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

HARD SUBSTRATUM FAUNA

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Presented by Ilse De Mesel & Francis Kerckhof

LEARNING FROM THE PAST TO OPTIMISE FUTURE MONITORING
• First year: samples at different depths
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Splash zone: Dominated by *Telmatogoton japonicus*
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Splash zone: Dominated by Telmatogoton japonicus

Infralittoral zone: from Barnacle-Jassa to Barnacle - mussel zone
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Splash zone: Dominated by *Telmatogeton japonicus*

Infralittoral zone: from Barnacle-Jassa to Barnacle - mussel zone

Subtidal zone: species rich community
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• First year: samples at different depths
• Afterwards:
  • focus at -15 m
  • stones from scour protection
  • semi-quantitative samples and observations in intertidal and splash zone
• Seasonal sampling
• Organisms larger than 1 mm
• Distinction between:
  • counted individuals (ind/m²)
  • coverage of species (cover%)
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After 3 months…

- 28 species
- 1,900 ind/m²
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After 1 year…

- 22 - 32 species
- 19,000 ind/m²
After 2 years...

- 25 - 34 species
- 185,000 ind/m²
After 3 years…

- 25 - 30 species
- 84.000 ind/m²
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After 4 years...

- 18 - 32 species
- 120,000 ind/m²
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Number of species

- new
- established
- single

Year 1
Year 2
Year 3
Year 4

Number of species
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RELATIVE DENSITIES

- Sipuncula
- Platyhelminthes
- Nemertea
- Mollusca
- Echinodermata
- Cnidaria
- Arthropoda
- Annelida

Arthropoda
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- Stenothoe valida
- Stenothoe monoculoides
- Pisidia longicorns
- Pilumnus hirtellus
- Phitiscia marina
- Pagurus bernhardus
- Necora puber
- Mesopodopsis slabberi
- Macropodia linasari
- Liocarcinus holsatus
- Jassa herdmani
- Hyperia galba
- Hippolyte varians
- Eualus sp.
- Decapoda
- Corophium acherusicum
- Cancer pagurus
- Balanus perforatus
- Balanus crenatus
- Atylus swammerdami
- Aora gracilis

ARTHROPODA

Jassa herdmani
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ARThropoda

Jassa herdmani
Stenothoe valida
Stenothoe monoculoides
Pisidia longicornis
Pilumnus hirtellus
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DENSITIES

- Sipuncula
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- Mollusca
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- Cnidaria
- Arthropoda
- Annelida

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- Arthropoda
- Annelida

Legend:
- Sipuncula
- Platyhelminthes
- Nemertea
- Mollusca
- Echinodermata
- Cnidaria
- Arthropoda
- Annelida
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DENSITIES

- Sipuncula
- Platyhelminthes
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PREDATOR PREY RELATIONSHIPS

**Odostomia turrita**

**Epitonium clathratulum**

**Facelina bostoniensis**

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**Pomatoceros triqueter**

**Metridium senile**

**Tubularia larynx**
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BLIGH BANK – BELWIND WINDFARM

Similar patterns in community development
- patterns in density
- patterns in diversity
- patterns in succession

Difference in subdominant species

Due to:
- distance to the coast?
- foundation type?
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FISH COMMUNITY

[Pie charts showing fish community changes over seasons for Wind turbines, Wrecks, and Sandy areas. Each chart is divided into sections representing different fish species: Pouting, Atlantic cod, Pollack, Horse Mackerel, Saithe, Mackerel, Dragonet, Dab, Black Seabream, Bull ron, Red Gurnard, Plaice, Common sole, Sea bass, Flounder, Dogfish.]
## HARD SUBSTRATUM FAUNA

### % G of pouting

<table>
<thead>
<tr>
<th>SAND</th>
<th>OWF</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Callionymus</em> sp.</td>
<td>43.1</td>
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<tr>
<td>Pisces sp.</td>
<td>9.8</td>
</tr>
<tr>
<td>Actiniaria sp.</td>
<td>9.7</td>
</tr>
<tr>
<td>Polychaeta sp.</td>
<td>4.7</td>
</tr>
<tr>
<td><em>Liocarcinus holsatus</em></td>
<td>4.3</td>
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</tbody>
</table>
FULLNESS INDEX OF POUTING

- July
  - Sand
  - OWF

- October
  - Sand
  - OWF
CONCLUSIONS

• Many species reach the foundation, only few establish a community

• High community dynamics during the first year, later on mainly seasonal dynamics.

• Dominance of few species (*Jassa* – Actiniaria – *Tubularia*), similar to other artificial hard substrata in the Southern North Sea

• Structuring force of generalist and specialised predators

• Fouling differs from natural hard substrata

• Fouling organisms are food for fish
FUTURE MONITORING

- Continuation of the current monitoring
- Large scale patterns:
  - on the turbines
  - onshore-offshore gradient
- Impact of foundation type:
  - on the fouling community
  - on the fish community
- Better assessment of food availability for higher trophic levels
- Scour protection: habitat for larger organisms (lobsters and crabs)
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THANK YOU

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