Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

Framework Ecology and Cumulation

Rijkswaterstaat

Ministry of Infrastructure and Environment

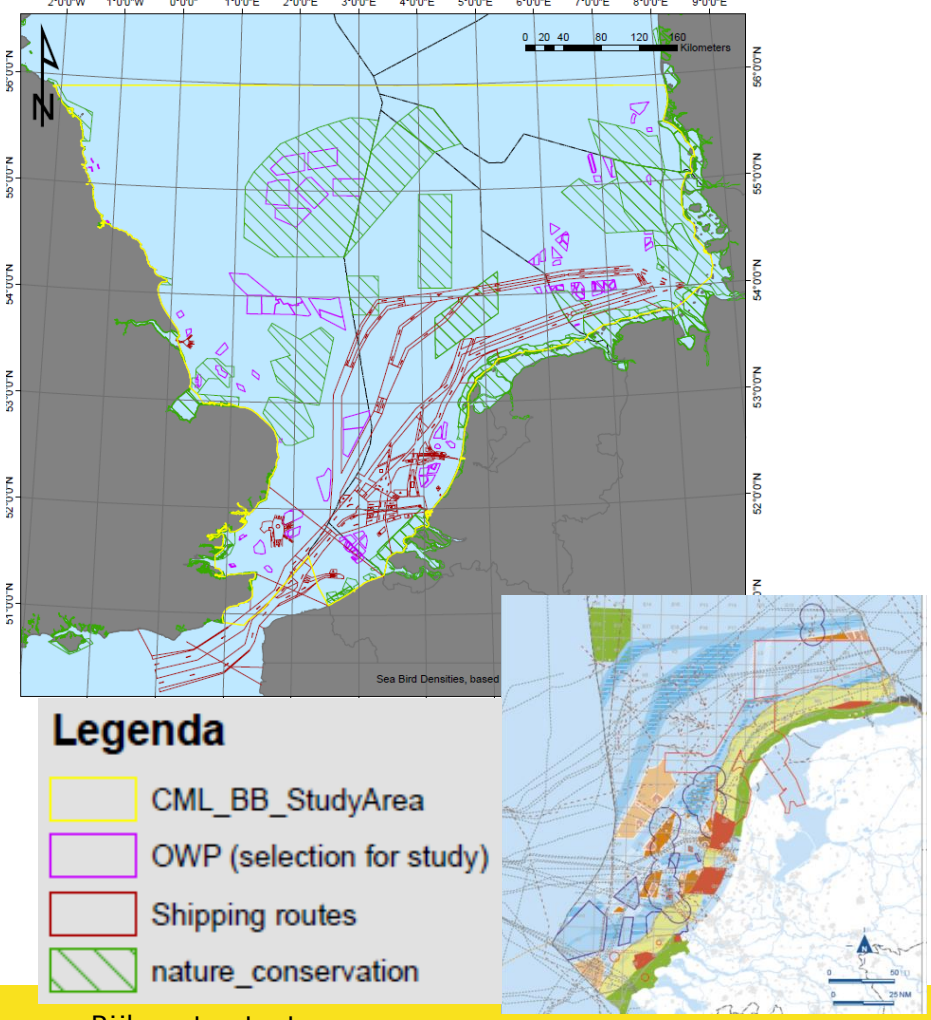
Commissioned by:

Ministry of Economic Affairs

Why assess cumulative effects of offshore wind development?

Energy agreement: plans for 3500 MW OWF in the Dutch EEZ

- Planned OWF in neighbouring countries, up to 8000 turbines
- Need for clear framework for cumulation stressed by the advisory commission on EIA
- Not cumulation on a license by license base, all windparks together -> no unpleasant suprises



New policy system for offshore wind farm development

Designed to speed up licensing and subsidy process for offshore wind (in order to reach the goals of the Energy Agreement)

- Government designates areas for offshore wind (wind farm sites)
- Wind farm site decisions are composed that establish the conditions (ecological as well as other constraints) under which a wind farm can be constructed
- A tender determines who will be granted the license to construct the wind farm (lowest energy price wins)

Goals of the Framework Ecology and Cumulation

1. Understanding and evaluating cumulative effects of the implementation of the offshore wind farms in the Energy Agreement

2. Detailed methodology for determining cumulative effects of offshore wind

3. Methodology for determining cumulative effects in general

Expected results and basic principles

Expected results:

- Understanding of the cumulative effects of implementation of wind energy at sea as stated in the Energy agreement - strategic advice
- Advice regarding regulations for wind farm site decisions (on ecology)
- Overview of knowledge gaps - foundation for monitoring and research on offshore wind

Basic principles:

- Transparancy
- Precautionary principle, but realistic worst case scenarios
- The use of expert judgement for filling knowledge gaps
- Only published information / models used.

