Bat migration across the southern North Sea and possible implications for offshore wind farms

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Historical bat observations in and around the southern North Sea

- Records at offshore platforms and ships
- Observations during surveys / onshore ‘seawatching’ efforts
- Ultrasonic recorders at the coastline
- Records at remote islands (e.g. Faroe Islands, Heligoland etc.)

=> Other regions: offshore bat activity Baltic Sea and off Pacific and Atlantic North America
Migration flyway of Nathusius’s Pipistrelle

Reports of banded individuals from UK in The Netherlands and from Latvia in the UK
Pilot study with bat detectors, 2012-2014

- One onshore location (EAZ: Beach Egmond aan Zee)

- Three offshore locations:
  - OWEZ: meteo mast
  - PAWP: trafo station
  - IJMM: IJmuiden meteo mast
Beach Egmond aan Zee - 2014
OWF Egmond aan Zee (15 km offshore) - 2014
Pr. Amalia Wind Park (23 km offshore) - 2014

[Graph showing bat activity from March to October with specific times and months highlighted.

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For quality of life

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Ministerie van Infrastructuur en Milieu
Monitoring 2015 and 2016
Hoek van Holland (coast) 2015
Goeree (c. 30 km offshore) 2015
Europlatform (c. 50 km offshore) 2015
Bat migration and weather conditions

- Focus on Nathusius’s Pipistrelle

- Only OWEZ data 2012 - 2014

- Period of 22 Aug – 10 Oct

- Weather data obtained from B11B (75 km offshore) and Valkenburg airport (3 km from coast)

- Weather parameters considered (Wind speed & direction, Humidity, Cloud cover, Visibility, Temperature, Atmospheric pressure, Precipitation)
Preliminary results

- Weather conditions at sea provide better fits than those on land
- Relevant parameters are: wind speed and direction, and visibility
- Link with insect migration?
Wind speed (PB11B)

96% of bat activity at wind speeds < 7m/s
Wind direction (PB11B)

76% of bat activity at wind directions between NE en SE.
Visibility (PB11B)

98% of bat activity
at visibility $> 8500$ m
Bats and offshore wind farms (1)

- Possible attraction to offshore structures
- Possible link with insect availability at sea
- Risks for collision and/or barotrauma
- Fatalities at sea likely
- Mostly migratory species at risk
Bats and offshore wind farms (2)

- Population effects not excluded for at least one species (Leopold et al. 2014)
- Therefore, bats relevant in (spatial) planning and operating of offshore wind farms
- Mitigation based on results so far: increase cut-in speed of wind turbines in vulnerable periods, thus resulting in stand-still during low wind speeds
- OWF Borssele (soon to be raised in Dutch North Sea) probably first offshore location in the world with mitigation measures for bats
- Follow-up research to address potential population effects and effectiveness of mitigation measures
Conclusions (1)

- Regular occurrence late Aug – early Oct, less frequently in spring
- Associated with nights with E wind at low speeds and high visibility
- Species composition and timing of occurrence indicate migration (however, occasional feeding flights may also be involved)
Conclusions (2)

- Nathusius’s Pipistrelle the most abundant species
- Other species offshore: Common Noctule, Common Pipistrelle and (prob.) Parti-coloured Bat
- Occurrence of east-west migration
- Frequently spending the day at sea!
Options future research: migration ecology and fatalities at sea

- Modelling necessary, but input data needed

- Input to be obtained by:
  - Behavioural research with a combination of thermal imaging cameras and bat detectors
  - Tracking and tracing of bats
  - Determining insect distribution / migration at sea
Testing thermal imaging cameras
In collaboration with:
Thanks for your attention!

Any questions?