Reef effects of structures in the North Sea: Islands or connections? (RECON)

Introduction to 2 IMARES research projects

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2. Artificial reefs in the North sea

3. The RECON project
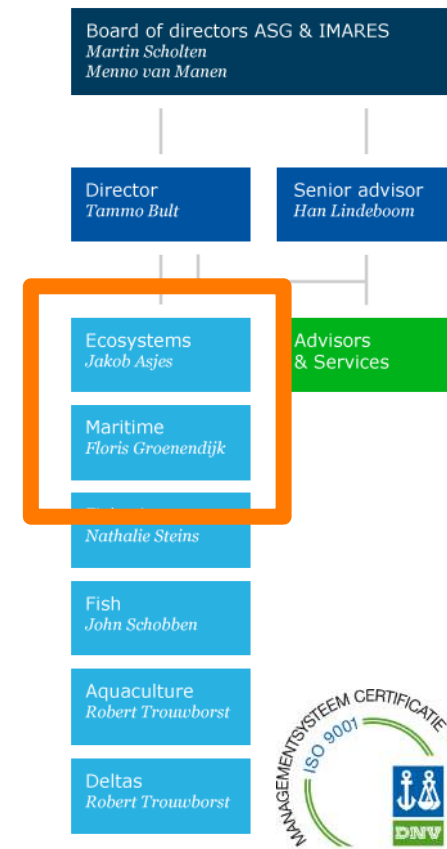
4. Call for help

5. The end

Who is Joop Coolen?

- Marine biologist
- Specialised in North Sea reef ecology
- Commercial diver SCUBA & offshore
- Wreck diver North Sea

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What is IMARES Wageningen UR

- Institute for Marine Resources & Ecosystem Studies
- Part of Wageningen University
- Applied marine ecological research
- Consultant effects of activities at sea
- E.g. fisheries, construction, production
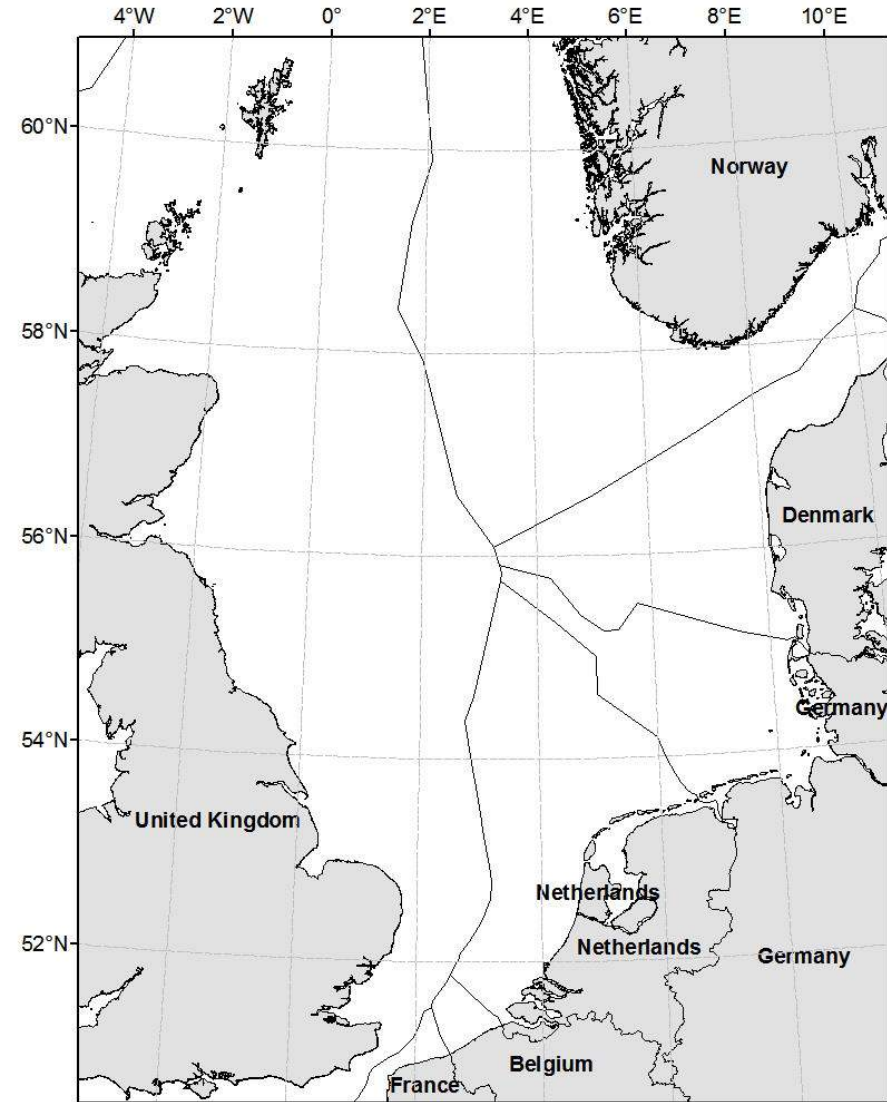
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Diving research

