Belgian pilot: Fouling organisms on oyster restoration tables and algae nets

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This Project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement no 862915

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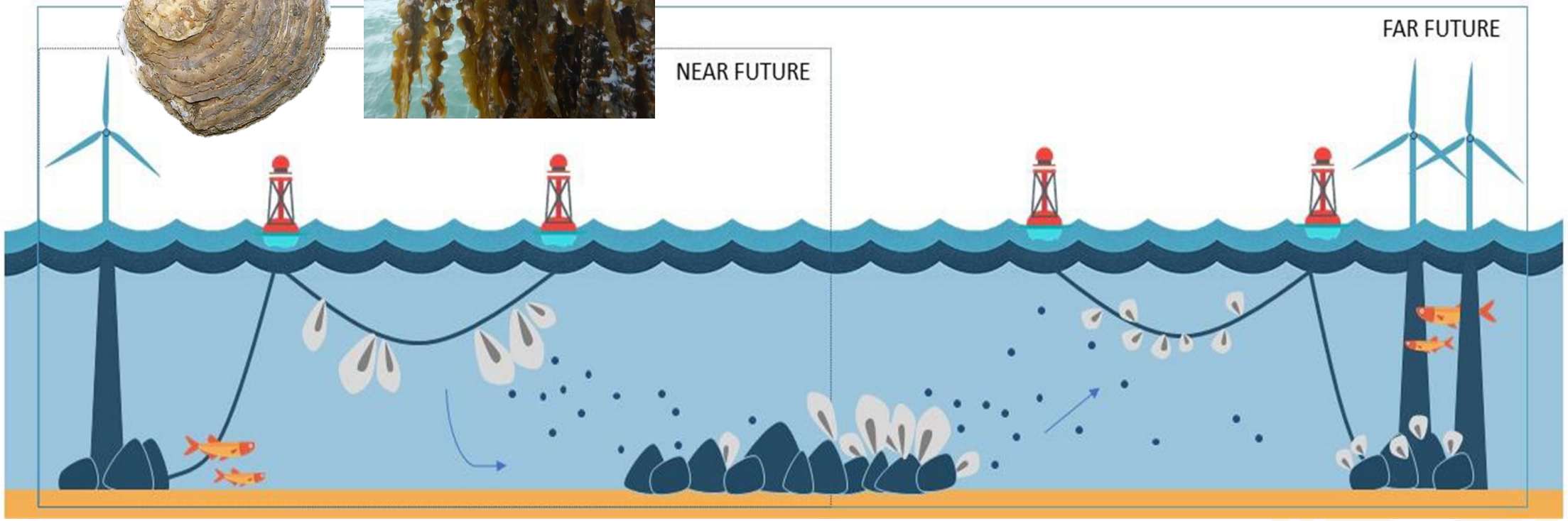
Multi-use activities



Aquaculture **Restoration**

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Consortium partners

- Academic and industrial partners
- Pilot lead: Ghent University
- Multi-use activities:
  - Aquaculture of seaweed and flat oysters
  - Restoration of oyster reefs
  - Offshore wind

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Project locations

- Nearshore: Westdiep area (5 km) = European protected area (NATURA 2000)
- Offshore: Belwind wind farm (46 km)

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Project locations

- Nearshore: Westdiep area (5 km) = European protected area (NATURA 2000)
- Offshore: Belwind wind farm (46 km)
- Difference:
  - Eutrophication
  - Depth
  - Hydrodynamics
  - Level of safety measures

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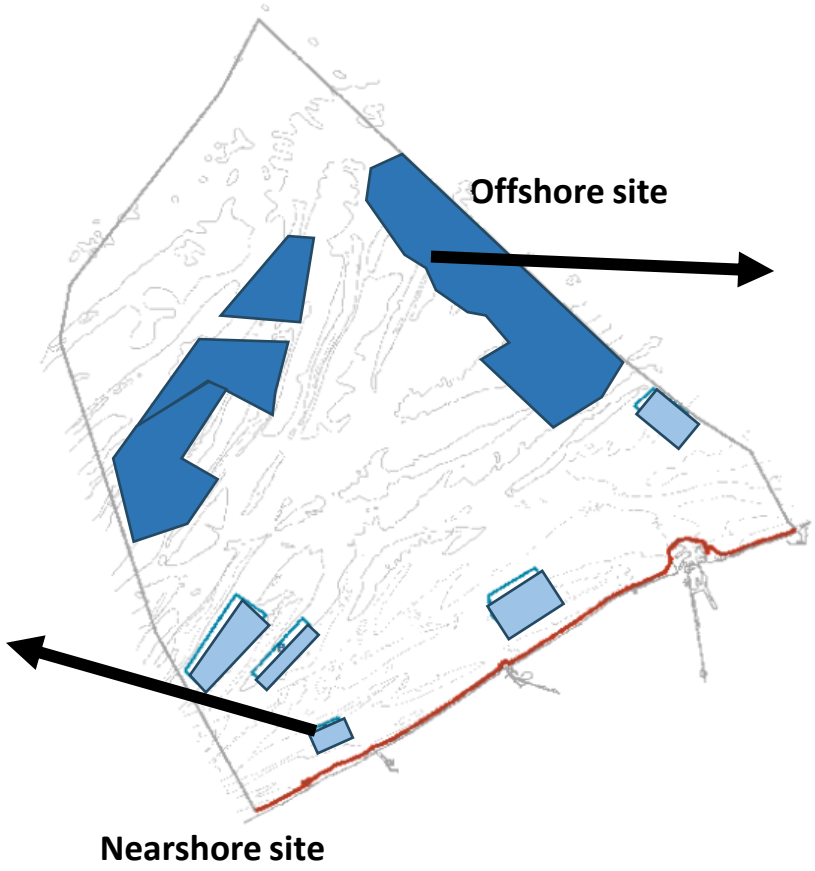
Strategy

