



WP7 – Belgian Pilot

*Wind energy – flat oyster aquaculture & restoration –
seaweed cultivation*



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

03/06/2020

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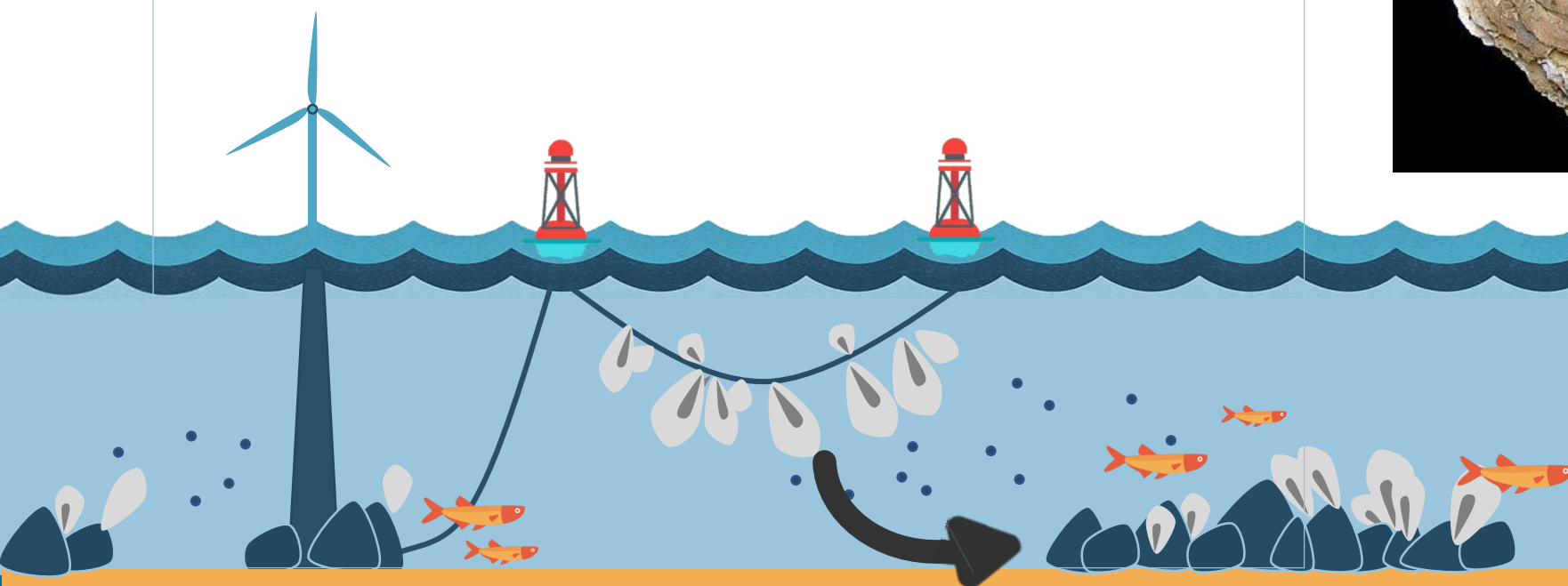
AQUACULTURE