© Udo van Dongen
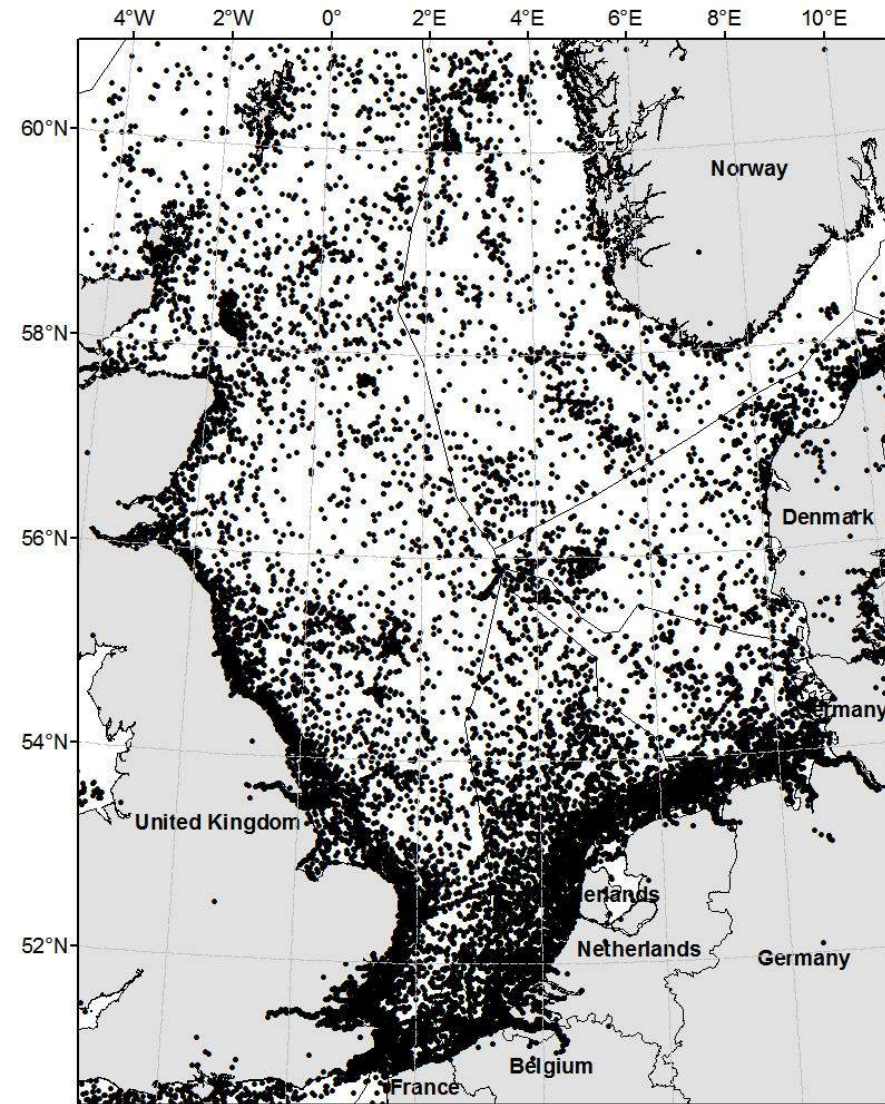
Effects of objects on ecology
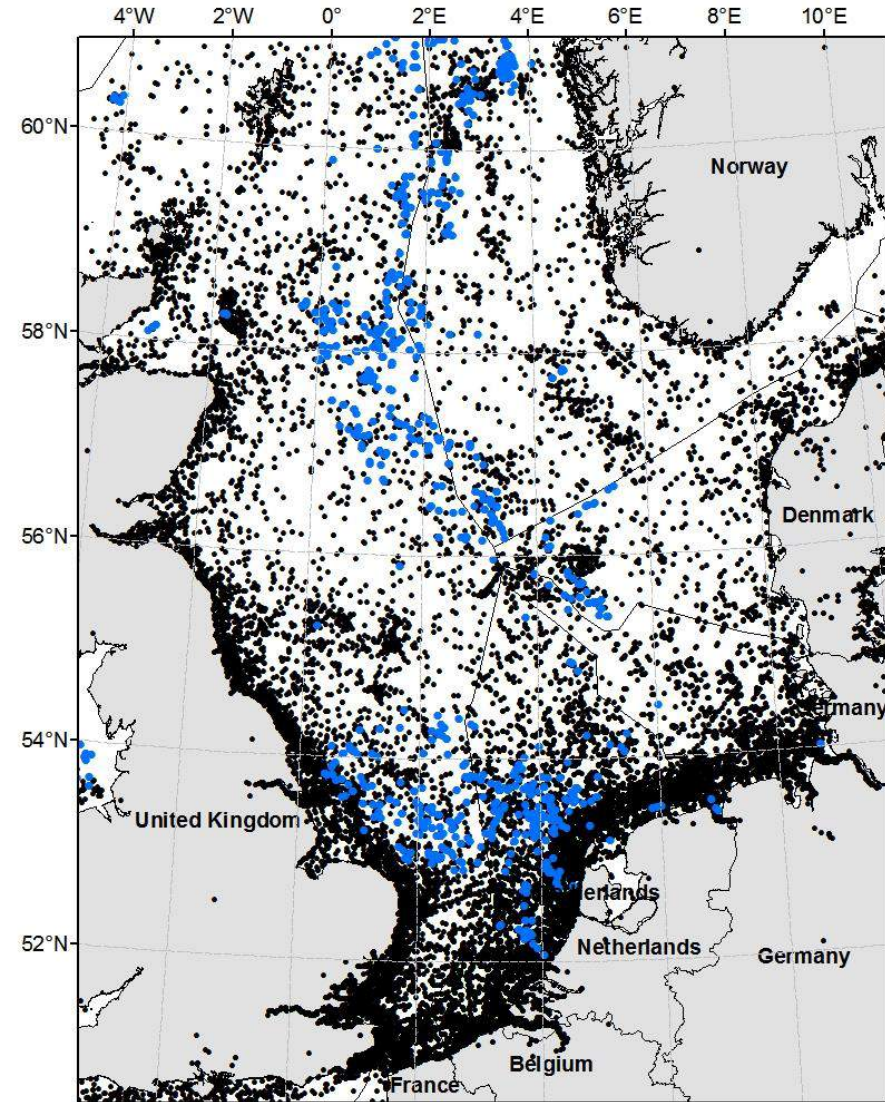
- Mainly sand bottom

