



Rijkswaterstaat  
*Ministerie van Infrastructuur en Milieu*



# An approach on cumulative effect assessment of offshore wind park development in the Netherlands



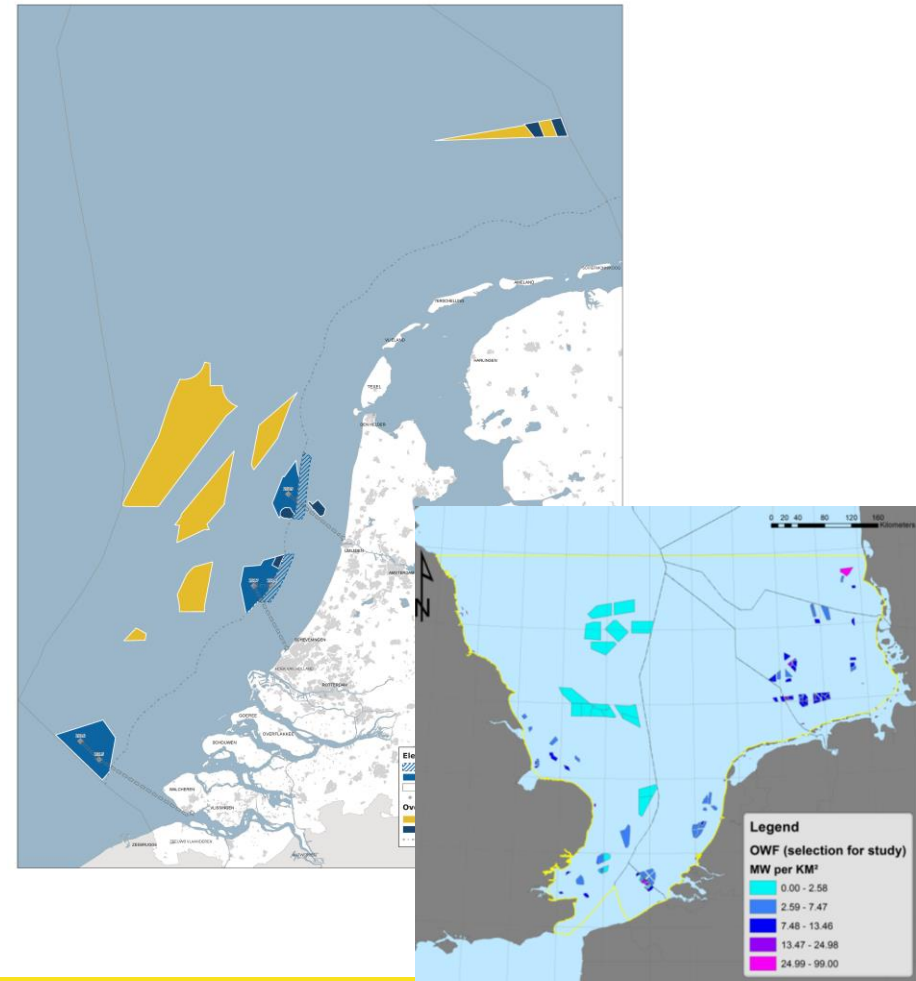
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Watermanagement



## Why assess cumulative effects of offshore wind?

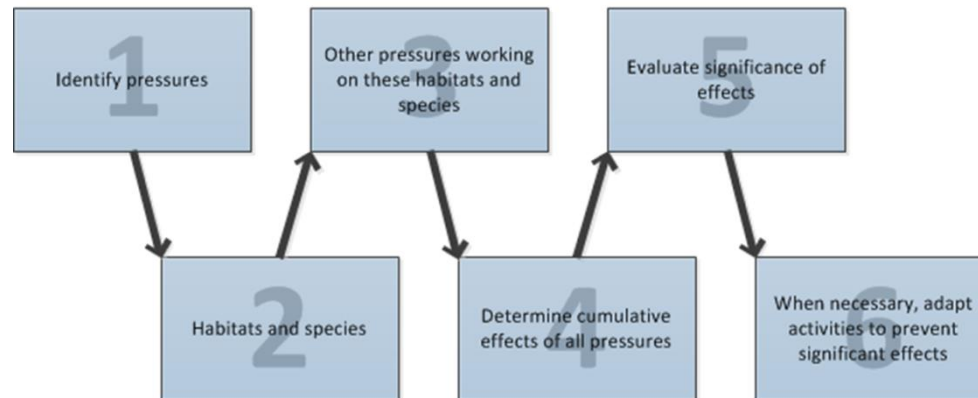
- Energy agreement (2015): plans for additional 3500 MW offshore wind farms in the Dutch EEZ 2023
- Up to 8000 turbines planned in neighbouring countries,
- Need for clear framework for cumulation stressed by the advisory commission on EIA
- no unpleasant surprises for the last plans in the row -> No evaluation on a license by license basis but all planned wind farms together