RESTORATION



Ostrea edulis
or
Flat oyster

NEAR FUTURE



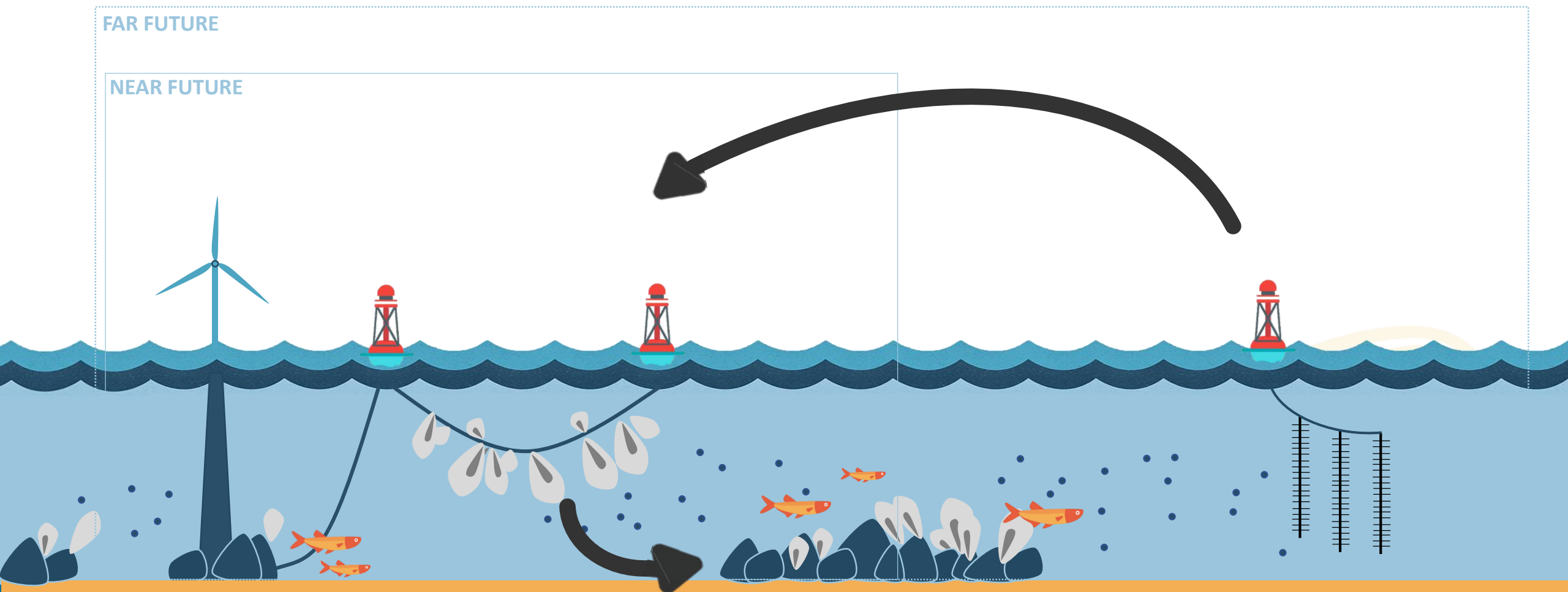
AQUACULTURE

RESTORATION



FAR FUTURE

NEAR FUTURE



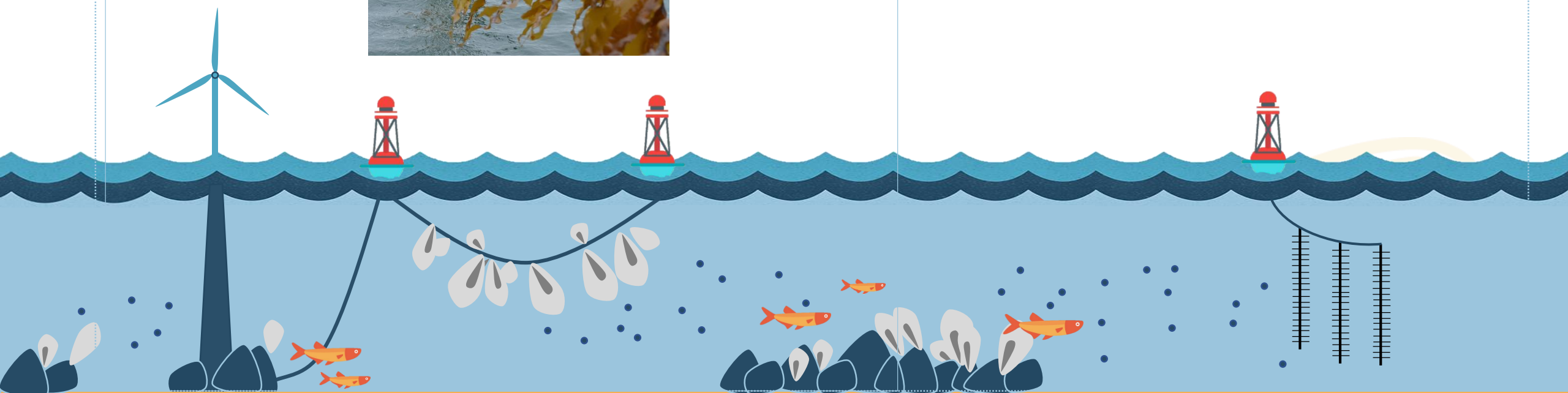
AQUACULTURE

Saccharina latissima

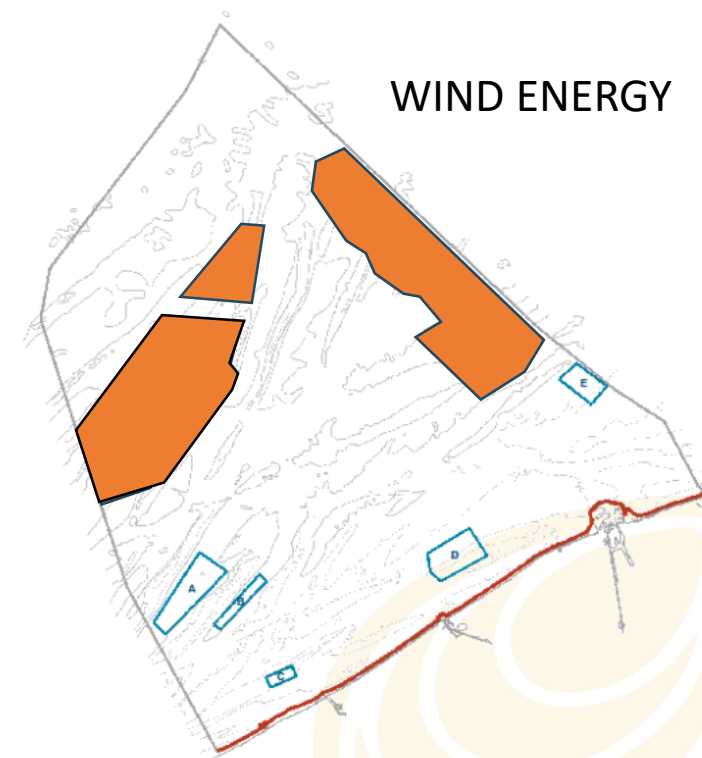
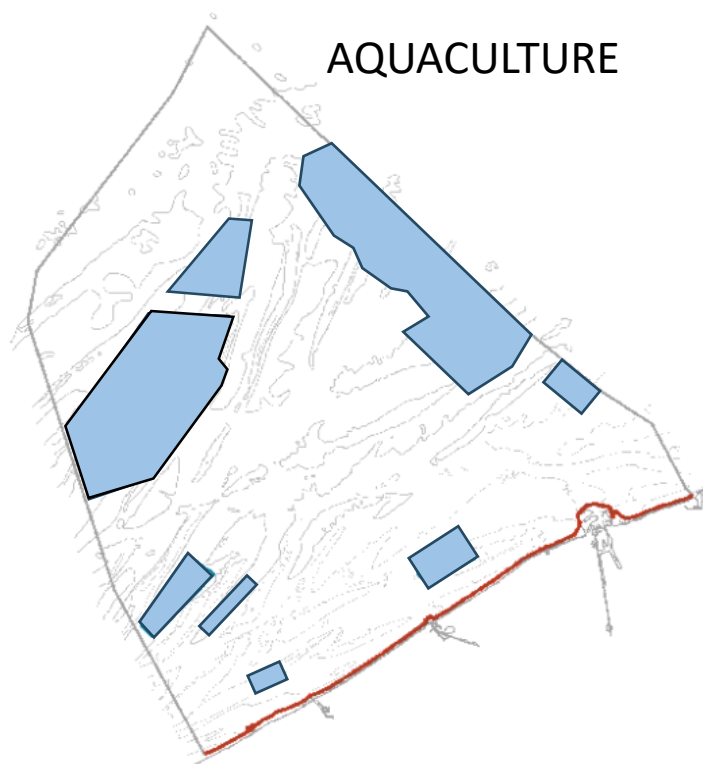