Effects of objects on ecology

- Mainly sand bottom
- **Add objects:**
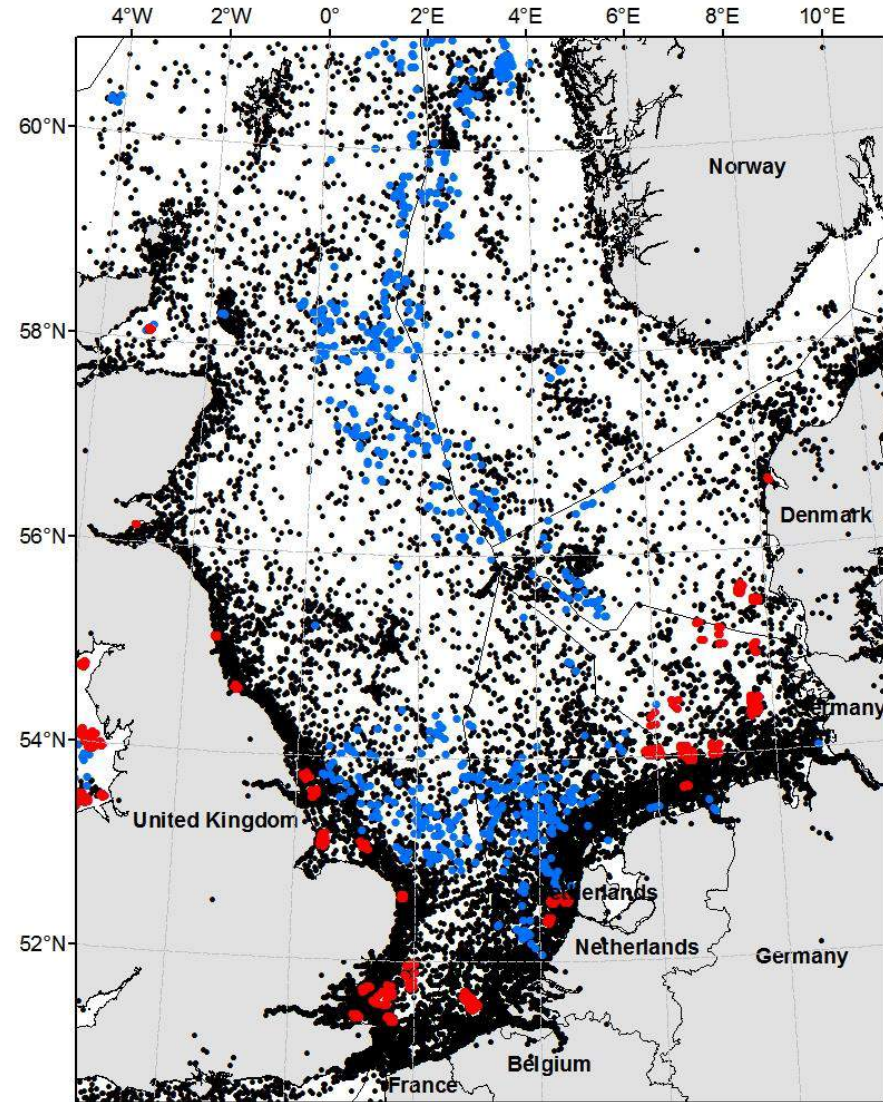- Wrecks (~25.000)

Effects of objects on ecology

- Mainly sand bottom
- **Add objects:**
- Wrecks (~25.000)
- O&G installations (~ 1,000)
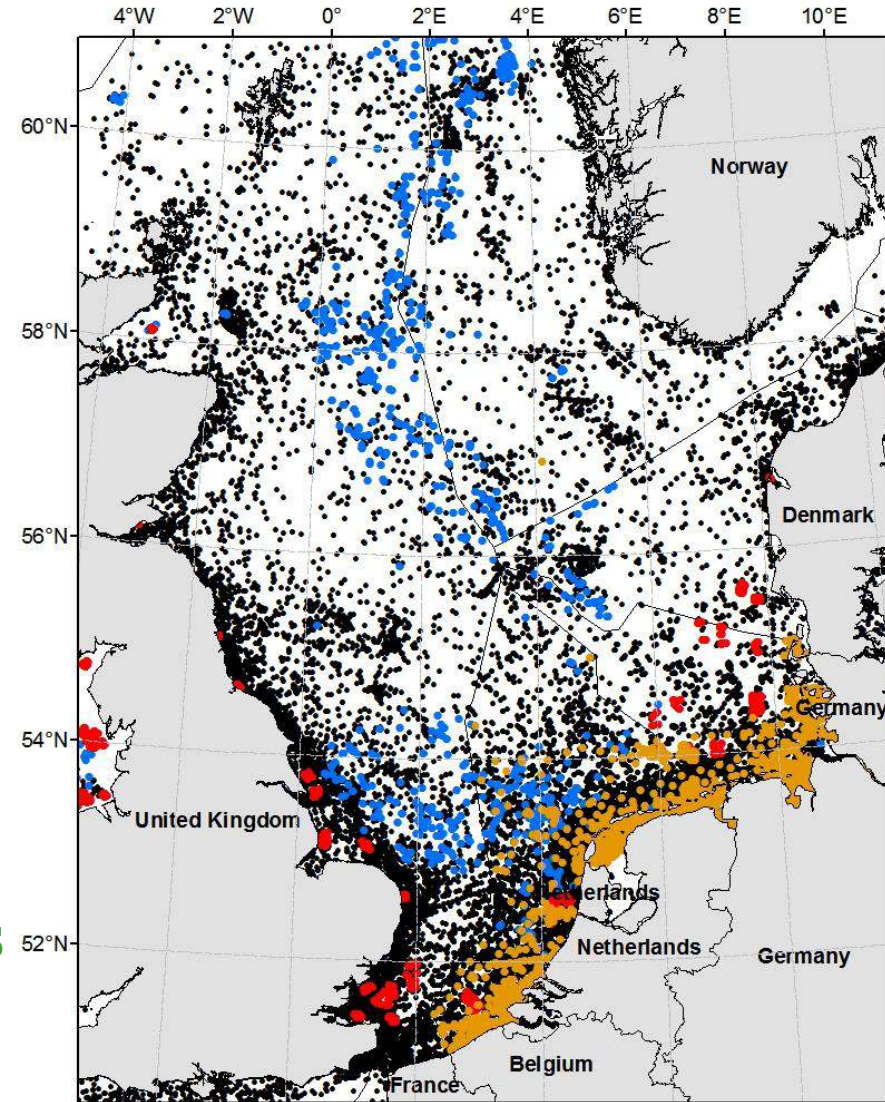
Effects of objects on ecology

