



SIXTH FRAMEWORK  
PROGRAMME

# Collective Research on Aquaculture Biofouling

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# What is collective research?

**Aim:** To expand the knowledge base of large communities of small & medium sized enterprises (**SME's**)

Carried out by **RTD** performers on behalf of industrial associations or industry groupings (**IAG's**) in sectors where SMEs are prominent.

# The CRAB consortium

## ■ Co-ordination

- ◆ TNO Science and Industry (NL)

## ■ IAGs

- ◆ Federation of European Aquaculture Producers (FR), Fiskeri og Havbruksnaeringens Landsforening (NO), Irish Salmon Growers Association (IRE), European Aquaculture Society (BE)

## ■ RTD Performers

- ◆ University College Cork (IRE), University of Newcastle upon Tyne (UK), Global Aquafish S.L.(ES), TNO Science and Industry (NL)

## ■ SMEs

- ◆ Aquatt Uetp Ltd (IRE), Boris Net Company Ltd (UK), Materials Innovation Centre (NL), Bømlo Skjell AS (NO), Val Akva (NO), James Newman (IRE), Curryglass Enterprises Ltd (IRE), Fastnet Mussels Ltd (IRE), Promociones Marsan SL (ES), Cudomar SL (ES), Alevines y Doradas S.A. (ES), Viveiros Ana Manjua Lda (PT), Quinta Formosa Lda (PT), Lakeland Marine Farms Ltd (UK), Sagremarisco Lda (PT)