Scope

- Existing and planned wind farms in the Southern North Sea, both national and international
- Priority for biggest impacts: Sea mammals & underwater noise, Birds, Bats
- Only generic advice for mitigation measures
- Regular updates as more information becomes available

6 step approach based on DPSIR

1. Identify the relevant pressures the envisaged activities could cause.
2. Identify the habitats and species that may be affected by these pressures.
3. Describe all other activities that could affect the same species.
4. Describe the nature and scale of the cumulative effects of all the activities selected in Step 3 on the selected habitats and species.
5. Evaluate the significance of the effects on the selected habitats and species.
6. If necessary, adapt the activity by taking measures to prevent the activity causing significant effects.

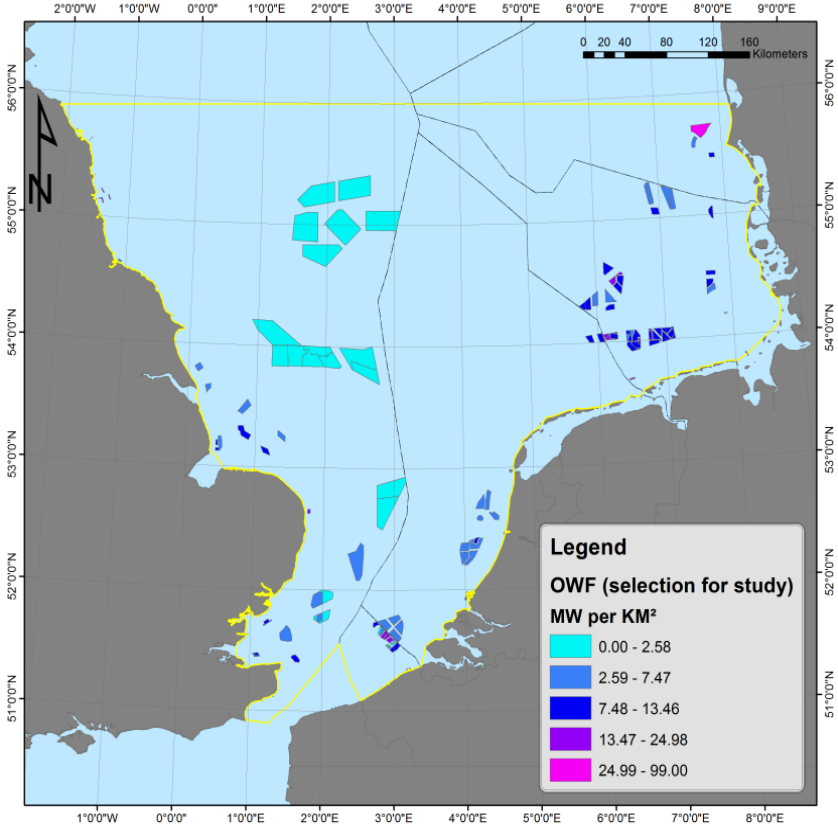
Cumulative impact scenario Southern North Sea

All planned and existing OWF until 2023

- Ca 8.000 turbines
- Ca 37 GW

Configuration/lay-out: ‘worst case´

- International planned wind farms with unknown configuration 5MW
- Planned Dutch wind farms scenarios with 3, 4, 6, 8 and 10 MW turbine



How to evaluate the calculated cumulative effects

Birds and Bats:

- Choice for Potential Biological Removal (PBR) as maximum acceptable impact, allows for scanty population data. PBR has a stronger scientific basis than ORNIS 1% additional mortality (Birds) and is therefore legally accepted under Dutch law.

Harbour Porpoise:

- ASCOBANS, 95% chance on a impact at which population is maintained at at least 95% carrying capacity





Birds

Pressures of offshore wind

Presence of offshore wind farms

- habitat loss for certain seabirds
- barrier effects for coastal birds moving out to sea and back

Rotation of rotor blades:

- collision risks for seabirds and migrating ‘land’birds

Birds: Habitat Loss (and barrier-effects)

- Overlap density maps & cumulative scenario
- Assumption: 10% mortality of ‘displaced’ seabirds (Bradbury et al., 2014)
- Maximum impacts on common guillemot:
  3.464 individuals ~ 0,13 * PBR
- All other seabirds < 0,1*PBR