- Mainly sand bottom
- **Add objects:**
- Wrecks (~25.000)
- O&G installations (~ 1,000)
- Wind turbines (> 1,500)
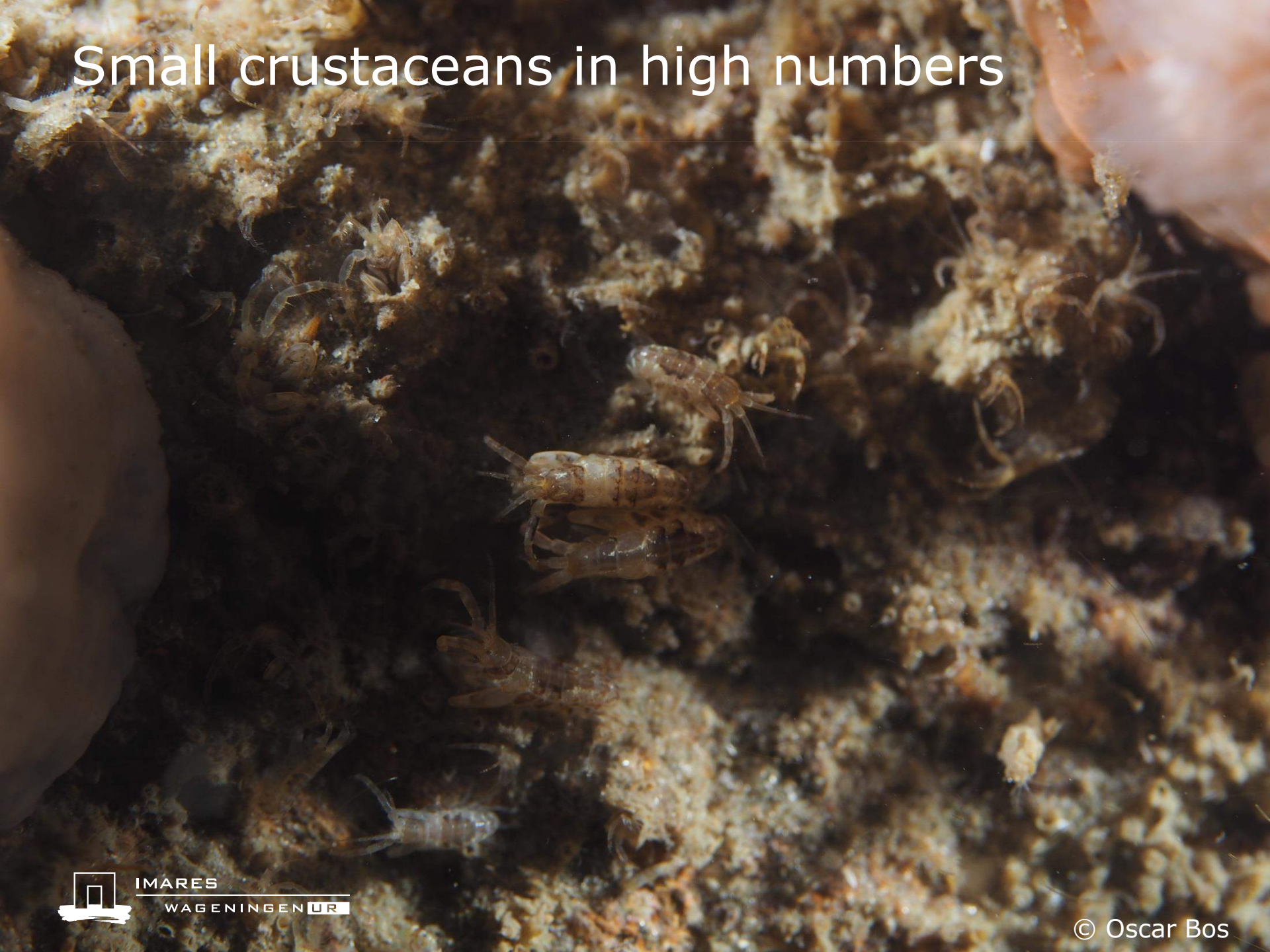
Effects of objects on ecology

- Mainly sand bottom
- **Add objects:**
- Wrecks (~25.000)
- O&G installations (~ 1,000)
- Wind turbines (> 1,500)
- Buoys (many thousands)
- Et cetera

→ **New habitat for species**

Small crustaceans in high numbers

© Oscar Bos

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Fish like the Longspined Bullhead

Several species of sponges

© Oscar Bos

Anemones on offshore platform

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Edible crabs live on offshore installations

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RECON Research questions

- What is the effect of these artificial objects on the distribution of reef species in the North Sea?
    1. Which species live on offshore structures?
    2. Can we identify the drivers for their presence?
    3. Can we predict which species grow at locations?
    4. Are these locations interconnected or isolated?

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Which species live on offshore structures?

1: Analyse ROV inspection video's

- Pilot 2014, effects of:
- Depth (most species 10-20 m)
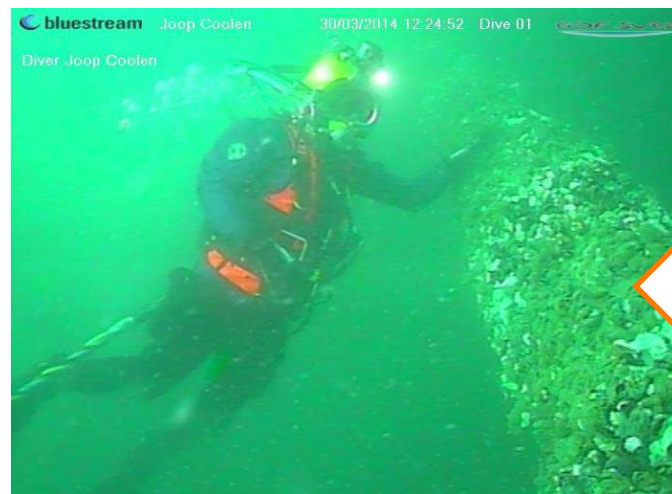- Age of the community