# A practical approach on cumulative effect assessment

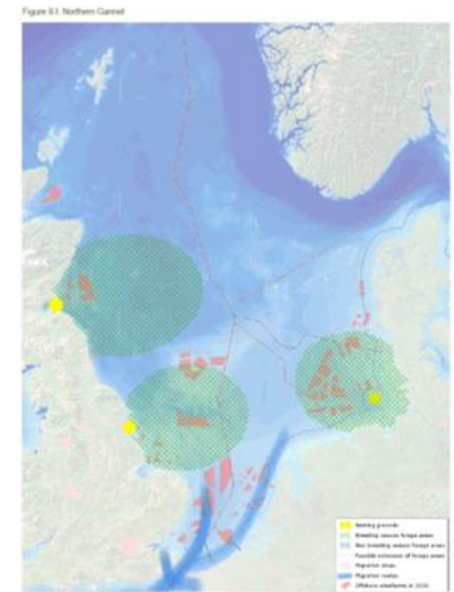
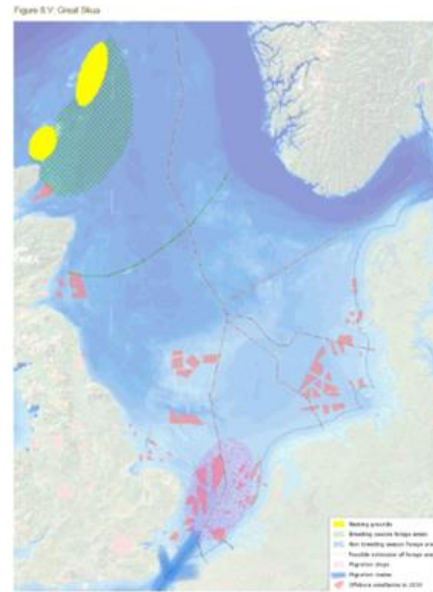
- A stepwise approach (based on DPSIR)



- Focus on most likely affected species and habitats (N2000) and the pressures that are relevant for these species; migrating species (birds, marine mammals, bats);
- A flexible instrument that can adopt new knowledge and models/methods for calculations.

# Defining the ecological sound spatial - and temporal scale for calculations

- Spatial scale:  
Focus on the biogeographical area of selected species populations (within the North Sea area). Site protection for these migrating species is not sufficient;
- Temporal scale, 2023:  
Other plans and projects to be considered: recently completed, approved by the planning authorities, currently undergoing planning approval.





## Assessment

Taken into account:

- More than 70 bird species; collisions risk and displacement;
- Marine mammals; disturbance by pile driving noise;
- Bats; collision risk and barotrauma.

Calculating population impact with best available data and models  
(Only published information / models used).

Knowledge gaps; making assumptions (expert judgement), based on a realistic use of a precautionary approach.





# Evaluation of the calculated cumulative effects

## **Birds:**

- Choice for Potential Biological Removal (PBR) as maximum acceptable impact, allows for scanty population data.

