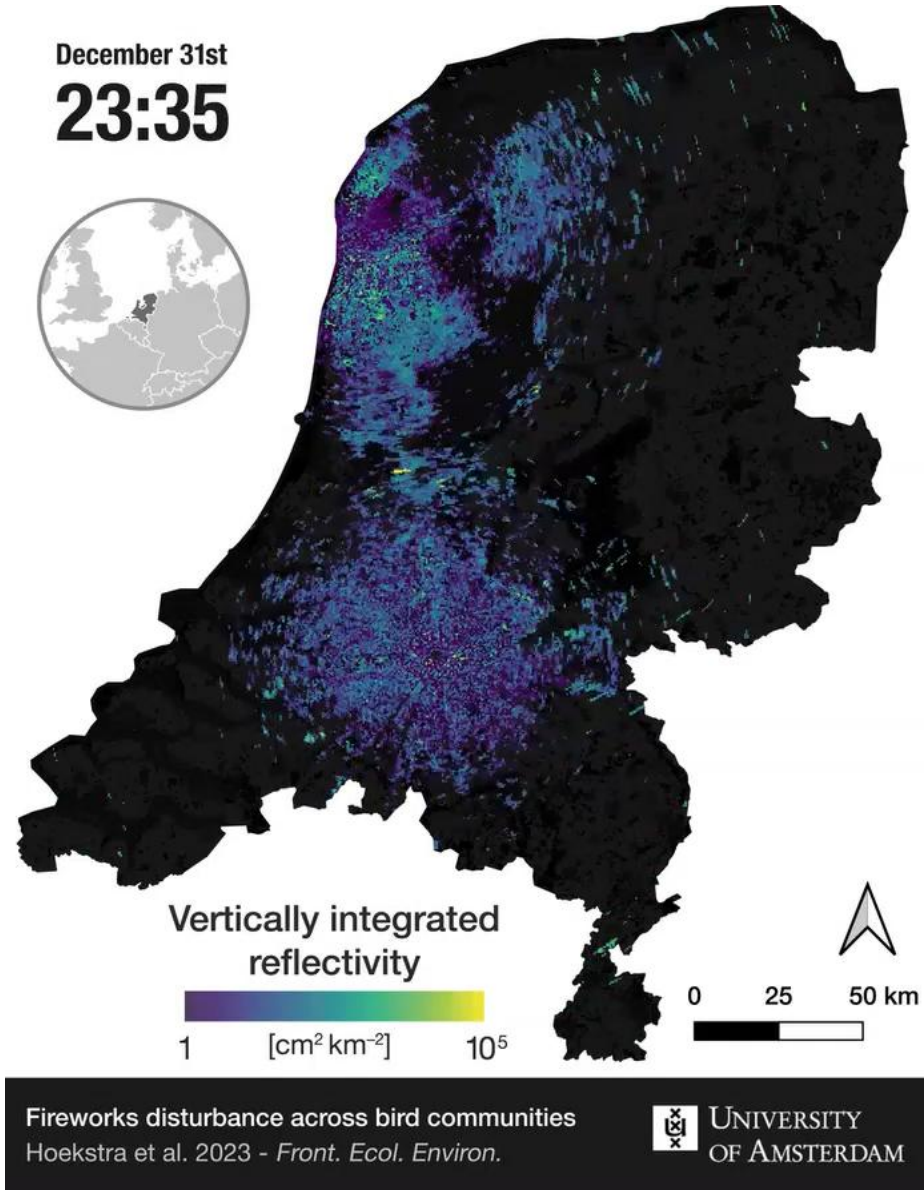
Lappeenranta
Villmanstrand
Turku
Åbo
Mariehamn
Maarianhamina
Helsinki
Helsingfors




Passerine-type
Wader-type
Öffnungswinkel


December 31st
23:35
Vertically integrated reflectivity
1
[cm² km⁻²]
10⁵
0
25
50 km
Fireworks disturbance across bird communities
Hoekstra et al. 2023 - Front. Ecol. Environ.
University of Amsterdam

Bird Radars in Offshore Wind Farm Surveys

Bird radar systems use modified marine or purpose-built radar to detect and track bird movements in real time

- Track flight paths
- Measure altitude
- Estimate flight speed
- Monitor migration intensity

Two main types

- Horizontal & vertical scanning radar
- Recent 3D radar

Actively used in the North Sea and Southern Baltic Sea (e.g. Denmark, UK, Germany, Sweden)

Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (STUK4)

Image sources: Robin Radar, Hyötytuuli

Bird Radars in Finland

Currently, offshore survey methods are limited to vision-based surveys and optimal conditions

A consistent recommendation for radar surveys has emerged from authorities and various national and international guidelines

Determining the flight intensity, altitudes and corridors of migratory birds, and detecting nocturnal migration plays a major role

Flight altitudes are crucial baseline data for collision risk models

Tahkoluoto offshore wind farm has currently the only bird radar system (fixed radar on land), presented at the Wind Finland Offshore 2023

Pictures: Aku Kalliomäki/Ramboll

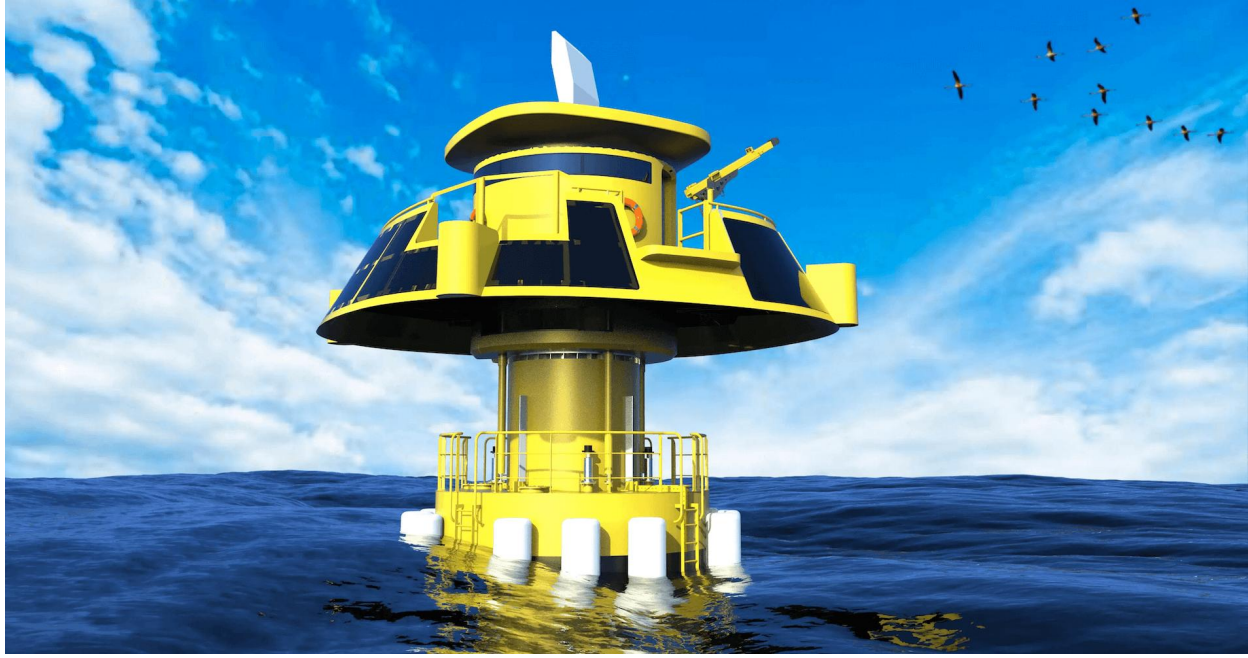
Bird Radar Challenges at Sea

Fixed installation at sea

- Passive, buoy-based systems would require independent energy production (e.g., solar panels or wave energy)
- Operational limitations due to low light conditions and ice cover
- Limited spatial coverage within offshore wind farm areas
- Species-level identification requires an ornithologist or a camera system

On a moving vessel

- Radar-assisted surveys on a moving vessel would better align with our environmental limitations, only limited by ice coverage and extreme weather conditions



Pictures: Wedge, Juho Jolkkonen/Ramboll

2km
1km
3km
2km
1km
LE FORNA
CAMPO INGLESE
video2
Via Forna Grande
Via Provinciale Le Forna
Via Capobosco
Via Provinciale Le Forna


2025-05-13 11:46:04
P:4.17 T:7.94 Z:33.36
Field:0.76
FL:551mm
bird
Tracking FPS: 50

Benefits of the Radar-Assisted Surveys

Provides calibrated, objective data on bird altitude, route and speed, automatically recorded and visualised