FAR FUTURE

NEAR FUTURE

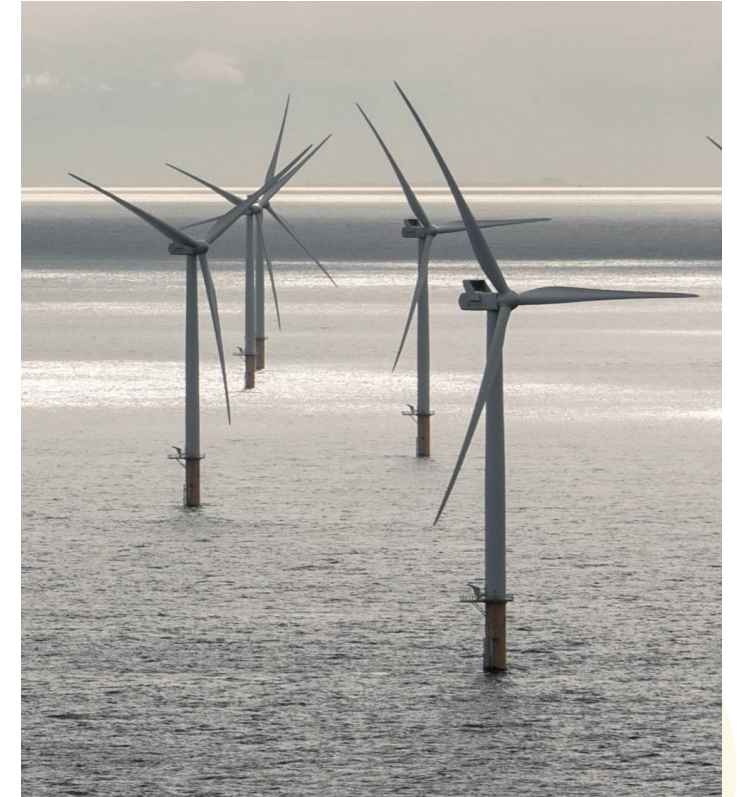


The BELGIAN SITUATION: MSP



Objectives

- Evaluation of wind farms as locations for restoring native flat oyster reefs in combination with culturing flat oysters for human consumption
- To compare growth of seaweed offshore and nearshore
 - Morphology and nutritional characteristics



Expected output

- Simulate aquaculture and restoration scenarios
- Potential to culture flat oysters under exposed conditions
- Potential to restore flat oyster reefs in offshore wind mill parks
- Seaweed quality i.f.o. environmental conditions
- Remote monitoring as a tool to collect data
- Life cycle analysis of cultivation practices
- **Synergies and its added value**



The Belgian Team

Partners and experience



- Near shore shipping activities ; pioneer mussel & flat oyster production North Sea



- Retailer



- Dredging company; installation of wind farms



- Concession holder several windparks



- Marine ecology and management; remote sensing data

Activities Belgian pilot

- Preparation longline; assisting crew for installation culture devices and sampling nearshore and offshore; facilitator nearshore activities
- LCA; economical sustainability flat oyster production
- Installation longline offshore and scour protection material nearshore and offshore
- Facilitator multi-use approach offshore; crewvessels for sampling
- Advise on oyster restoration; scientific divers for sampling; ecological impact BP; remote sensing data

The Belgian Team

Partners and experience



UGent ARC



- Bivalve aquaculture, larval production and diseases, nutrition

UGent Biology



- Seaweed reproduction, genetics, & aquaculture

UGent Law



Maritime Institute

- Internationalisation and governance

UGent MTD



- Numerical modeling of oyster longline using "MoorDyn-UGent"