Top image source: totalworldenergy.net
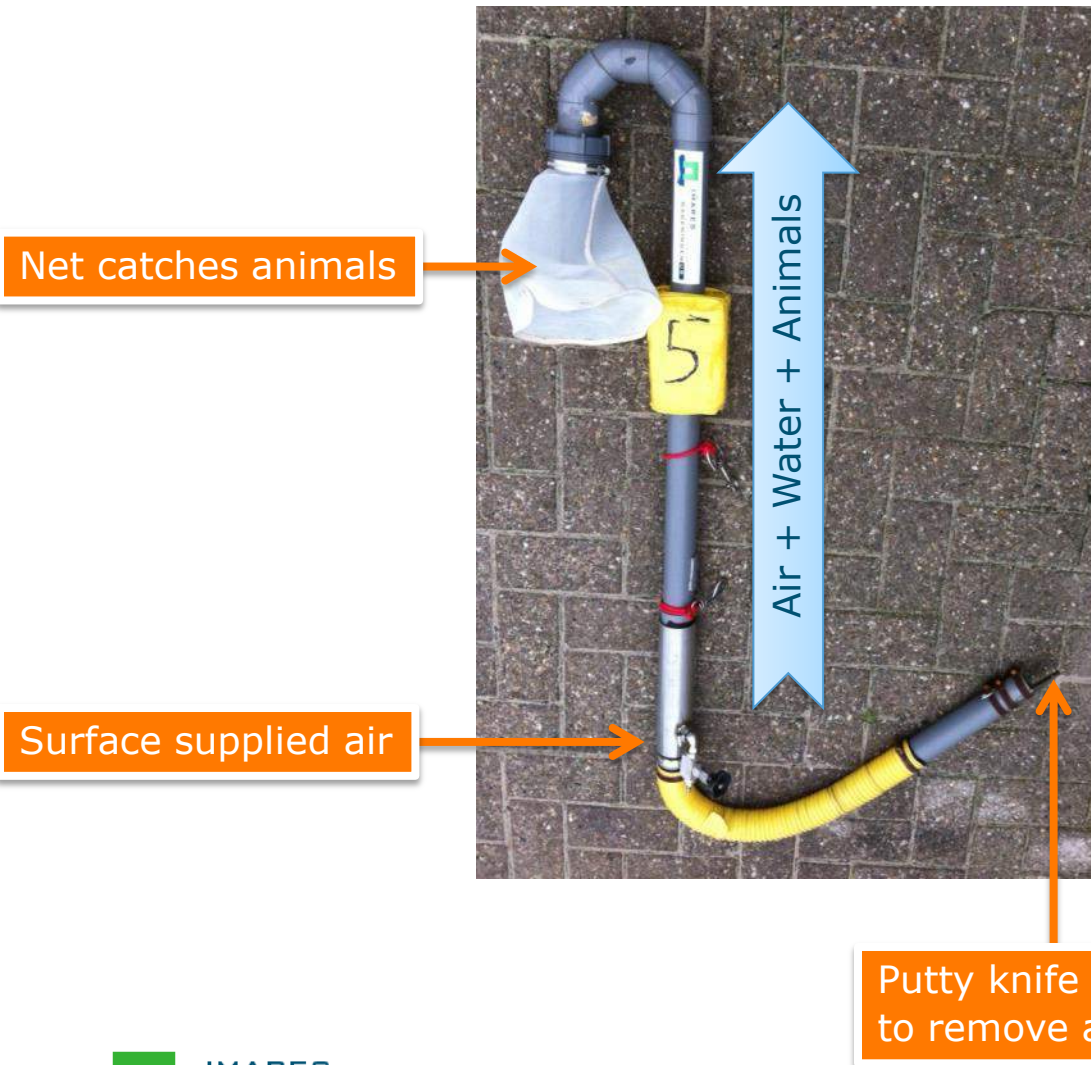
Which species live on offshore structures?

2: Take samples at O&G platforms

- Using surface supplied airlift
- All depths are sampled
- Processed in lab container on board
- Identify in lab
- Create species database

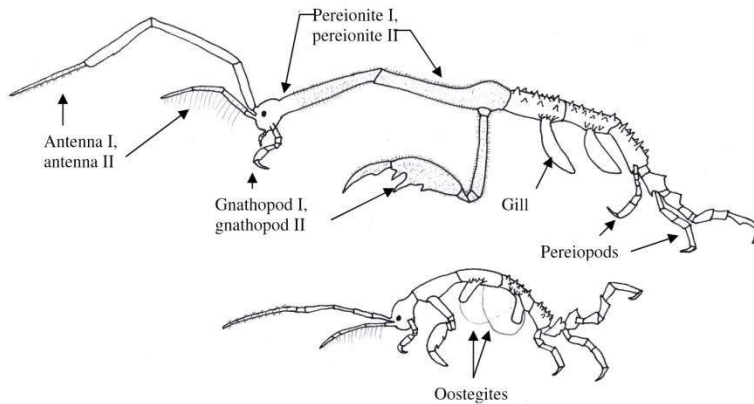# Sampling platforms: diver airlift sampler

Net catches animals

Air + Water + Animals

Surface supplied air

Putty knife to remove animals

Sampling frame

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Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data

Antenna I, antenna II

Pereionite I, pereionite II

Gnathopod I, gnathopod II

Gill

Pereiopods

Oostegites

Present / absent

Example: *Caprella mutica* pilot study
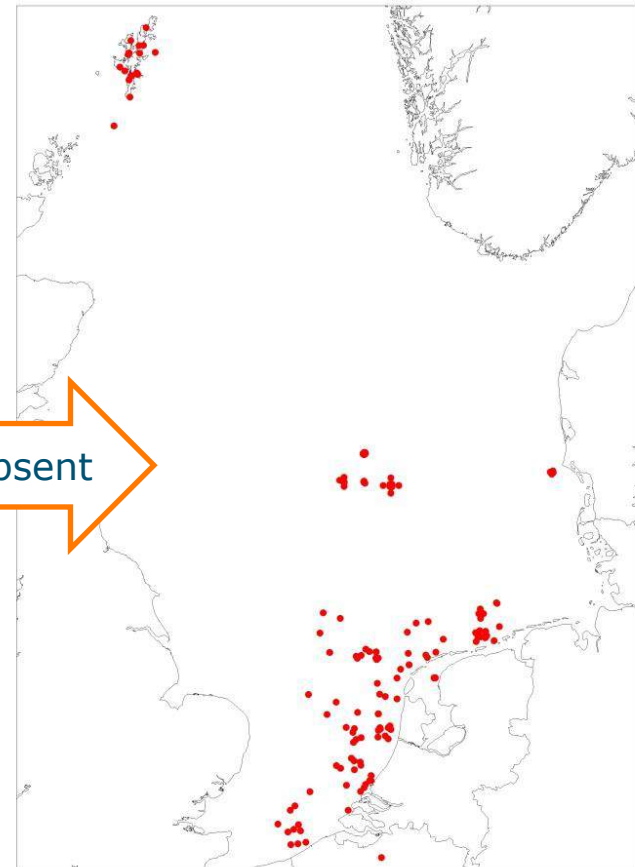
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Images sources: Turcotte C, Sainte-Marie B (2009) Biological synopsis of the Japanese skeleton shrimp (Caprella mutica) & https://en.wikipedia.org/wiki/Caprella_mutica
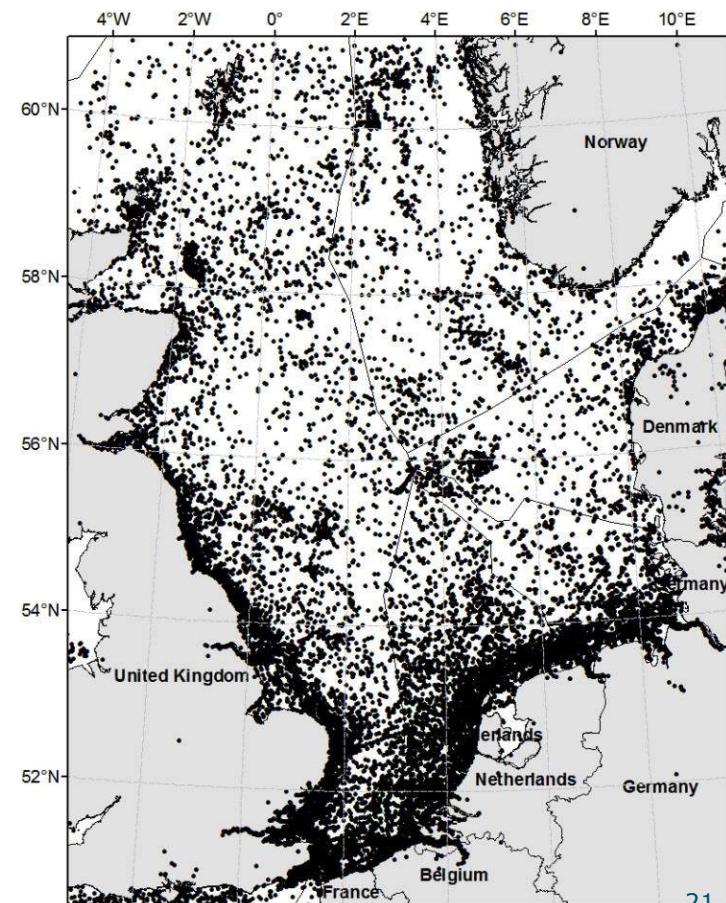
Can we identify the drivers?

