

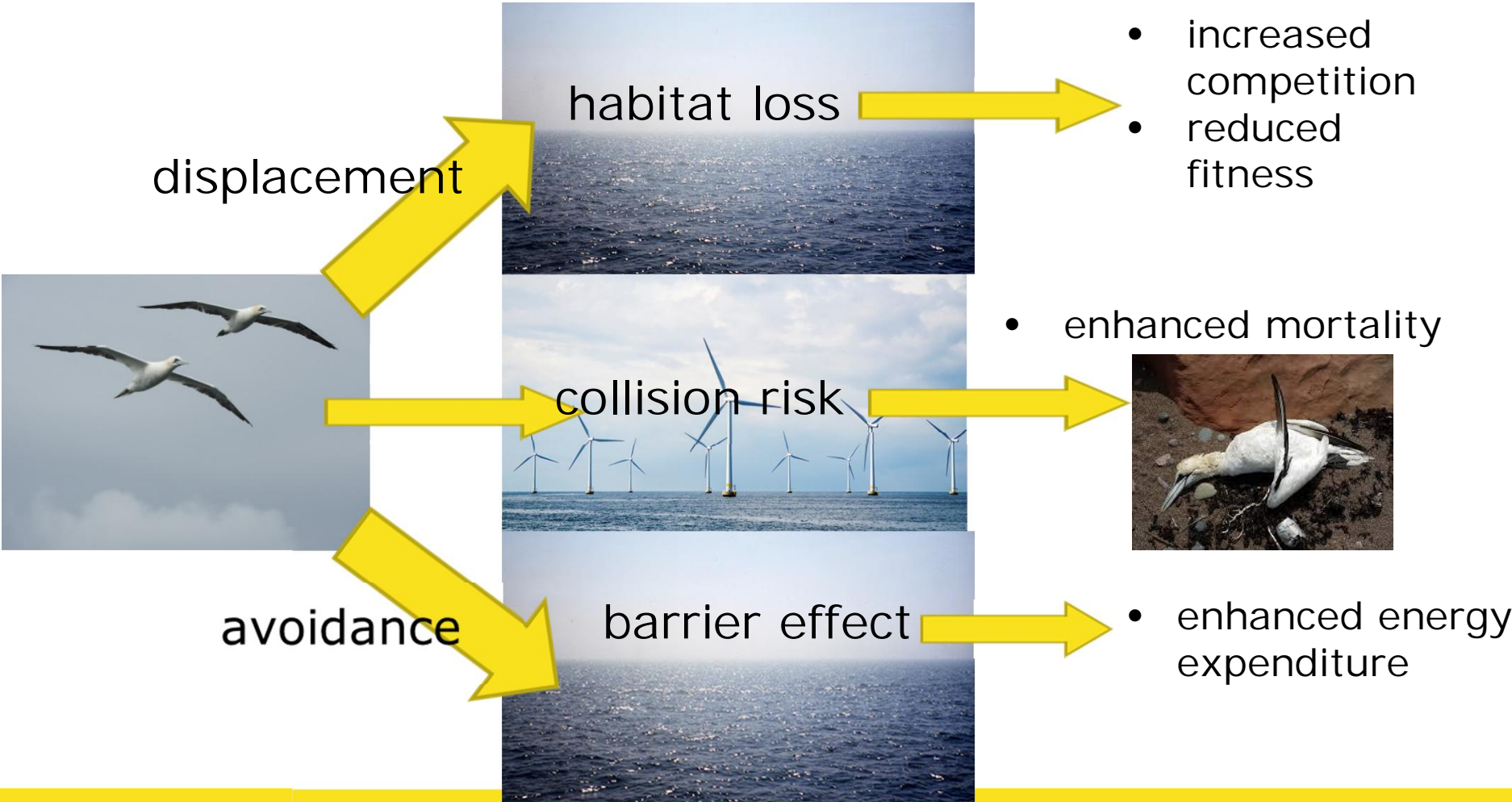
Filling the gaps by modelling: how can offshore wind farms impact populations of seabirds and coastal birds?

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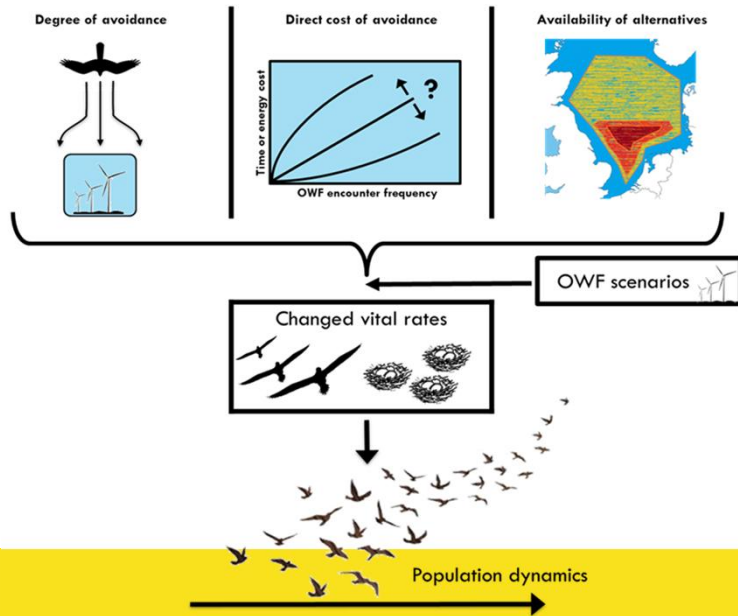
# Potential effects on individual level...