## **Bats**

- PBR, but population information not available

## **Harbour Porpoise:**

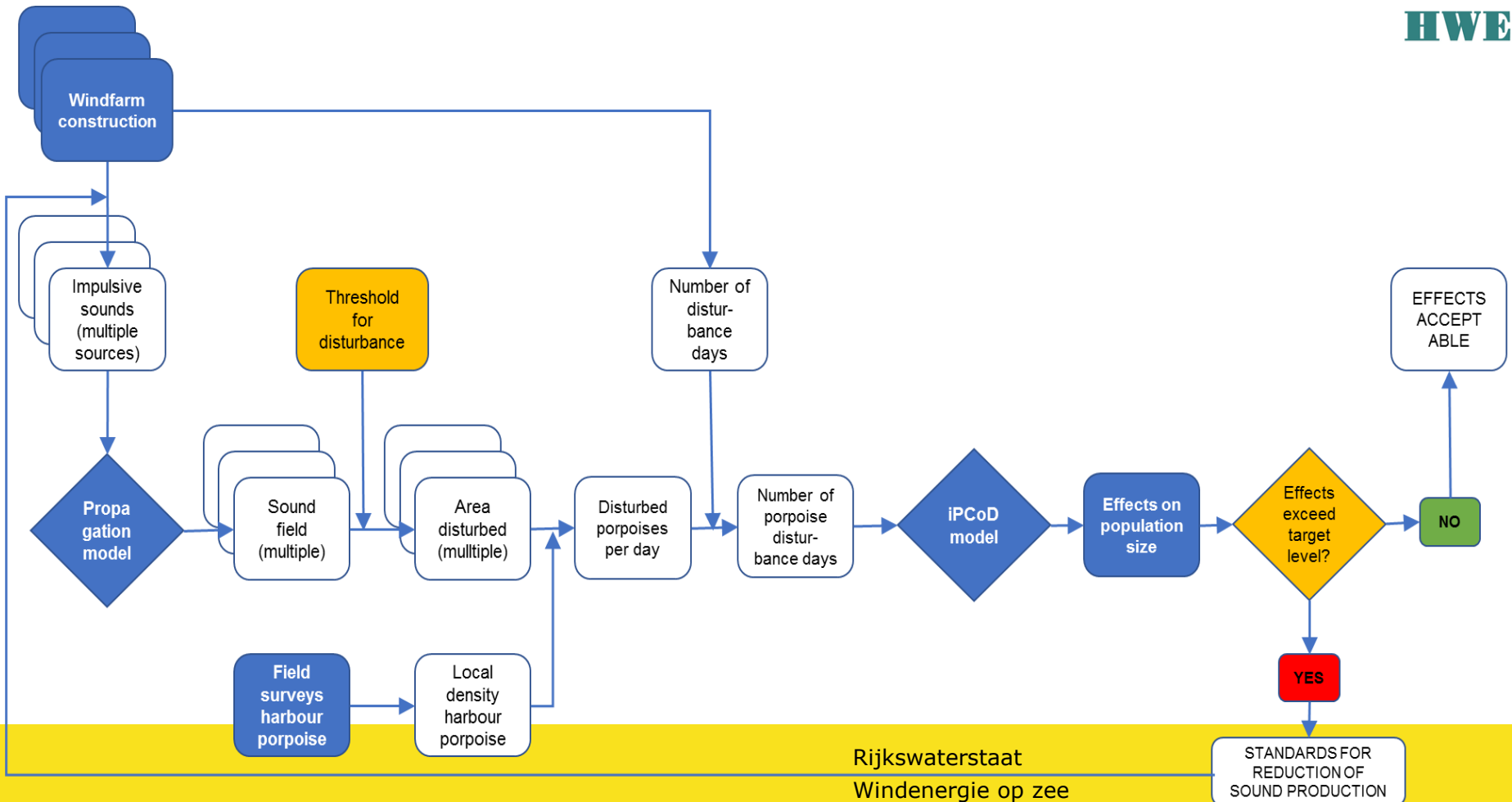
- Based on ASCOBANS (population maintained above 80% of carrying capacity):





# Example on assessment: Framework for assessing the effects of windfarm construction (by Floor Heinis HWE)

HWE





## Results: Marine mammals

### **Harbour porpoise**

- High chance of un acceptable population decreasing under carrying capacity in scenarios without noise reduction







## Results birds

### Habitat loss

- Maximum impacts on common guillemot: 13% of PBR
- All other seabirds < 10% of PBR

### Collision risk

- Most species < 10% of PBR
- Five species 10-60% of PBR
- 3 species of gulls impacts near or over PBR
  - Lesser black backed gull
  - Great black backed gull
  - Herring gull