Subcontractor

ILVO  ILVO

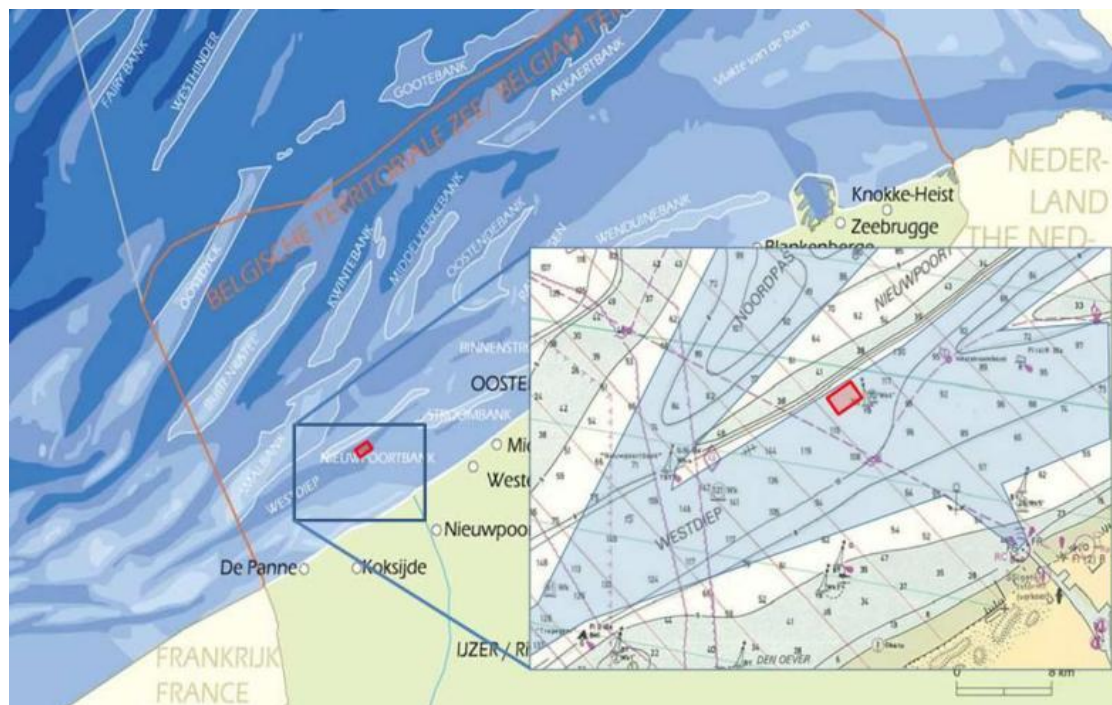
- Fisheries and aquaculture, agri-food sector

Activities Belgian pilot

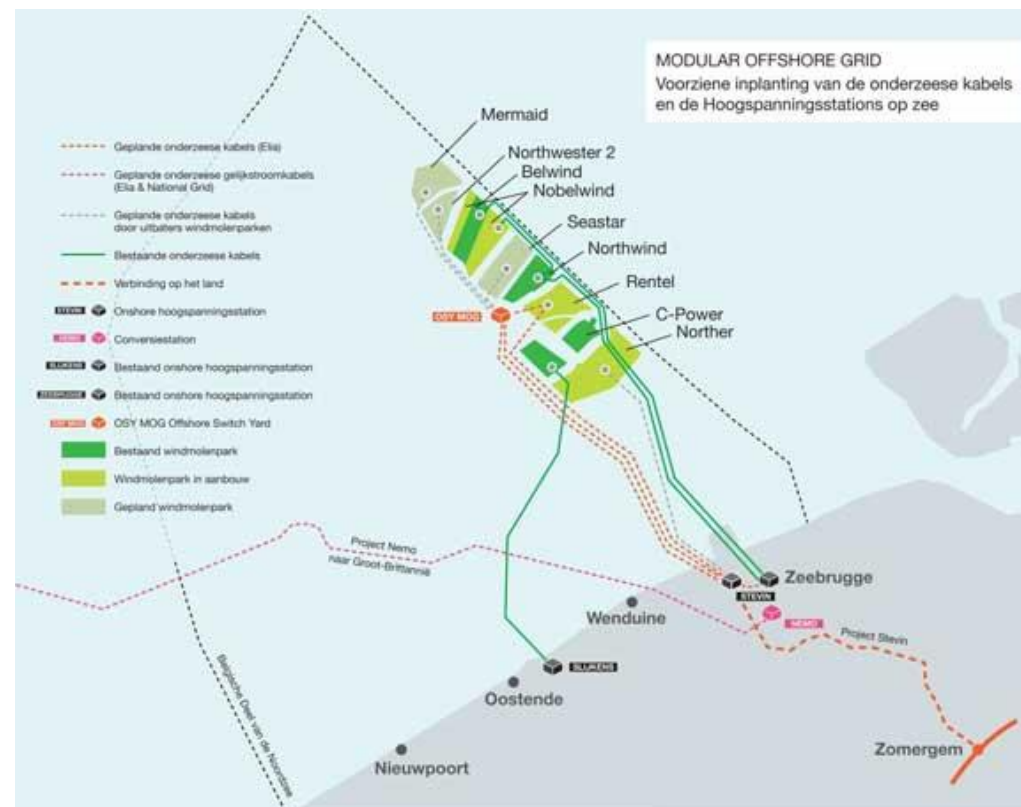
- Belgian pilot coordinator; flat oyster growth modelling, prevalence of oyster diseases, and other biological aspects of oyster culture
- Study impact of environment on seaweed composition and morphology
- Legal aspects related to offshore activities in the Belgian Part of the North Sea in a multi-use context
- Design offshore longline for flat oyster and seaweed
- Assisting in preparation of the longlines and oysters