- First nearshore testing of systems before moving offshore with best suited materials and methods
- Focus on commercially viable options



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Oyster cultivation and restoration

Preoperational phase – nearshore testing

- Fouling on cultivation structures is a major challenge
  - Hydrozoans (*Tubularia*)
  - Amphipods (*Jassa* and *Corophium*)
  - Requires regular maintenance

- Successful observation of flat oyster spat settlement

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Video fragment from UNITED diving campaign in Belwind

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Oyster cultivation and restoration

Fouling in restoration = a mixed story

- Settlement of *Ostrea edulis* spat
- Embryonic reef formation by Ross worm *Sabellaria spinulosa*
- Biogenic reefs support high biodiversity
- Dominant fouling species competing for space (*Metridium*, *Crepidula*)

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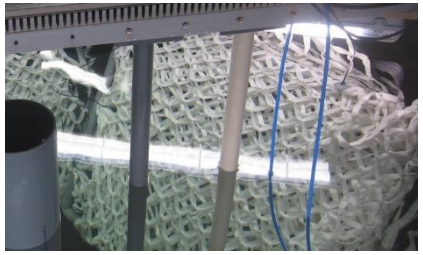
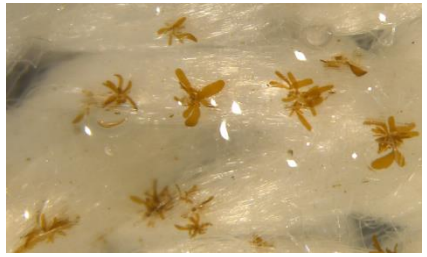
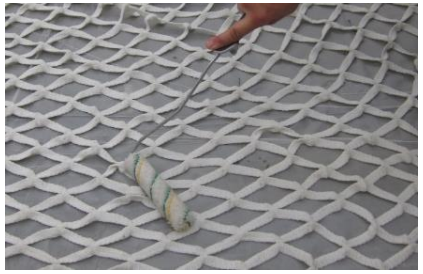
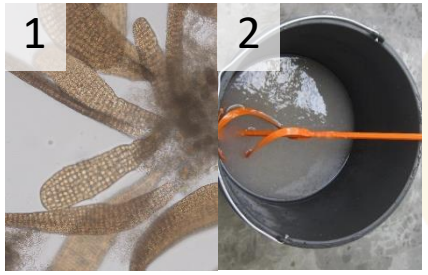
Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational

- Identification and development of suitable cultivation techniques for offshore conditions

	1st year (Nov 20 – May 21)		2nd year (Nov 21 – May 22)	
Substrates				
Nursery period				**Adapted**
Direct seeding				

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Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational: Overview

Nov 2020

Feb 2021

May 2021

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Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational: Seeding method

Seaweed cultivation – 1st sampling Feb 2021

Direct seeding

Nursery seeding

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Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational: substrate

Nearshore net type

Offshore net type

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Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational: fouling community

- Overall 20 species of fouling organisms identified
- Dominated by hydrozoans (*Tubularia larynx*) and amphipods (*Jassa herdmani & Jassa marmorata)*

Tubularia larynx

https://www.britishmarinelifepictures.co.uk/tubularia-sp-1

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Fouling on seaweed nets

Seaweed cultivation nearshore/pre-operational: fouling community

- Overall 20 species of fouling organisms identified
- Hydrozoans (*Tubularia larynx*) and amphipods (*Jassa herdmani & Jassa marmorata)* dominating

Jassa herdmani

https://nl.wikipedia.org/wiki/Jassa_herdmani#/media/Bestand:Jass

Jassa marmorata


https://www.sealifebase.ca/summary/Jassa-

Cuthona gymnota


http://www.seawater.no/fauna/mollusca/gymnota.html

Facelina bostoniensis


https://opistobranquis.info/en/guia/nudibranchia/cla

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Fouling on aquaculture and restoration structures

Summary & Lessons learned

- Fouling on structures increases strongly in spring, dominated by hydrozoans and amphipods
- No major fouling on seaweed biomass
- Optimising substrate, seeding success and cultivation system design can lower fouling
  - ➢ Good cover with seaweeds early in the cultivation cycle can prevent extensive fouling
- Moving offshore = lower SPM, making this environment more suitable
  - ➢ Difference in fouling intensity remains to be assessed

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