# Habitat loss through displacement

- Direct observations suggest OWFs being avoided by certain species
- This may lead to substantial habitat loss in future, leading to:
  - Decrease in individual fitness
  - Negative population trends





## Modelling approach inevitable; assumptions so far...



- Precautionary principle assumes 'worst case' scenarios
- 100% displacement for each existing and projected OWF (incl. buffer of c. 3 km)
- Displacement lasts for entire OWF life cycle (c. 30 years)
- Local densities before OWF (measured/estimated) recalculated to numbers displaced
- Rough assumption: 10% of birds displaced die
- Modelling approach : deal with uncertainties and upscaling OWFs



## Collisions – improve input and validate output of collision risk models

2016

- Overview methods detection collisions, measurements fluxes
- Review and analysis of available tracking data – improve input for collision risk modelling

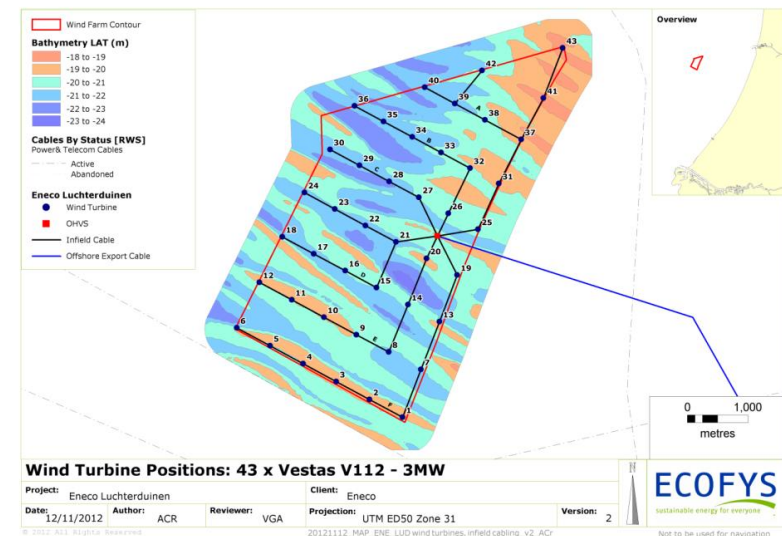
2017 -

- Field study collision monitoring & bird avoidance
- Pilot study catching large gulls at sea (GPS-tagging); behavioural study
  - Which populations involved, where do the birds come from?
- Population modelling for 10 vulnerable bird species



# Field study collision monitoring & bird avoidance

- Experimental setup in OWF Eneco Luchterduinen - collaboration
- Horizontal radars
- Vertical radar
- Camera's
- Planning
  - Q2/3 2018: installation sensors
  - 2 years of measurements





## Which populations involved, where do the birds come from?

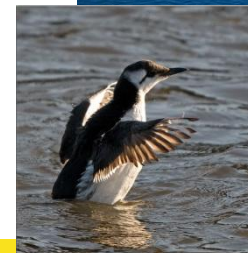
- Pilot catching gulls at OWFs: LBBG; HG & GBBG
- Planning:
  - Catching in April/May 2018
- Expected results:
  - Populations / colonies involved / at risk
  - More detailed info on flight behaviour inside OWF





## The modelling approach...

- Modelling habitat use, cause-effect relationships, flux levels, collision risk (CRM) and (consequences for) population dynamics
- Use of seabird monitoring data (distribution in relation to OWFs) for feeding models
- Use modelling results for identifying measurable knowledge gaps
- Measuring the gaps (i.e. behavioural response to OWF presence)







## Population modelling for species prone to habitat loss and/or collision risk

- 15 sensitive species:
  - Habitat loss: Northern Gannet, Common Guillemot, Razorbill, Red-throated Diver, Sandwich Tern
  - Collision risk: Lesser Black-backed, Herring & Great Black-backed Gull, Great Skua, Kittiwake, Brent Goose, Shelduck, Curlew, Black Tern, Bewick's Swan
  - Align with populations models for marine mammals, whenever possible
- Planning
  - Phase 1 (develop population models) – Q1 2018
  - Phase 2 (impact of OWFs, possibilities further research) – Q3 2018