

MONITORING ENVIRONMENTAL IMPACTS OF OFFSHORE WIND FARMS IN THE BELGIAN PART OF THE NORTH SEA

SIZE MATTERS

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Presented by Bob Rumes

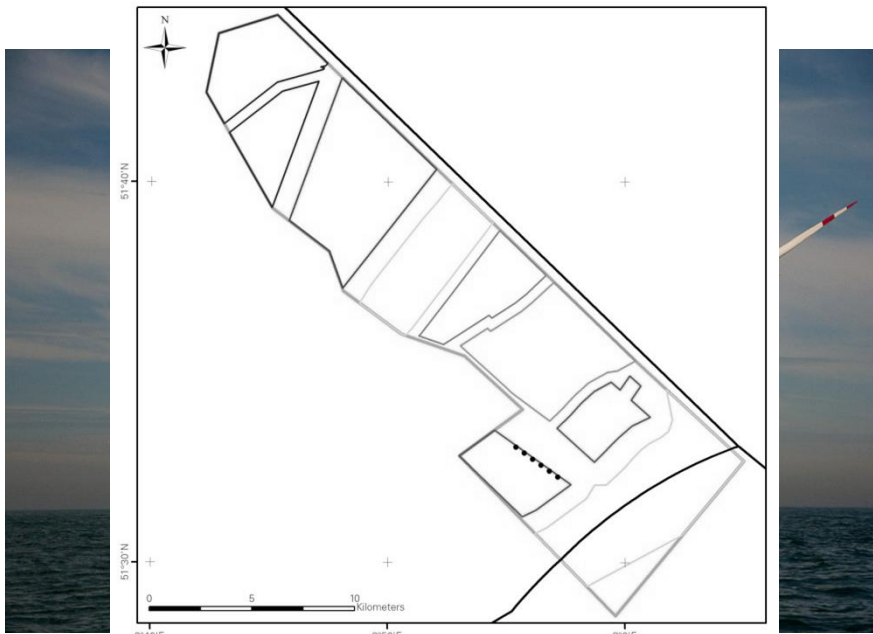


LEARNING FROM THE PAST TO OPTIMISE
FUTURE MONITORING

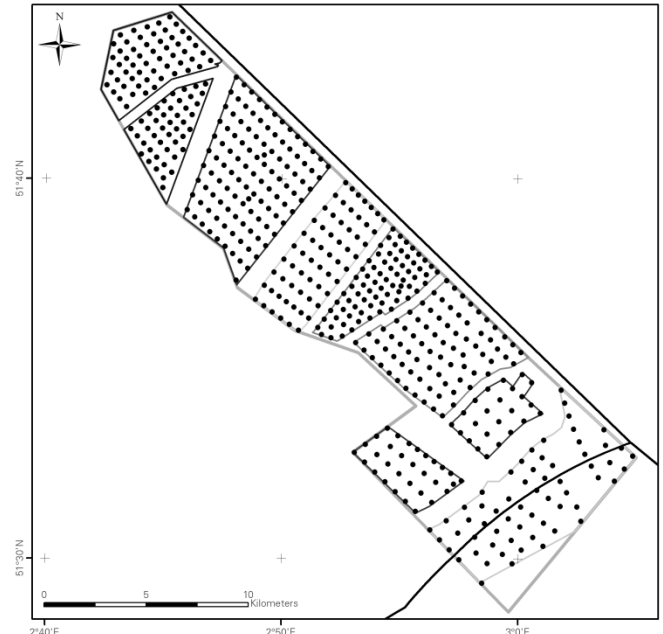
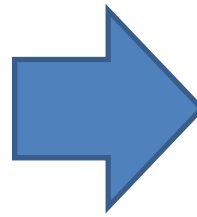
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INTRODUCTION



30 MW in 2009



2000 MW in 2020

Need to value impact at different scales

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INTRODUCTION

- Seabird attraction and collision risk
- Invasive species
- Artificial reef effect



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SEABIRD ATTRACTION AND COLLISION RISK

- significant attraction of large gulls to wind farms → increased collision risk
 - collisions estimated through model calculations (Band, 2012) based on visual and radar flux data:
 - visual - high resolution, species specific, but only daytime
 - radar - continuous but not species specific
 - 2,4 collisions of gulls / turbine / year at the Bligh Bank
 - 132 collisions / year @ Bligh Bank wind farm
 - threshold of 5% additional mortality per year is not exceeded for any population
- No impact @ population level