# The CRAB consortium



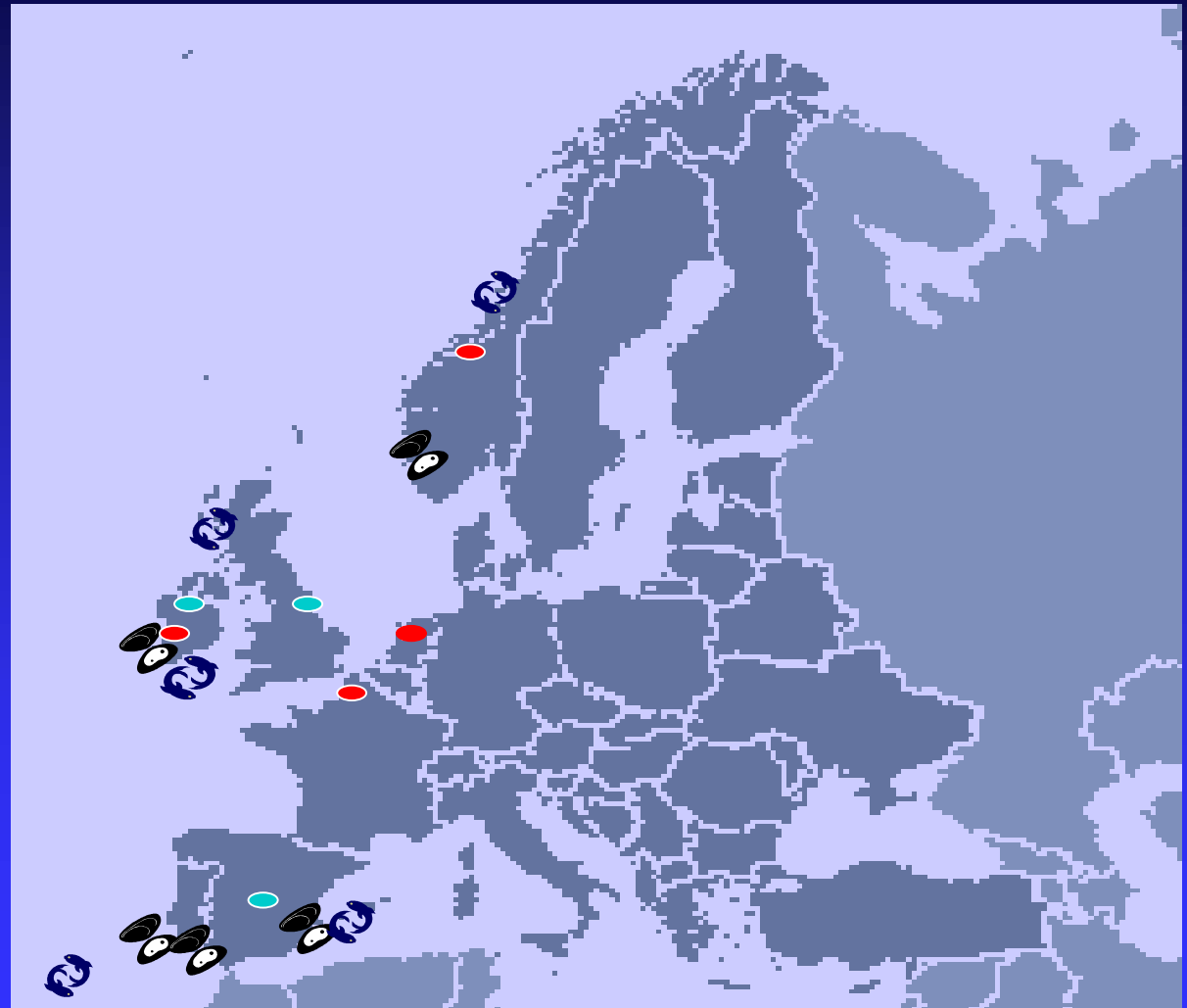
RTD



Co-ordinator and IAG



SME (15)



# CRAB objectives

- To develop **effective antifouling management strategies** for the European Aquaculture Industry
- To develop and disseminate **best practice guidelines** and support moves towards sustainability and environmental responsibility

# Biofouling costs the industry!

## ■ Infrastructure:

- ◆ Cages, netting, pontoons
  - ◆ Replacing nets = €120,000.
  - ◆ 2% salmon mortality after net replacement
- ◆ Tanks, pipes, pumps, filters

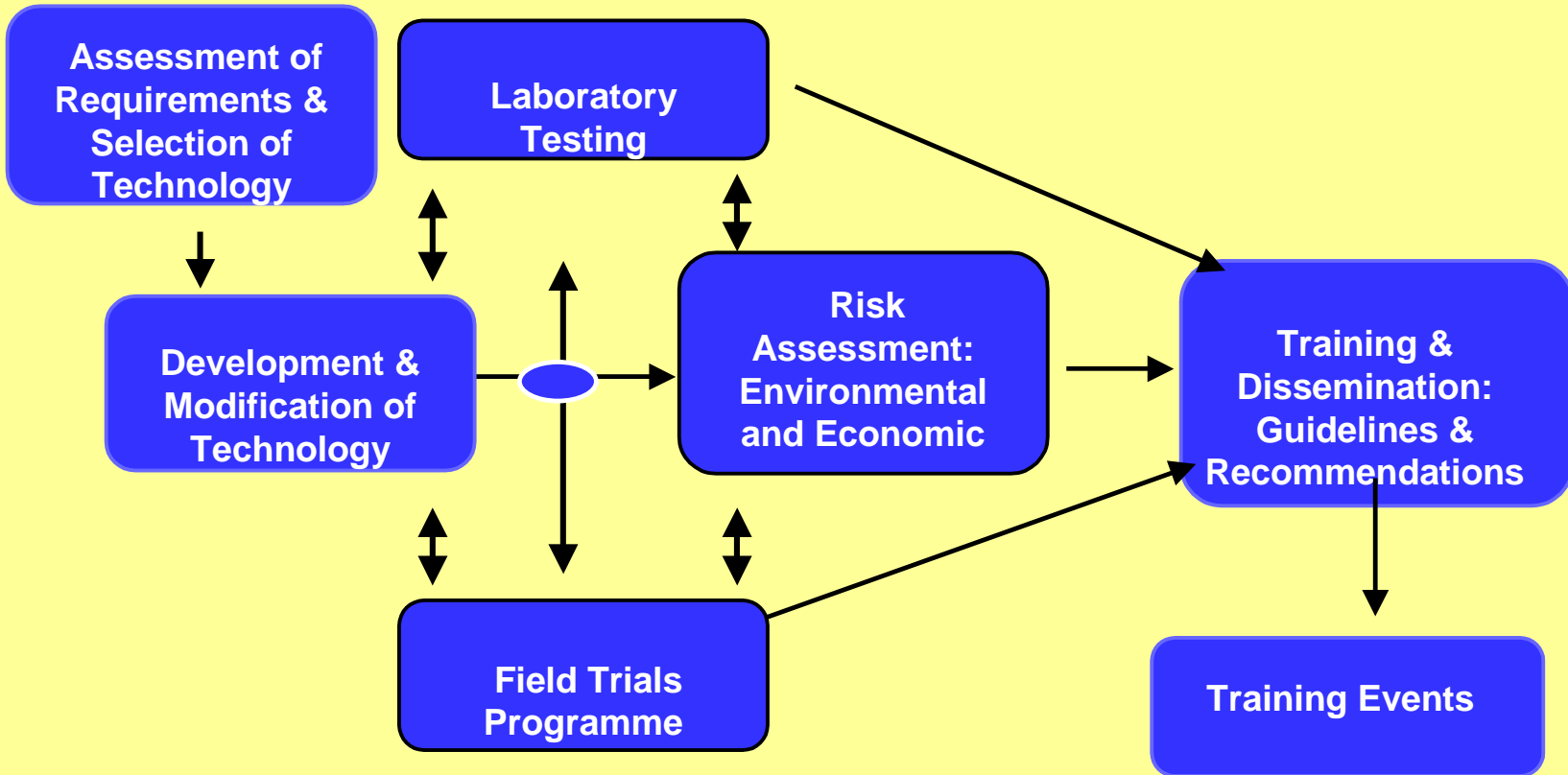
## ■ Stock species:

- ◆ Particularly shellfish
  - ◆ Cleaning oyster cultures = 20% of market value
  - ◆ Biofouling can reduce growth rates by over 40%.



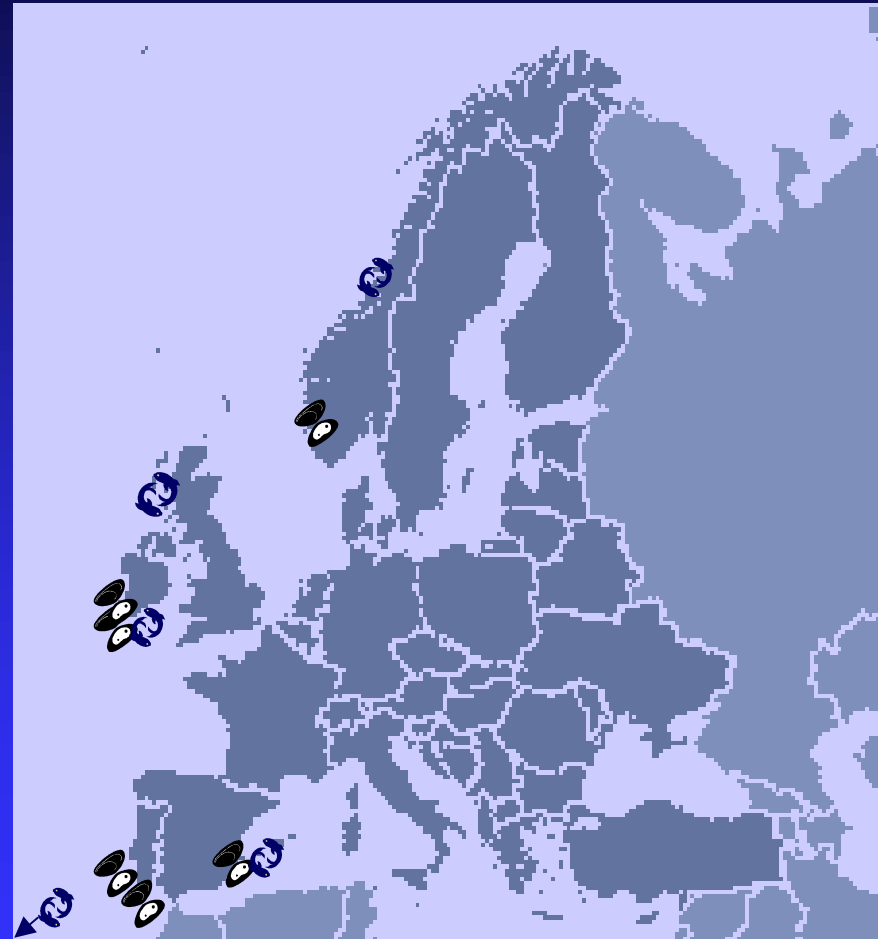
Potential cost savings in Europe €130-€260m