Activities and challenges

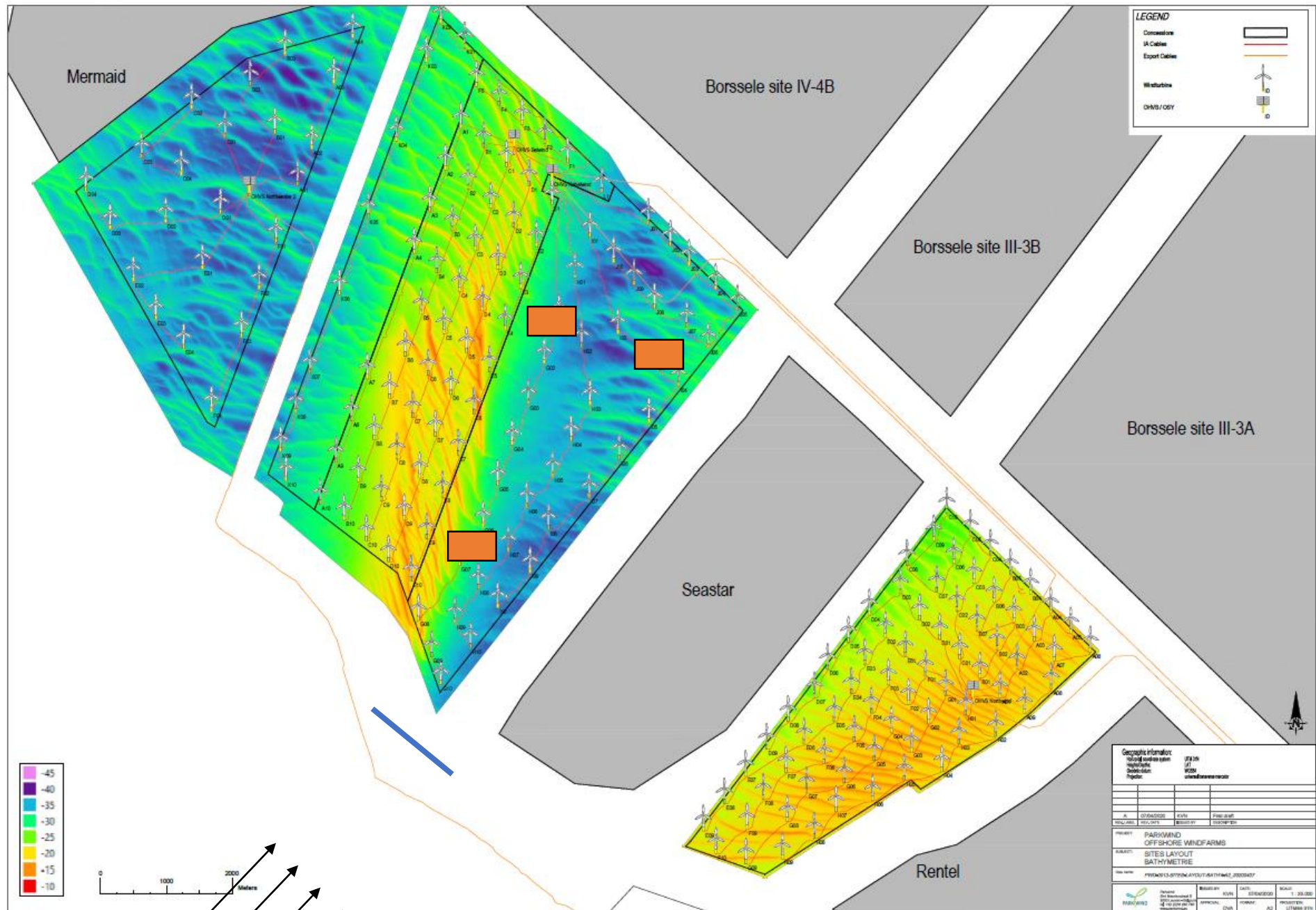
- Pre-operational phase



- Operational phase

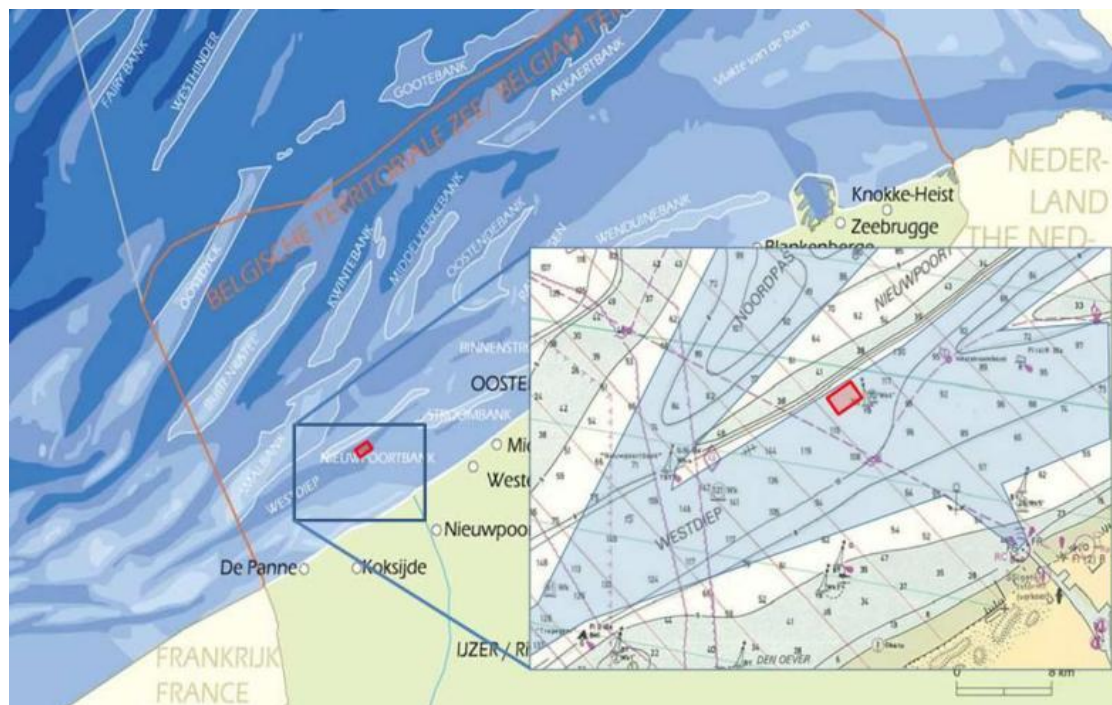


- Pre-d

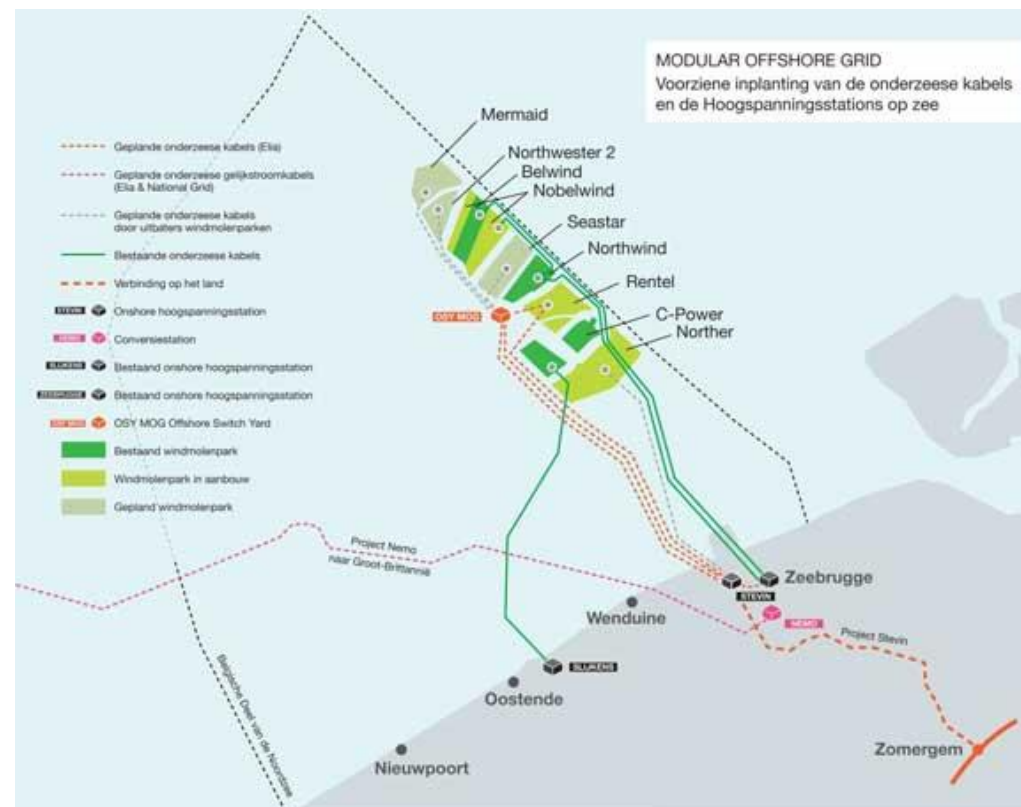