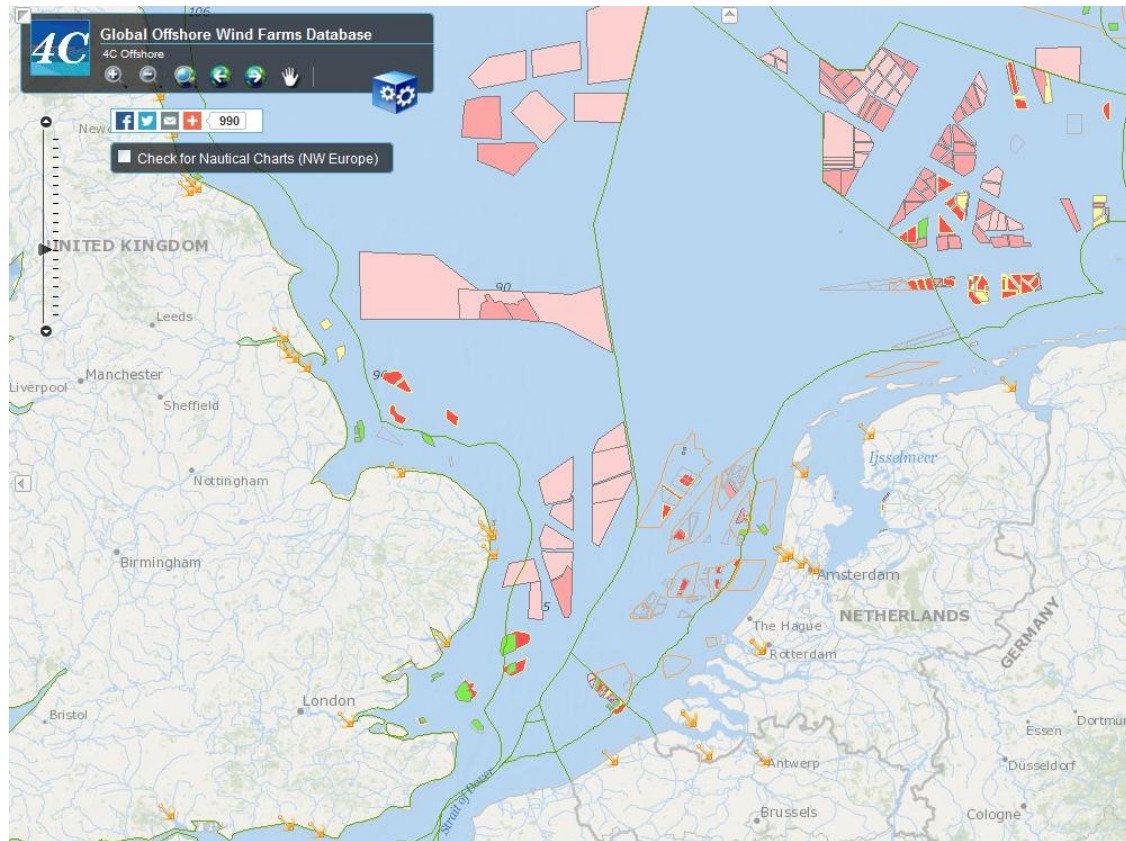


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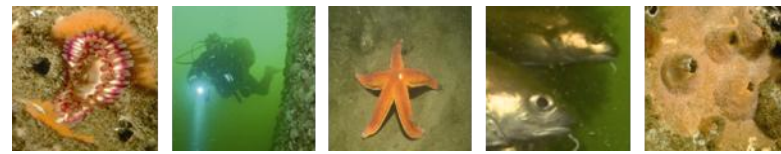
SEABIRD ATTRACTION AND COLLISION RISK

- target of 43 GW offshore wind in the European Union (EWEA, 2013)



(4C Global Offshore Wind Database)