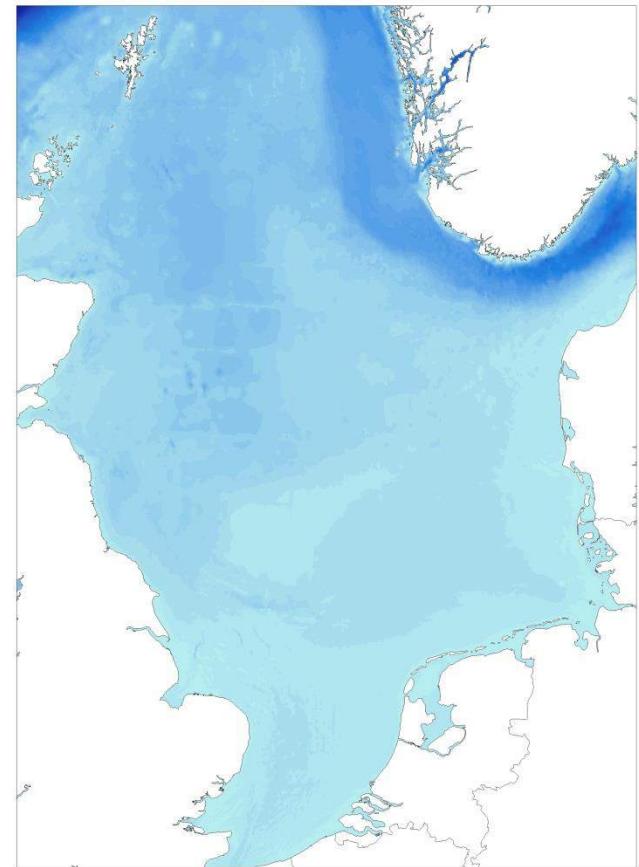Species distribution modelling with use of:

1. Species observation data
2. Presence of objects

Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data
2. Presence of objects
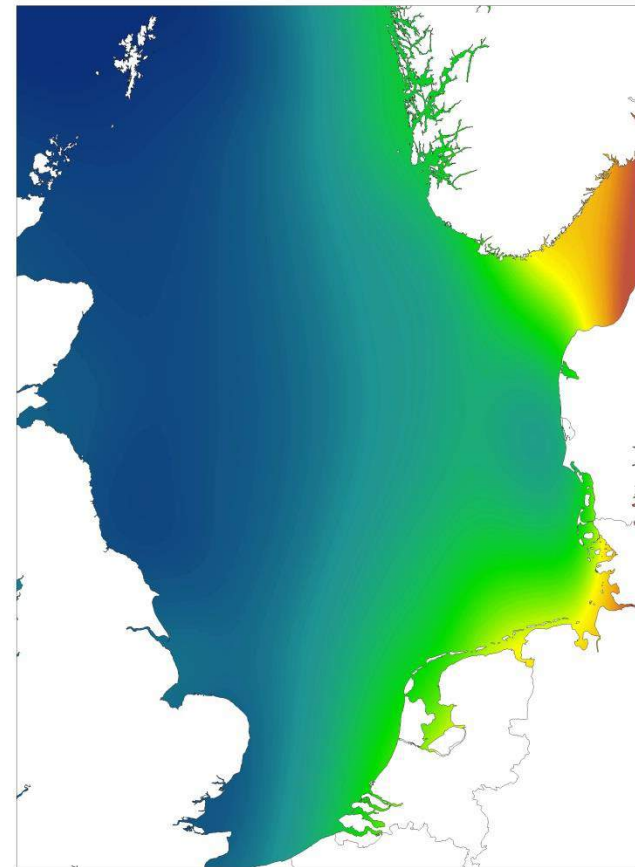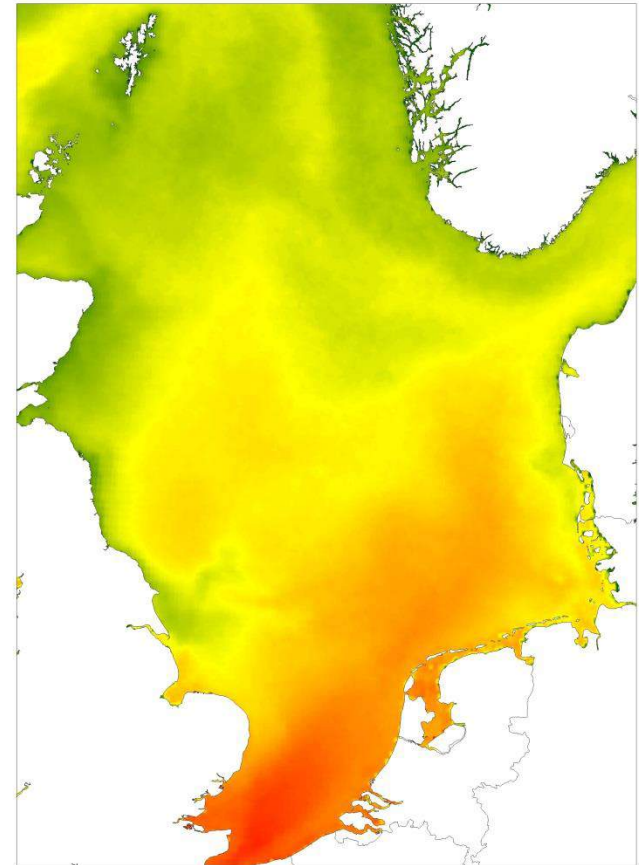3. Sea bottom depth