# The approach



# Biofouling pressure at selected sites

- Short term experiment; monthly deployment of settlement panels over 18 months.
- Long-term experiment; deployment of panels over 18 months with systematic removal of panels after 6 months.
- Every month all panels are photographed, weighed, and measured for thickness of fouling.



# Biofouling March 2005



# Technologies

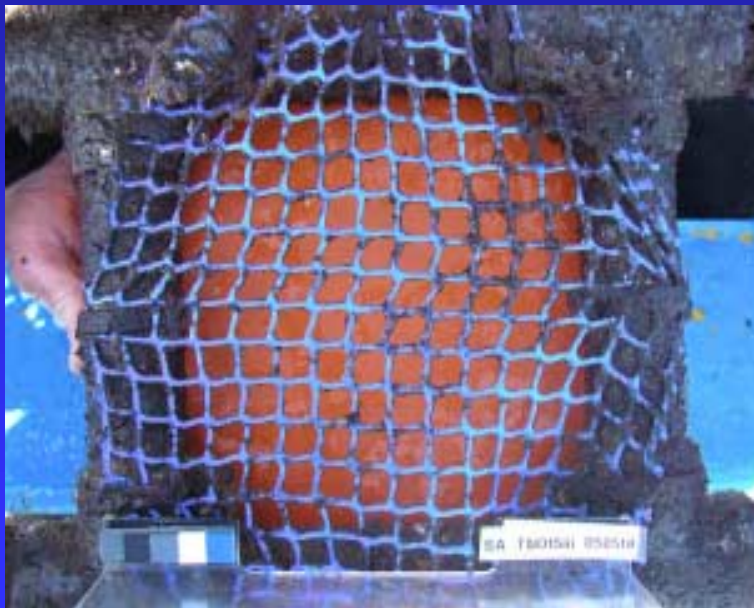
- Biological control
  - ◆ natural grazers such as sea-urchins
- New materials
  - ◆ non-toxic antifouling coatings
- Electrical methods
  - ◆ generating biocides (Cl-) or pH shifts
- New shellfish handling and immersion techniques
- Optimised cleaning techniques
  - ◆ enzyme technology to weaken the bond between biofouling and stock organisms
- Improved knowledge base
  - ◆ allowing avoidance measures