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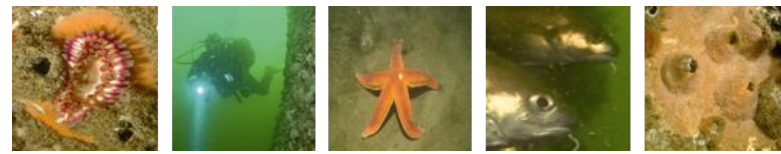


SEABIRD ATTRACTION AND COLLISION RISK

- target of 43 GW offshore wind in the European Union (EWEA, 2013)
- equivalent to > 14 000 3 MW turbines (cfr. Bligh Bank)
- extrapolated additional mortality for 10 000 turbines exceeds threshold (5% additional mortality) for both *lesser* (14.6%) and *great black-backed gull* (7.3%)



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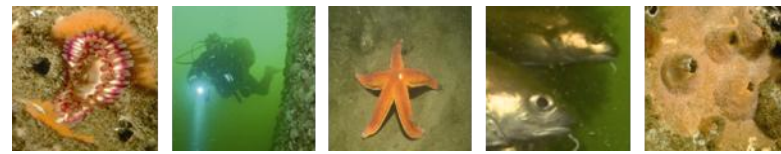


INVASIVE SPECIES

- offshore artificial hard substrata are rapidly colonised
- non-indigenous species (NIS) dominate the intertidal zone
- including both introduced (6) and range expanding (2) species
- minor differences between foundations, larger differences between foundation type and wind farm
- all NIS previously known from buoys, vessels other substrata in the area



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INVASIVE SPECIES

- more NIS likely as colonisation continues and more substrata become available
- strategic positioning of NIS increasing the risk of becoming invasive species (e.g. *Pacific Oyster* competing with the *blue mussel*)
- specific to areas of soft sediment environment (Southern North Sea)
- stepstone effect (between windfarms)



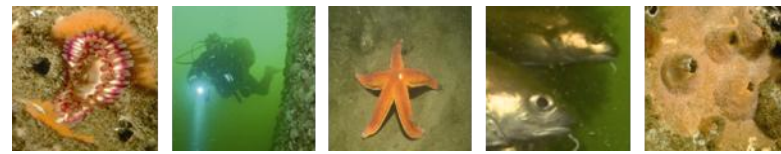
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ARTIFICIAL REEF EFFECT

- Rapid colonization of artificial hard substrate
- Attraction of high numbers of fish
- Possible foraging opportunities for birds and marine mammals
- Organic enrichment of nearby soft sediment substrate
- Increase in local biomass and species richness

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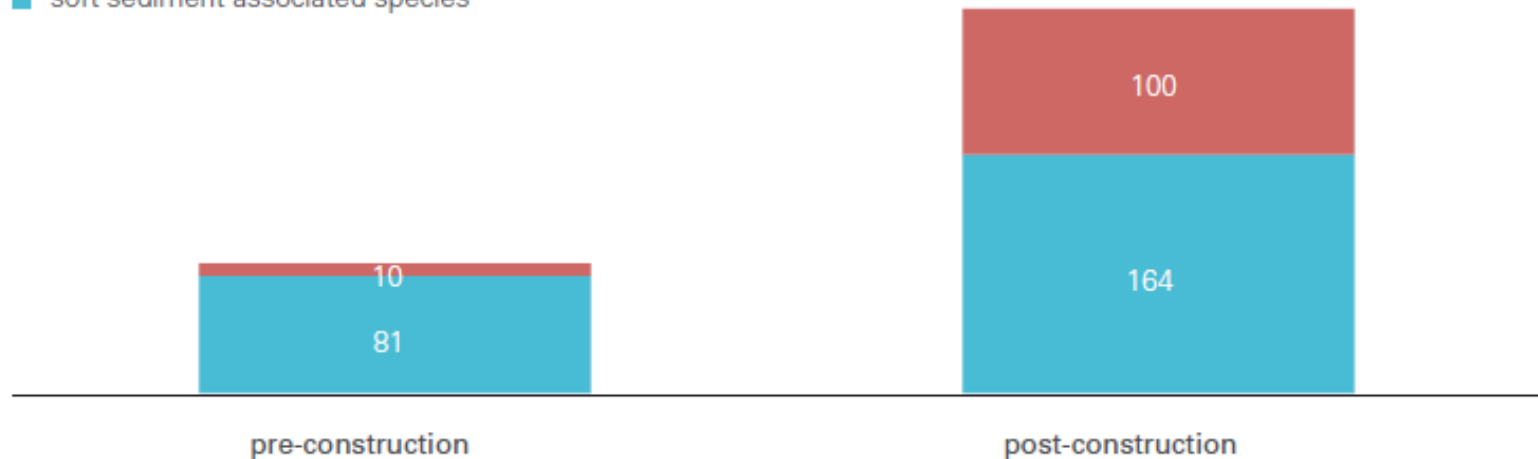