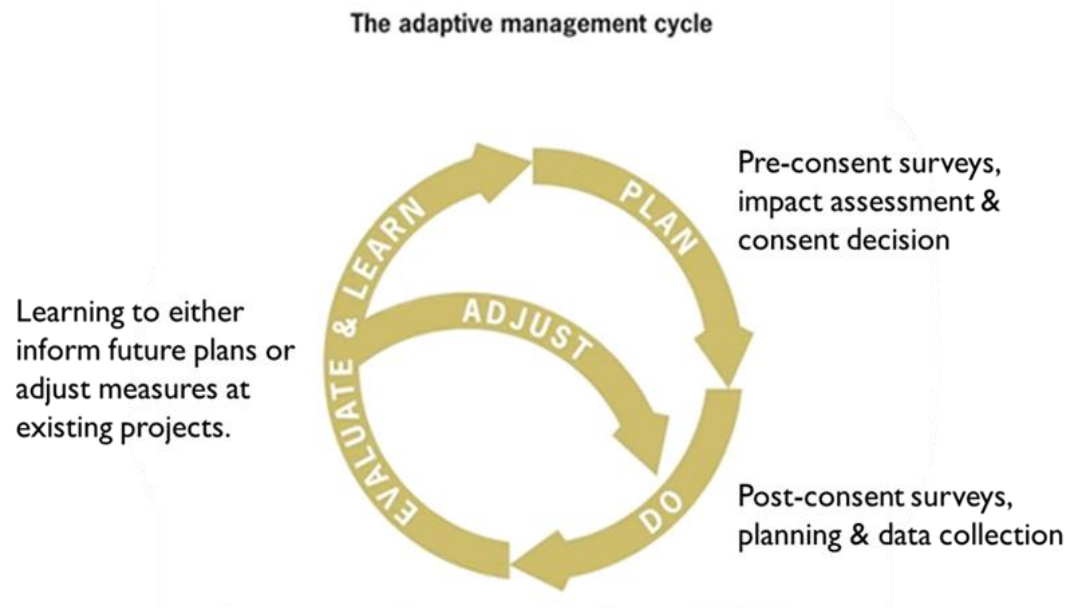
### Bats

- Assumed maximum impact near/over PBR (*Nathusius' pipistrelle*)  
(Depending on scenario for total population estimates)



## Dealing with knowledge gaps

- An Adaptive management process: A cyclic process that includes a knowledge agenda on the knowledge/data gaps and moments for adjusting projects and/or the instrument for impact assessment (based on the learning process)





## Response in policy

Wind farm site decisions set mitigation measures:

- Restrictions in minimum turbine size (4,6 or 8 MW)- birds
- Wind turbine blades turned out of the wind during mass migration of birds –birds
- Increased cut in speed to 5 m/s in fall (aug-sept) at night- bats
- Flexible noise limit based on season and number of wind turbines – harbour porpoise