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Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data
2. Presence of objects
3. Sea bottom depth
4. Salinity

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Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data
2. Presence of objects
3. Sea bottom depth
4. Salinity
5. Temperature

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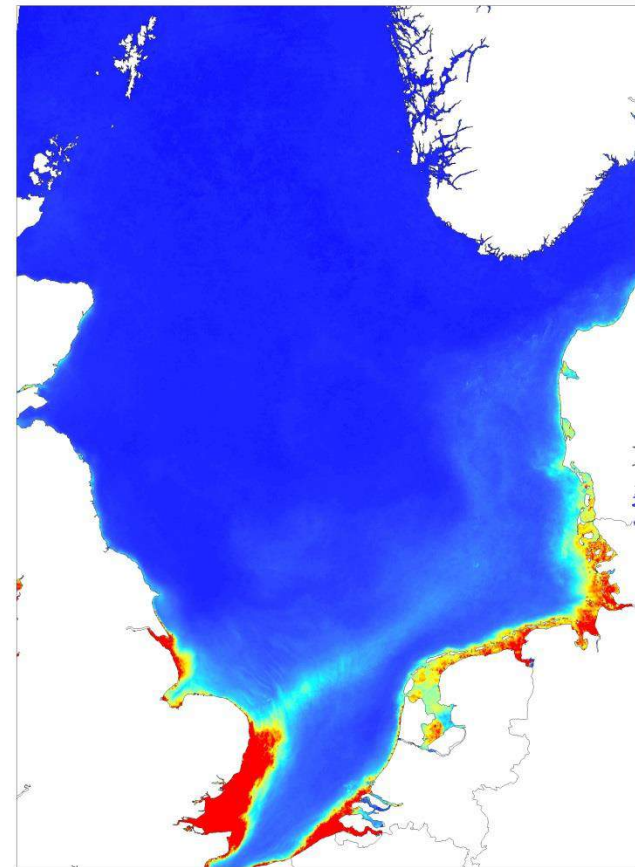# Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data
2. Presence of objects
3. Sea bottom depth
4. Salinity
5. Temperature
6. Density of particles (= food)

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Can we identify the drivers?

Species distribution modelling with use of:

1. Species observation data
2. Presence of objects
3. Sea bottom depth
4. Salinity
5. Temperature
6. Density of particles (= food)
7. Current velocity
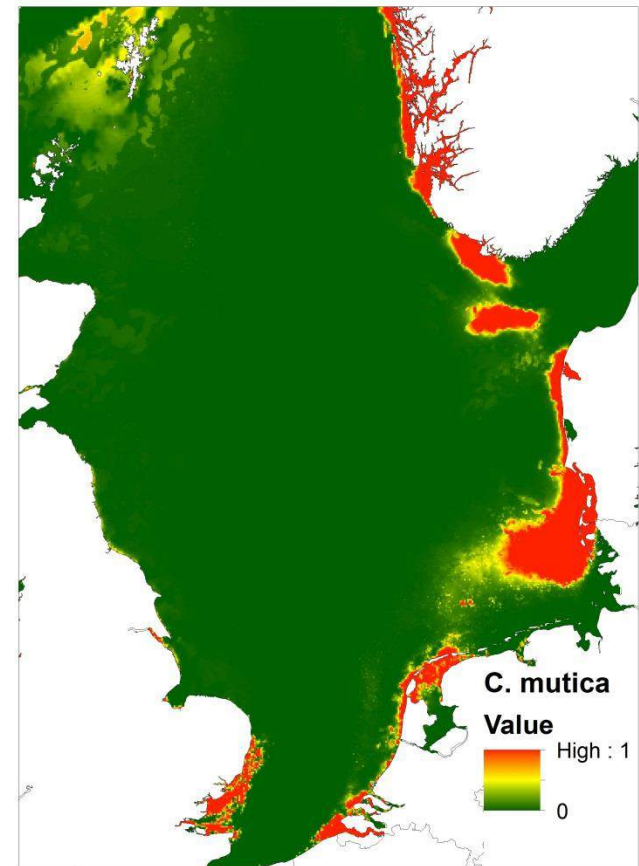8. + others in future models
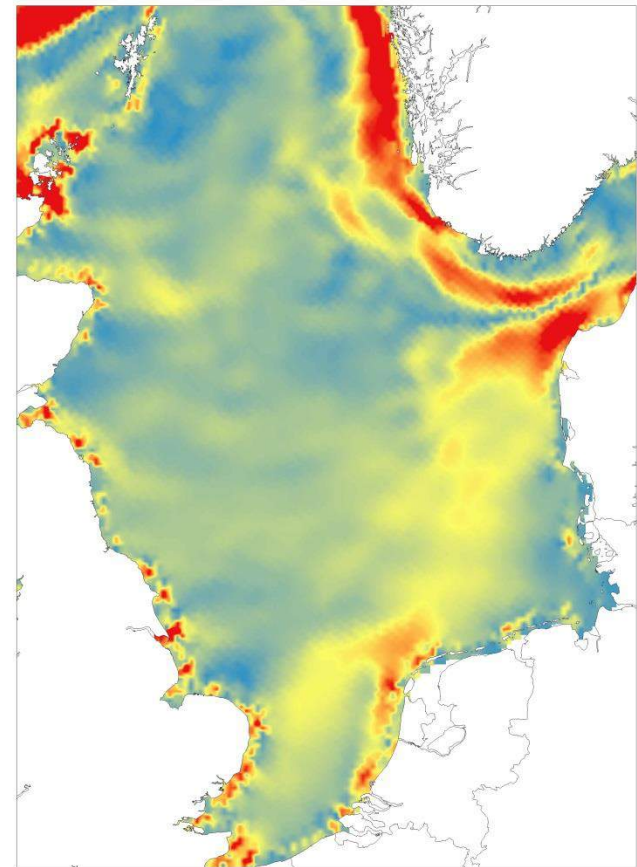
Predict which species grow at locations