ARTIFICIAL REEF EFFECT

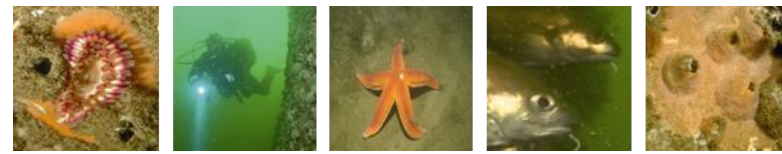
- Changes in species richness pre- and post-construction
- Increase in hard substrate associated fish species from 2 to 8 species

Species richness - Benthos

- hard substrate associated species
- soft sediment associated species

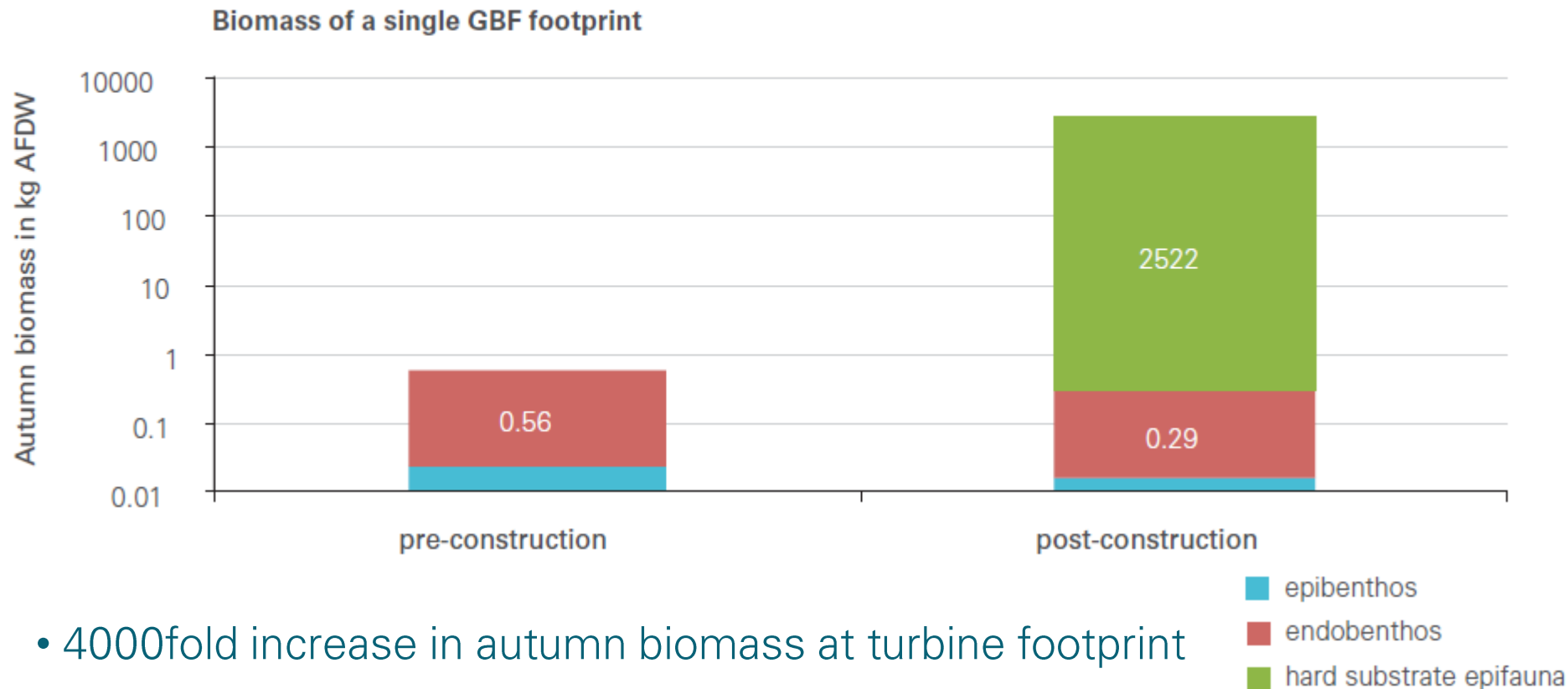


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ARTIFICIAL REEF EFFECT

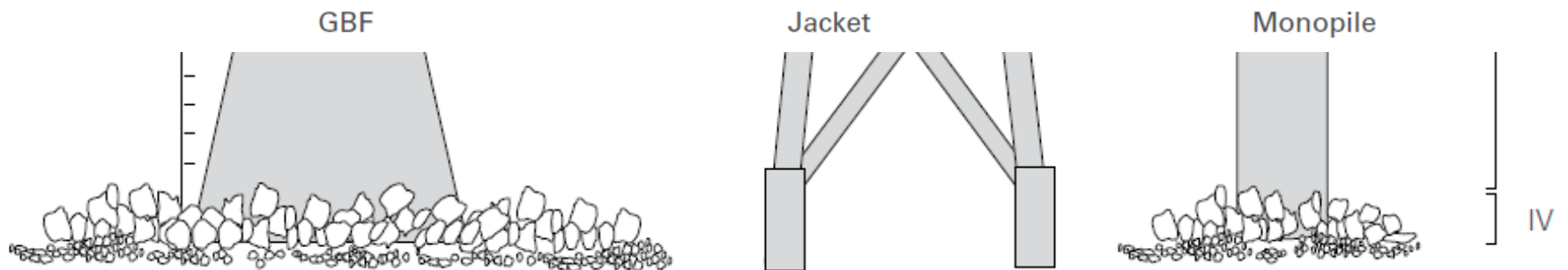
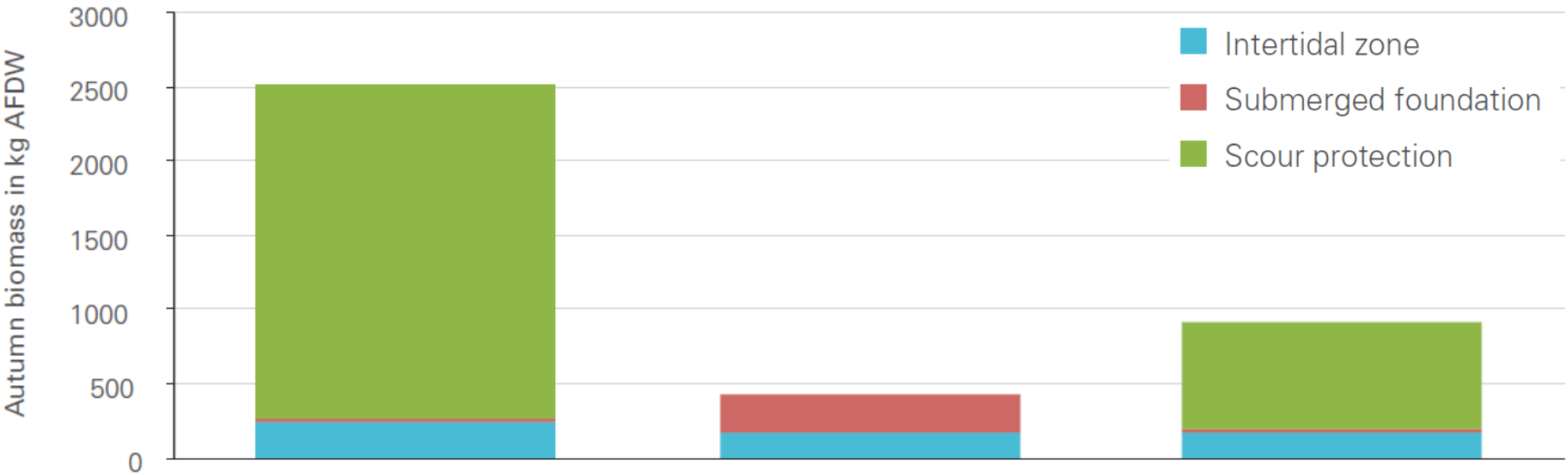
- Changes in biomass pre- and post-construction