Birds: Collision Risk Modelling - Band Model

- Most species < 0,10*PBR
- Some 0,10-0,6*PBR (northern gannet, kittiwake, tundra swan, curlew, black tern)
- 3 species of gulls impacts near or over PBR (depending on scenario)
  - Lesser black backed gull
  - Great black backed gull
  - Herring gull

Conclusions:

- Seabirds:
  - PBR near or exceeded for 3 gullspecies
  - Impact of Collision Risk > Habitat Loss (at least until 2023)

- Migrating ‘land’birds:
  - Max 0,4-0,6 * PBR in scarce species

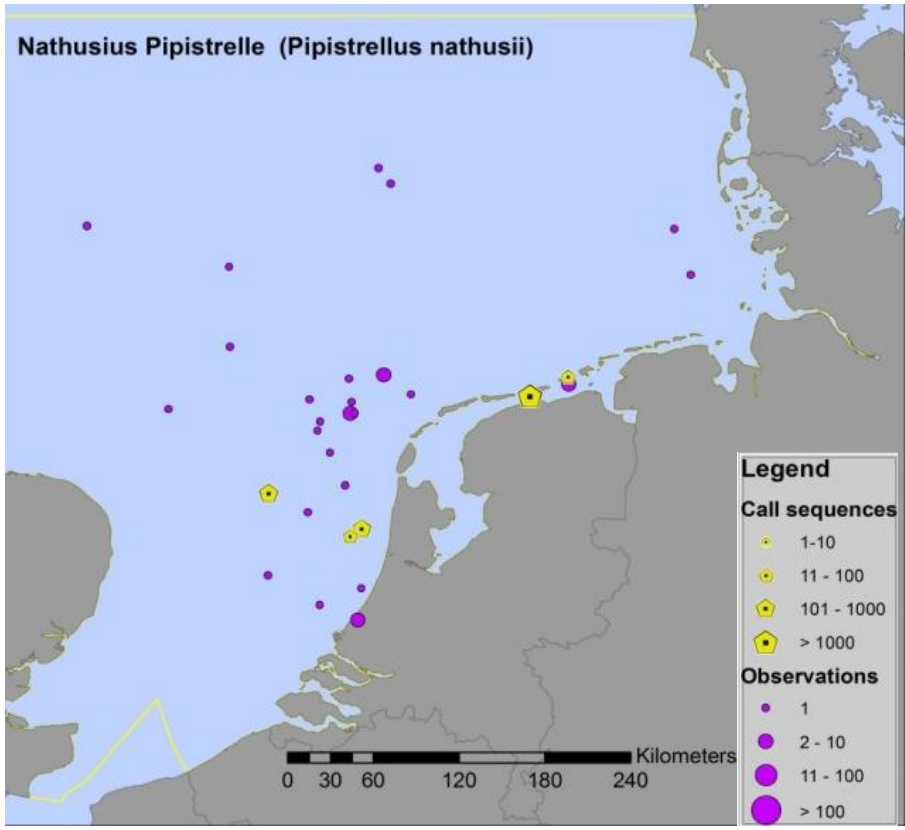
- Knowledge gap: scarce international data

Significant impact possible! (collison of seabirds)

Bats

Possible effects on Bats

- Research from OWEZ OWF:
  - Max 3 species, min 1 species (*Nathusius' pipistrelle*)
  - Only spring and fall
  - Mostly < 4 Bft (~5,5 m/s)
- Massive gap in knowledge, research needed
- Collision and disbalance, both lethal
- Based on expert judgement assumption 1 bat per year per turbine



Results bats

- Assumed maximum impact near/over PBR (Nathusius' pipistrelle)
- Knowledge gaps: occurrence, trends, numbers, behaviour at sea and wind farms

Significant impact possible! (collision of bats)

Underwater noise (Sea mammals)