Species distribution modelling result:

C. mutica only present with:

- Floating / shallow objects (buoys)

- Food-rich waters

- Average currents

- Annual av. temperatures <12°

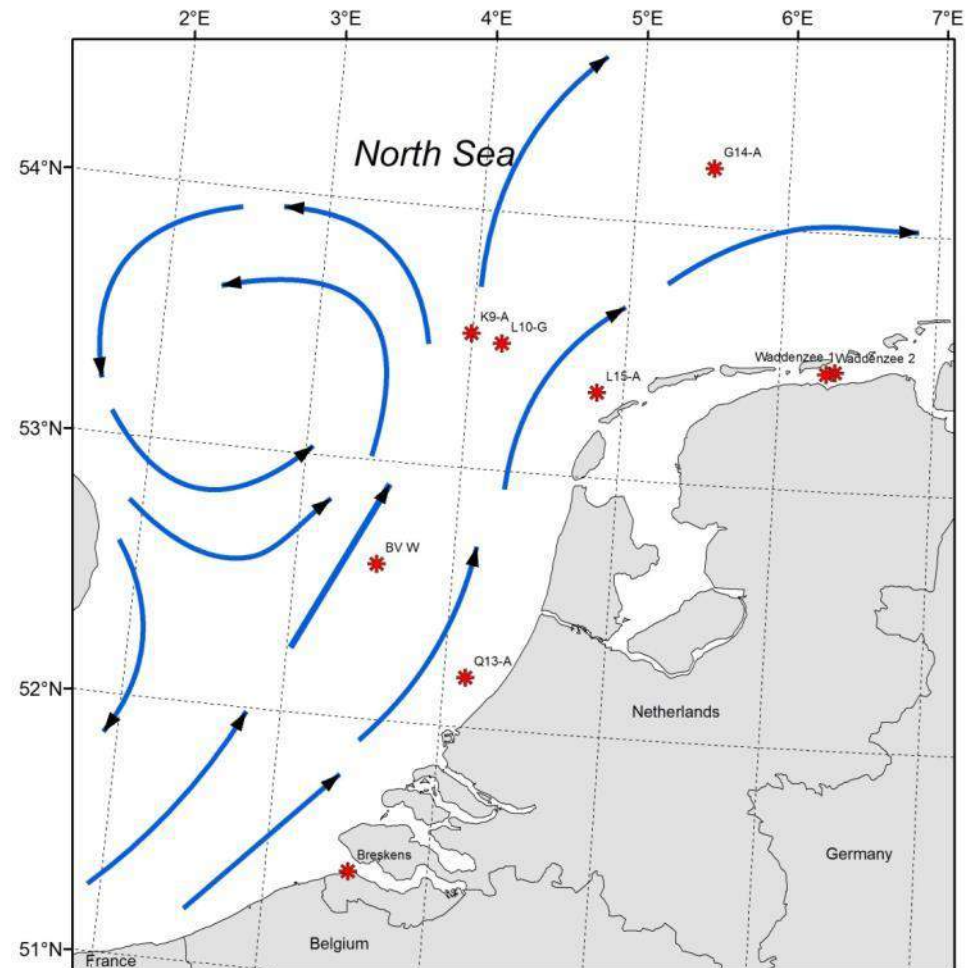C. mutica
Value
High : 1
0

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RECON activities

- Model many potential species on (R2R) locations
- Investigate connections between isolated locations:

Pilot 2014-2015: Mussel larvae step-stone between offshore structures

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We need help

- We are looking for operators outside NL to allow us to:

  - Analyse ROV images
  - Collect mussel samples
  - Take marine growth samples

- E.G. from UK, Denmark, Norway:

- Contact: Joop.coolen@wur.nl
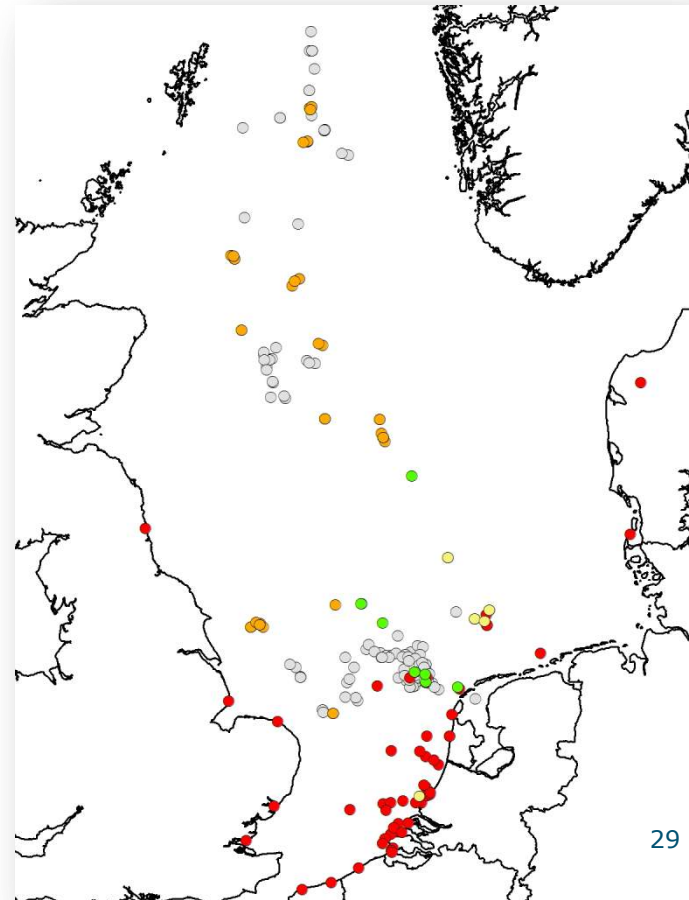
We thank our partners

Nathalie Kaarls, Ed Schmidt, Ulf Sjöqvist, Maico Vrijenhoeff

+ Bluestream offshore divers & Seamar Splendid crew
+ all colleagues and students helping in the lab

End

Thank you for your attention