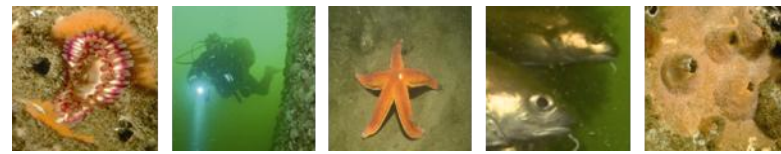
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Autumn epifaunal biomass of three foundation types

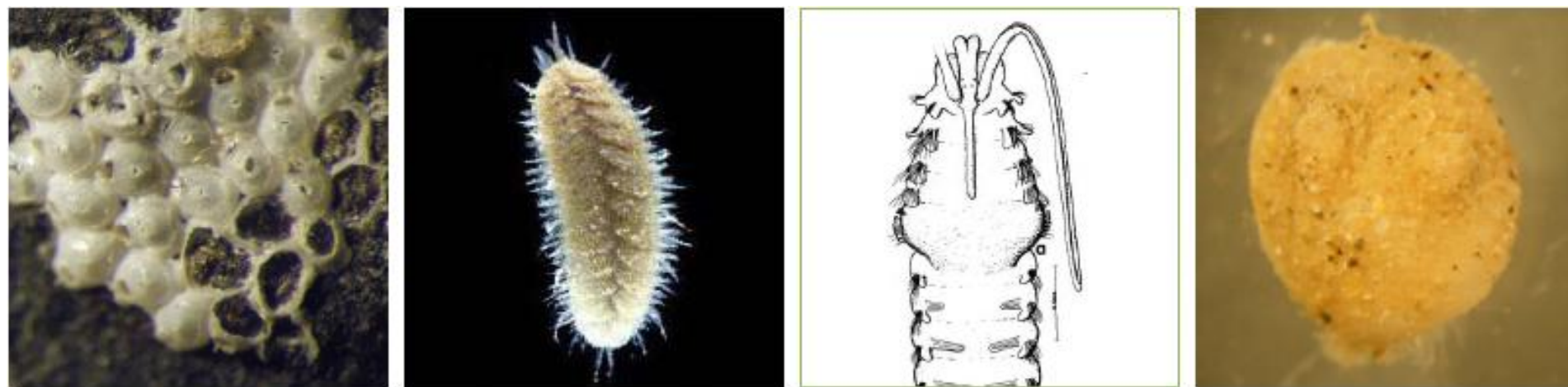


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ARTIFICIAL REEF EFFECT

- Four 'new' species for the Belgian part of the North Sea (BPNS)
- 14fold increase in autumn biomass at the level of wind farm
- Entire energy zone developed (~530 turbines) → maximal increase of autumn biomass by 3% for BPNS (similar to the impact of wrecks)



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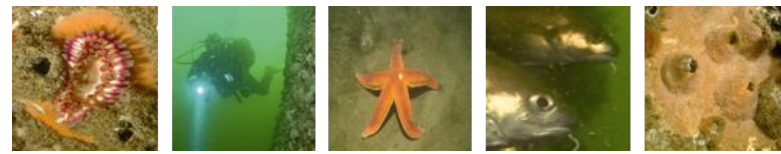
FUTURE RESEARCH

Before we can think big...

- Define scientifically sound thresholds (at North Sea scale)
- Require cross-windfarm/cross-sectoral international cooperation
- Evaluate impacts at the appropriate level / in the right context
- Address knowledge gaps on cumulative impacts
- Monitor existing wind farms to anticipate/mitigate future impacts



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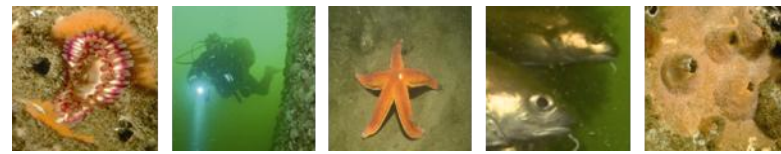
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Any Questions?



(vegasmike.deviantart.com)