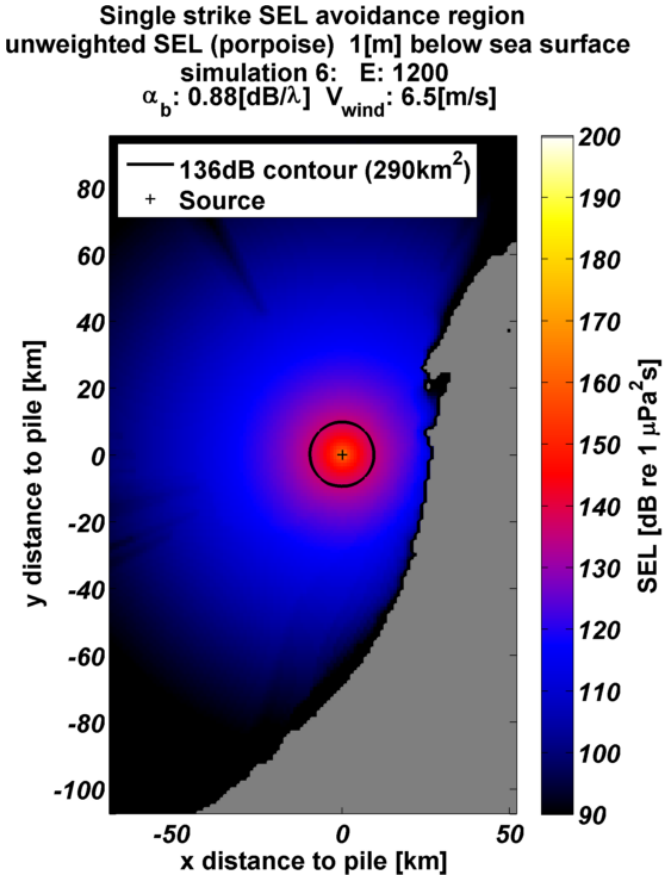
Scope

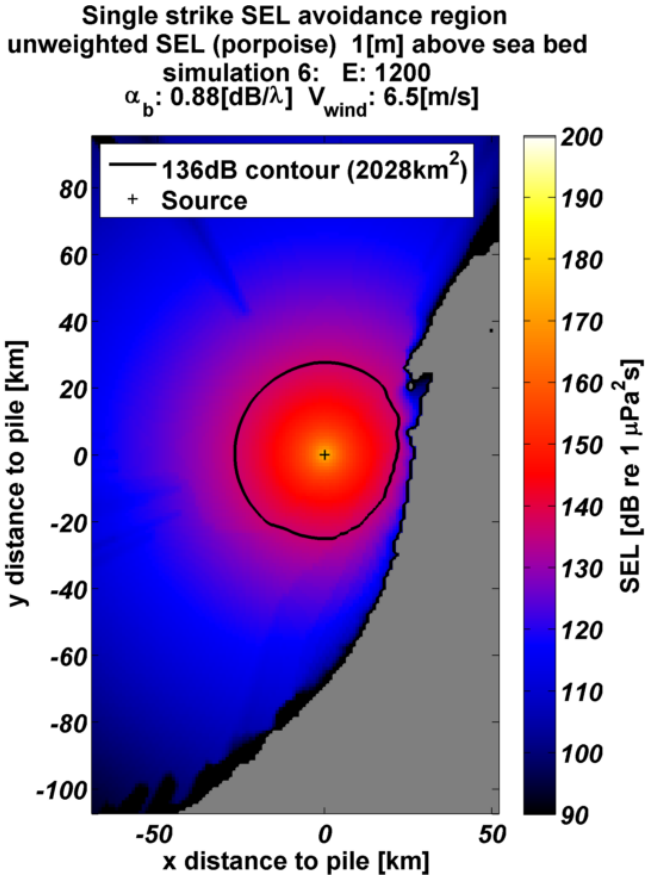
- Most vulnerable species: Harbour Porpoise
- Assumption: if you protect Harbour Porpoise you also protect seals and fish

Assessment underwater noise

- Calculate the propagation of underwater noise
- Determine thresholds for disturbance (136, 140, 144)
- Determine density of harbour porpoise within threshold circle
- Determine the sea mammal disturbance days
- Determination of the population size of harbour porpoises
- Determine population consequences (incl. PCOD)
- Effect-evaluation

Acoustic propagation





Disturbance days

Important part of the iPCoD model, strong correlation with outcome

Disturbance days are determined by

- the area of disturbance
- the density of the harbour porpoise in the area
- the number of piling days

Results sea mammals

High chance of population decreasing to under 95% carrying capacity in scenarios without noise reduction

Significant impact possible! (population consequences)

Response in policy

Wind farm site decisions set mitigation measures:

- Restrictions in turbine size (smallest wind turbines not permitted)
- Increased cut in speed to 5 m/s in fall (aug-sept) at night
- Flexible noise limit based on season and number of wind turbines
- Wind turbine blades turned out of the wind during mass migration of birds (requirement Flora and Fauna act)

Investment in research: start of Wind at Sea Ecological Programme

- Starts in 2016
- Five year programme
- 15 million euro budget
- Searching for international collaboration

Questions?

For more information,
go to www.noordzeeloket.nl