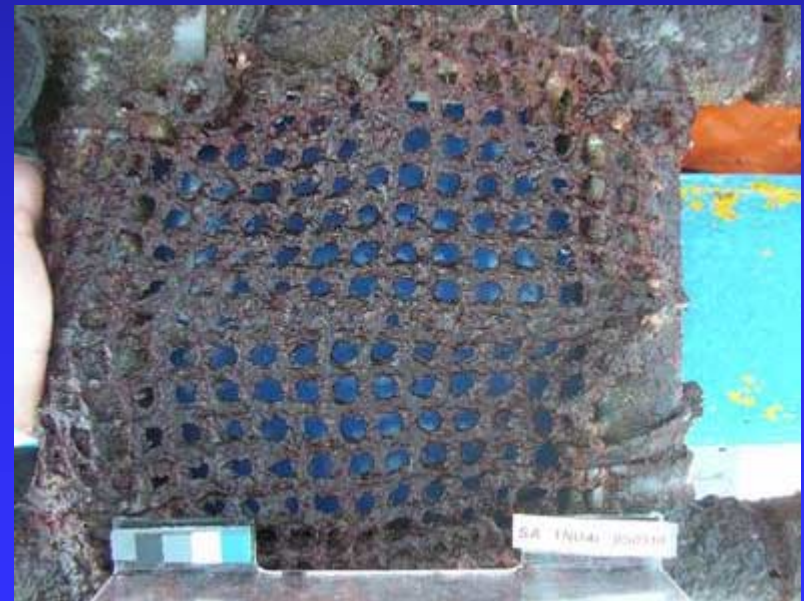
# New materials

Non-toxic fouling-release coatings:  
Efficacy testing at Sagres, Portugal

**Net with coating  
(after 4 months)**

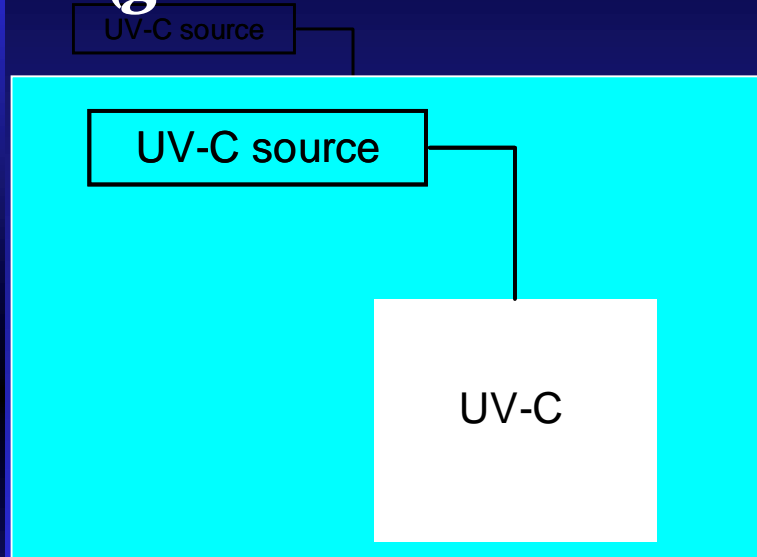


**Net without coating  
(after 4 months)**

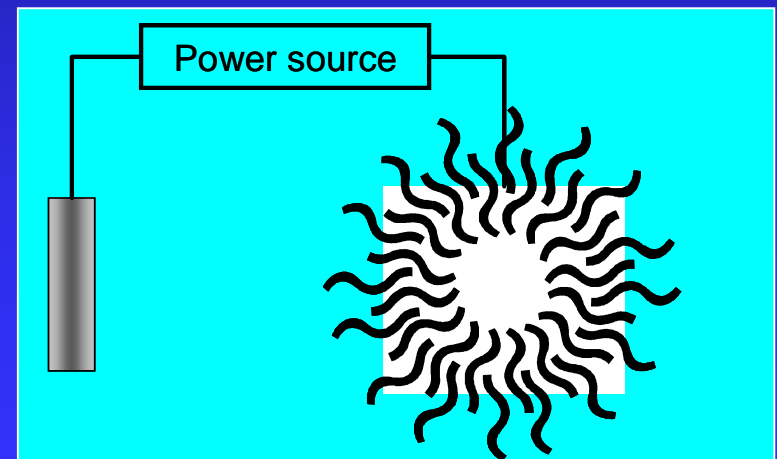


# Examples of Electrochemical Methods

## *UV-C (glass fibers in the netting?)*



## *Electromagnetic fields*



# EFFECT OF BIOFOULING & ANTIFOULING TREATMENTS ON MATERIALS

## Approach

- Standard materials (nets, ropes, shellfish bags)
- Mechanical tests on materials
- Visual inspection of materials

## Status (Laboratory testing)

- 1: condition + performance of standard materials
- 2: condition + performance of anti-fouling materials



# Expected outcomes

- CRAB will **select and optimise the most suitable strategies** to address biofouling problems in aquaculture.
- Key **deliverables** :
  - ◆ best practice guidelines
  - ◆ training courses and materials for industry workers
  - ◆ sustainable antifouling strategy management and decision support tools

**Training aquaculture managers and workers to make optimal use of the CRAB findings**

# More information

## THE CONSORTIUM WOULD WELCOME FEEDBACK

Co-ordinator - TNO (NL)

<http://www.tno.nl> ([peter.willemsen@tno.nl](mailto:peter.willemsen@tno.nl))

Web site - [www.CRABproject.com](http://www.CRABproject.com)

EC SME Measures (Collective research)

<http://sme.cordis.lu/home/index.cfm>

(EC Contract no: COLL-CT-2003-500536)

Thank you for your attention.