Activities and challenges

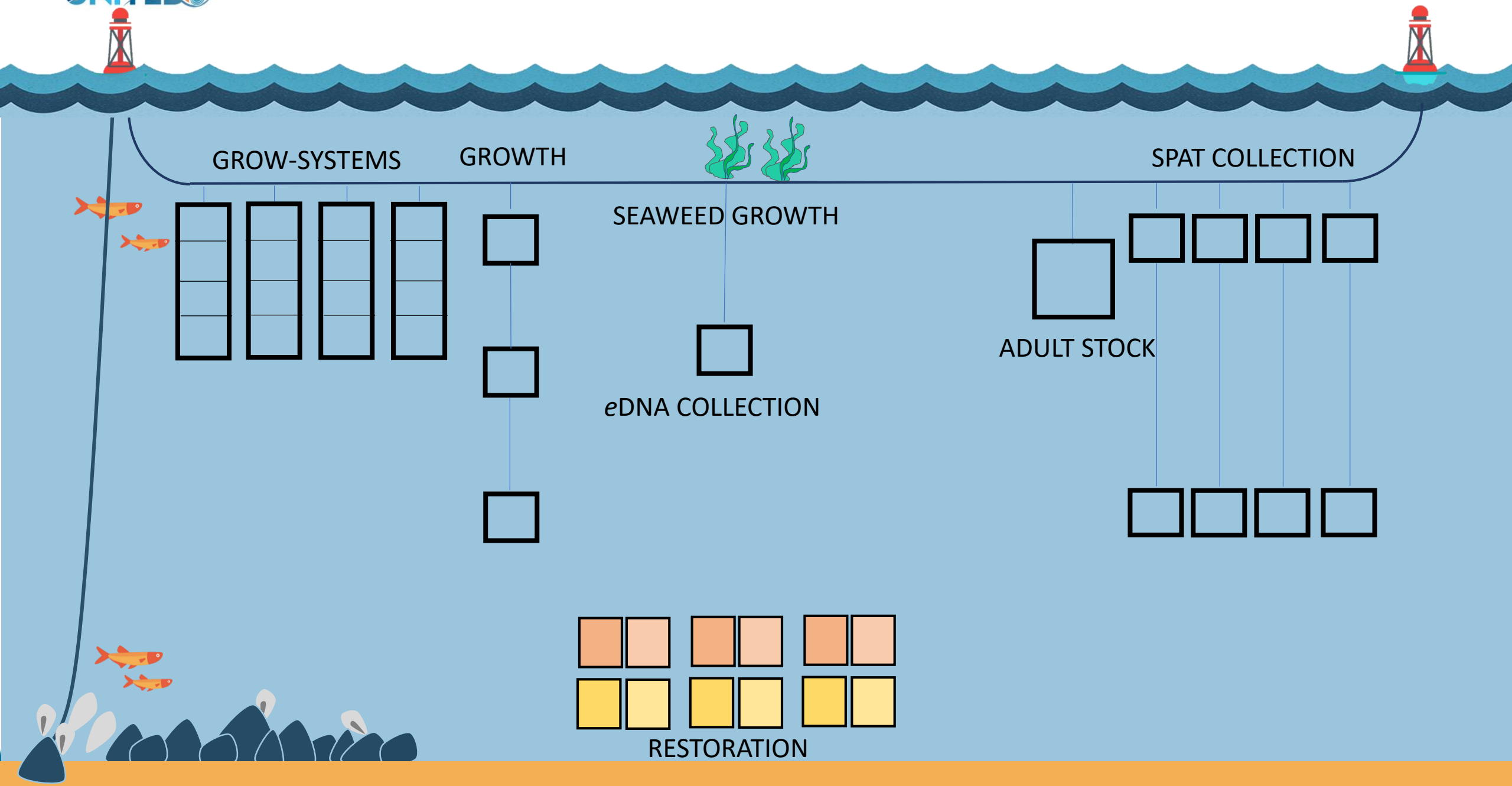
- Pre-operational phase



- Operational phase



- Post-operational phase



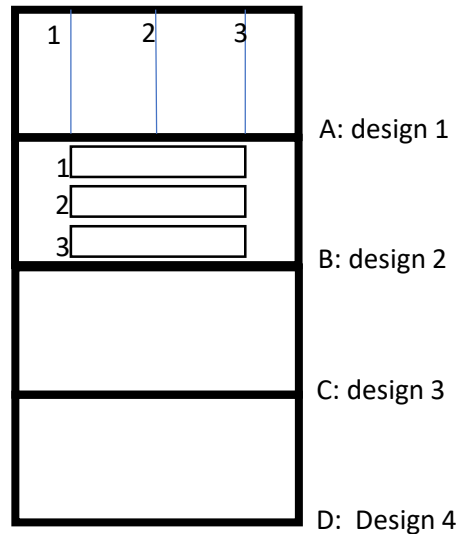
Parameters to measure

Grow-out systems

Systems x oyster sizes

Analysis

- Oyster growth
- Oyster reproduction
- Diseases
- Mortality
- Fouling
- Durability
- Effort
 - Deployment
 - Maintenance
 - Harvesting
- LCA (eu/oyster)