Investment in research: start of Wind at Sea Ecological Programme

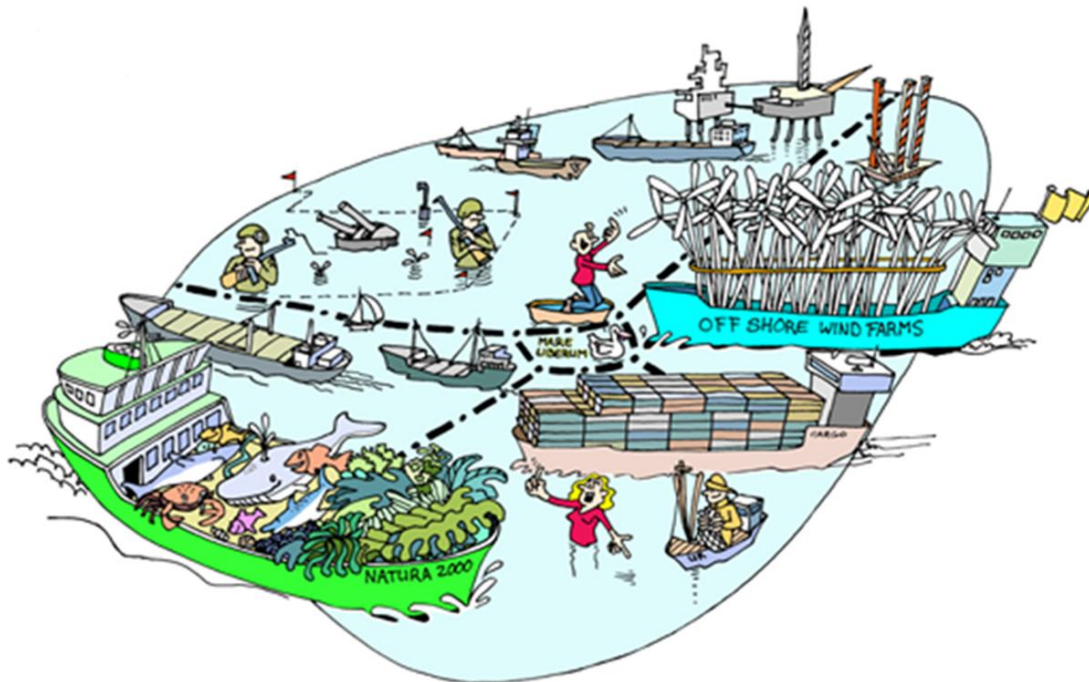
- Starts in 2016
- Five year programme
- 15 million euro budget
- Searching for international collaboration



# Thank you for your attention Questions?

For more information:

<https://www.noordzeeloket.nl/en/functions-and-energy/ecology/>







# New policy system for offshore wind farm development

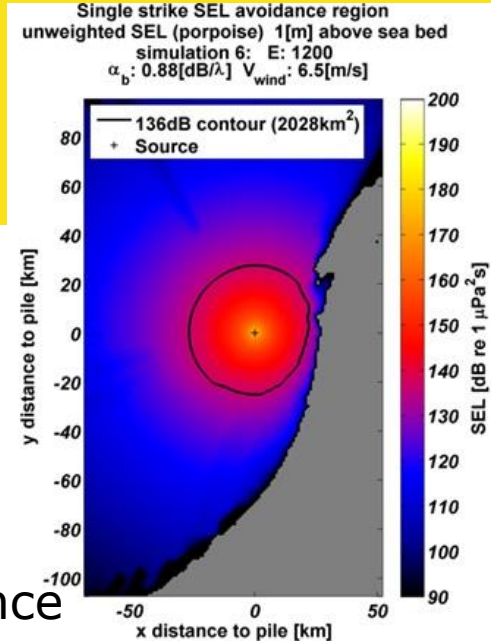
Designed to speed up licensing and government funding process for offshore wind (to reach the goals of the National Energy Agreement in time) and reduce costs

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



# Marine mammals: modelling of risks

1. Calculate the propagation of underwater noise
2. Determine species specific thresholds for disturbance
3. Harbour porpoise is the most vulnerable
4. Determine density of harbour porpoise within threshold circle
5. Determine the harbour porpoise disturbance days
6. Determination of the total population size of harbour porpoises
7. Determine population consequences (using iPCOD model)





## Flexible noise limit (Borssele wind farm site)

Number of wind turbines	Noise limit (dB re $\mu$ PA <sub>2s</sub> SEL <sub>1</sub> at 750m from source)		
	Period		
	January- May	June- August	September- December
77-95	159	165	166
64-76	160	166	167
55-63	162	167	169
49-54	163	169	170
43-48	163	169	171
39-42	164	170	172
35-38	165	171	172





# Knowledge gaps

## **Birds**

- Scarce international data available
- Uncertainty Band-model offshore (needs validation)

## **Bats**

- Massive knowledge gaps (occurrence, trends, population size and distribution, migration routes, behaviour at sea and in wind farms)

## **Marine mammals**

- Propagation model (being validated at the moment)
- iPCod model

**General:** effects of other human activities at sea



## Bats: Modelling of risks

Research from OWEZ OWF:

- Max 3 species, min 1 species (*Nathusius' pipistrelle* )
- Only spring and fall
- Mostly  $< 4$  Bft ( $\sim 5,5$  m/s)

Collision and barotrauma, both lethal

Based on expert judgement:  
assumption 1 bat per year per turbine