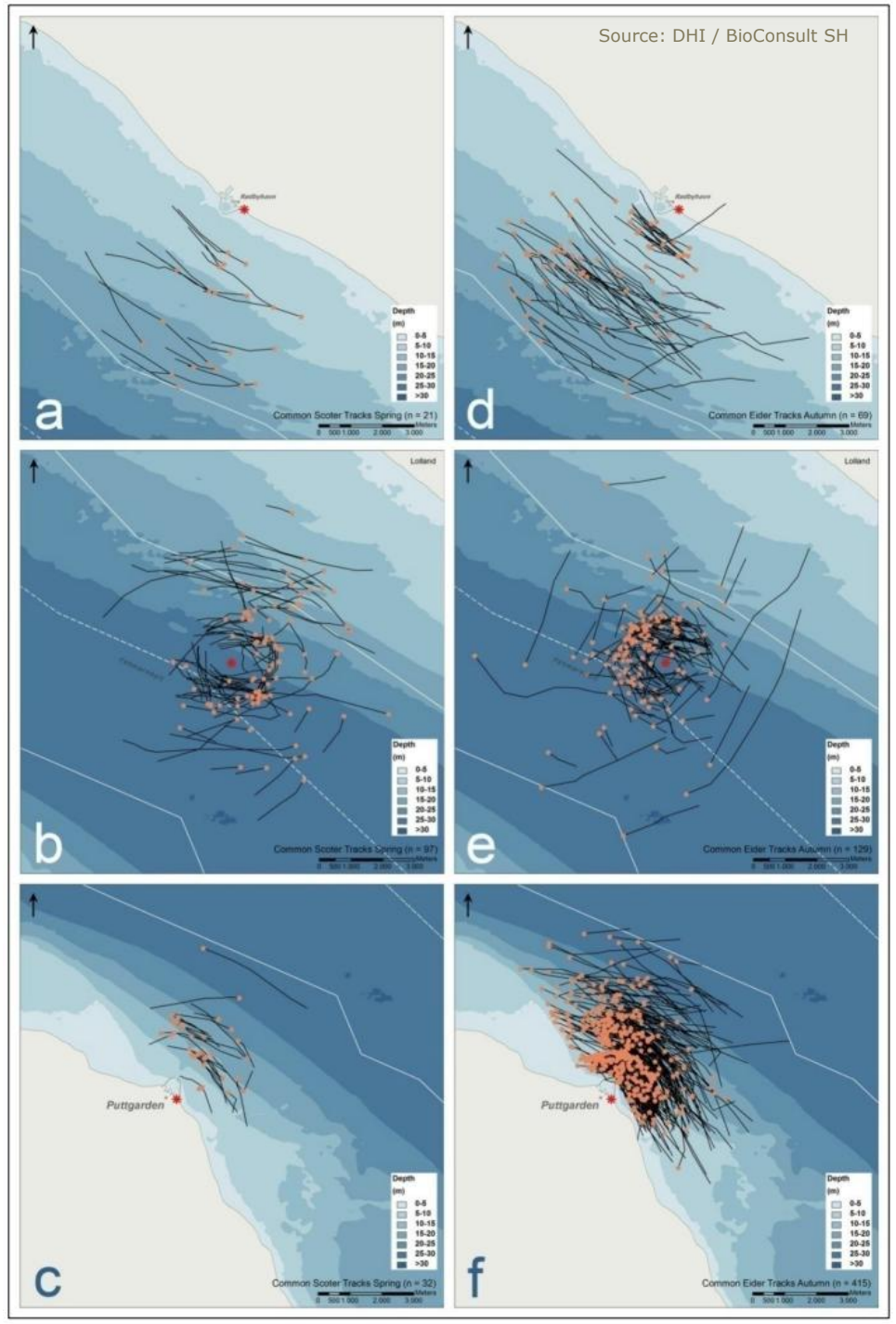
Wide effective range enabling large-scale 3D tracking

Only system capable of monitoring nocturnal bird migration, 24h monitoring

- Reducing uncertainty in the EIA

Cost-effective considering the amount of data collected per unit of time

Possibility for real-time monitoring during operation (water permit)



Summary

Radar-assisted bird surveys provide standardised, high-quality data of bird movements

Cost-effective monitoring both day and night, automatically recorded and visualised

Strengthens Environmental Impact Assessments

Decreases likelihood of permitting delays or legal challenge

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Picture: Juho Jolkkonen / Ramboll

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