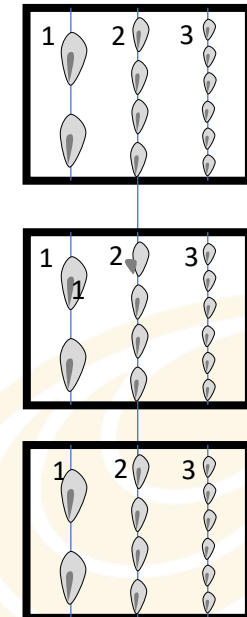


Growth

Depth

Analysis

- Growth potential
- Mortality
- Fouling
- System performance



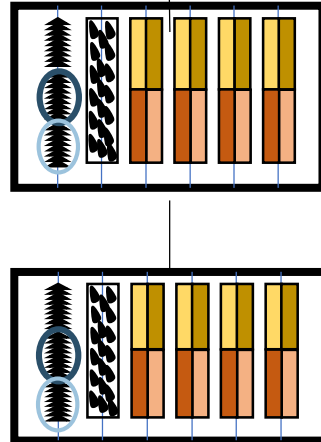
Parameters to measure

Spat collection

Depth x collection substrate

Analysis

- Density of larvae (#/m²)
- Density of larvae (#/m³)
- Fouling
- Spat growth (mm)
- Strength of system
- Timing of spawning

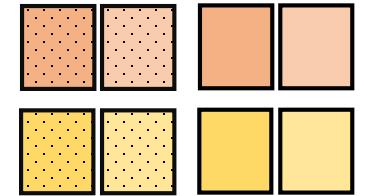


Restoration

Substrates x attractivity

Analysis

- Density of larvae (#/m²)
- Fouling
- Spat growth (mm)
- Diseases
- Oyster survival (%)



Parameters to measure

Seaweed research question

What is the effect of cultivation technology and genetic background of the sporophytes on growth of *Saccharina latissima* in the Belgian part of the North Sea?



Challenges

- Distance from the coast: +20 km
- Exposed North Sea conditions: +12m waves
- Disease management
 - E.g. *Bonamia* and *Marteilia*: qPCR via Isabelle Arzul & Benjamin Morga (Ifremer)
- Inconsistent larval supply
- Cooperation between experts
- Timing of the project



Partners Belgian pilot

Subcontractor Belgian pilot



**GHENT
UNIVERSITY**

museum



ILVO



BREVISCO
Serving the Fishing- & Aquaculture Industries



PARK WIND



Jan De Nul
GROUP



COLRUYT
GROUP

Q&A

Q: Speakers refer to "offshore locations with exposed conditions" for their pilots. Could you please define exposed conditions? Is it a combination of wave conditions, distance from coast, bathymetry? Something else?

A: The definition of offshore or exposed conditions is now discussed within the ICES workgroup of aquaculture. We use exposed conditions and offshore because we are dealing with harsh conditions, rolling waves of up to 12m, currents of 1m/s, strong winds. These have proven to be one of the harsh conditions to do aquaculture in previous projects.

Q: Thank you for organising and sharing the first results of the UNITED project. I wonder :in the preparation of the oyster spat, what factors were taken into account when building up the breeding programme?

A: There are two things here. Firstly we are planning to catch wild spat. Wild spat is needed if restoration will be successful, since reefs need to be connected and larvae from one reef should be able to reach another. For the grow-out experiments in which we will try different cultivation techniques, we will use spat from hatcheries. We are not designing or organising a breeding programme ourself. We intent to buy spat from *Bonamia*-free/*Martelia*-free hatcheries in Europe.



Q&A

Q: Is there a risk that environmental permits for offshore will not be issued in time?

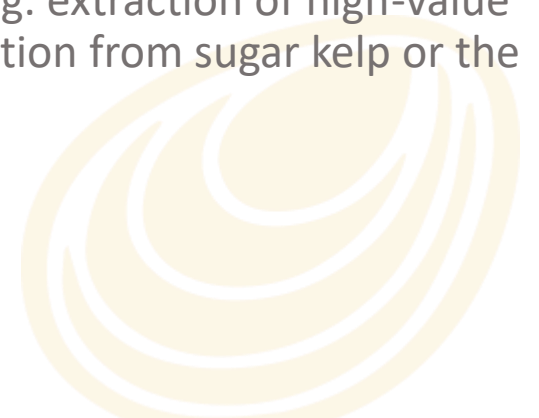
A: We don't expect problems. This is not the first time these projects are done in Belgium and we know who to contact with regard to permits. Since we are working with extractive aquaculture and no bottom disturbance will happen, research should be possible within the zones of the MSP (Marine Spatial Plan) designated for extractive aquaculture.

Q: What were reasons for selecting *Saccharina Latissima* for the pilot

A: there is already some knowledge regarding the cultivation techniques available that we can build on for the offshore cultivation. Furthermore, it occurs in wave-exposed shores which makes it suitable for the high energy-environment at offshore locations compared to other species of current interest. It also grows quickly allowing for high biomass production, which can be used for several downstream processing depending on interest (e.g. extraction of high-value compounds, fertiliser, food). There have been some projects looking e.g. into biofuel production from sugar kelp or the possible conversion into biological packaging.

Q: under what category of multi-use was this pilot assigned, A or B?or both:-)

A: The Belgian pilot falls under type B (multi-use of space)





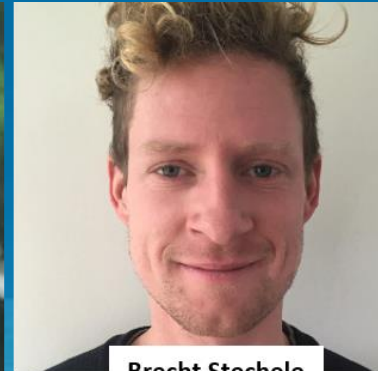
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