RightFish - Reducing environmental impact and greenhouse gas emissions in commercial fisheries

Barry (FG) O'Neill, Tiago Veiga-Malta, Nurul Huda, Jens Peter Kofoed, Ingunn Marie Holmen, Eduardo Grimaldo, Sepideh Jafarzadeh, Hanne Hjelle Hatlebrekke, Emilio Notti, Massimiliano Pinat, Antonello Sala, Einar Skaftason

The main objective of the BlueBio ERA-NET COFUND is to support research that will strengthen Europe’s position in the blue bioeconomy

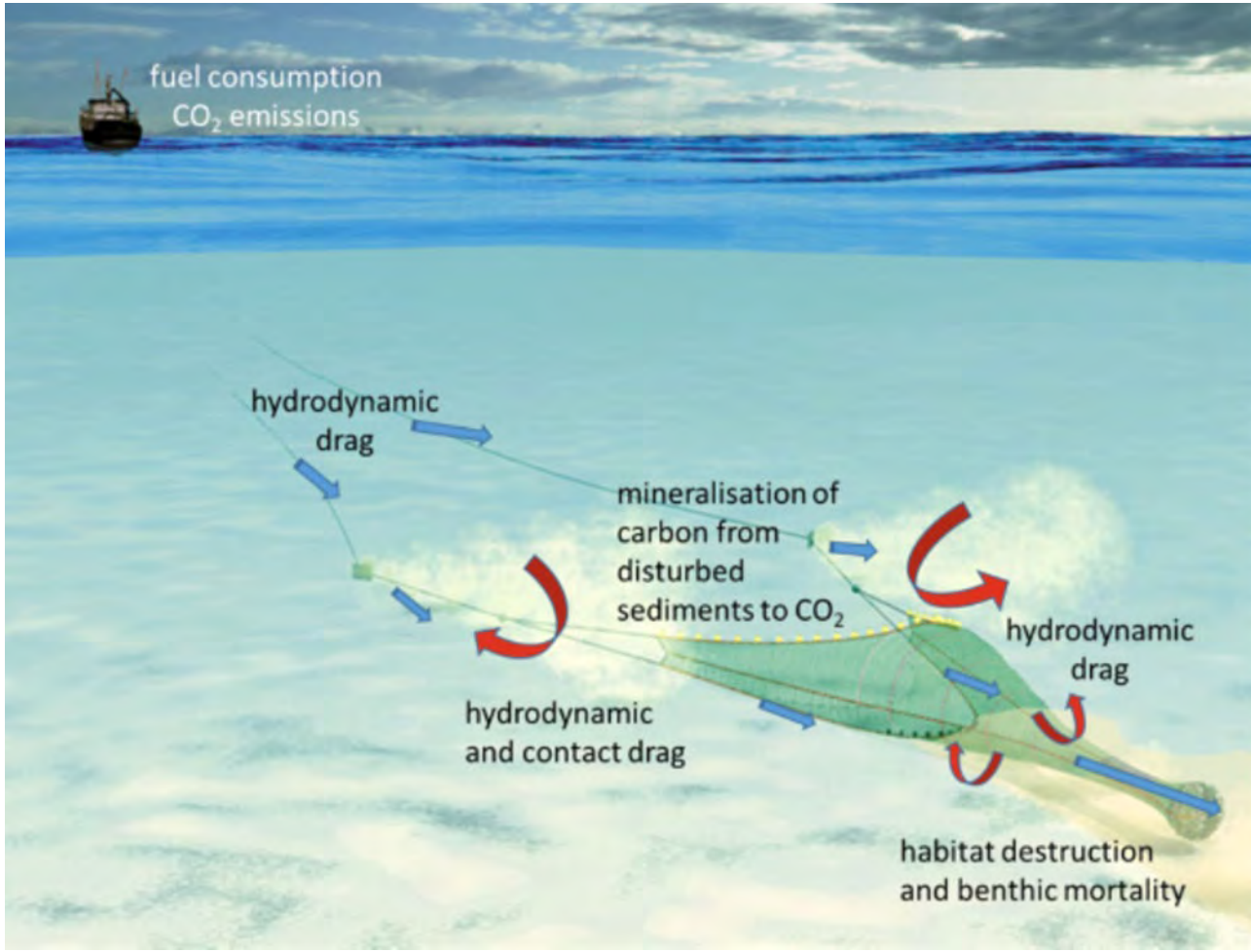
demersal trawl fisheries can affect the environment on the regional and global scale.

Regionally, they can cause habitat destruction and benthic mortality

- reducing biological sustainability, resilience and productivity of a fishery.

Globally, they are significant contributors of greenhouse gases

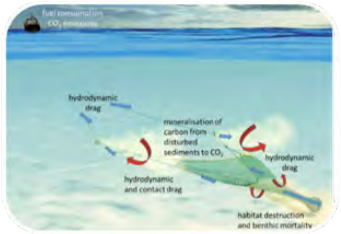
- CO2 is released when dormant, carbon-rich sediments are kicked up and converted microbially into CO2
- Fuel is consumed towing fishing gear across the seabed.



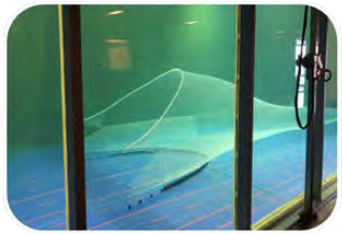
Overarching objective of RightFish

to develop fishing gears of reduced environmental impact and reduced carbon emissions

- review of literature/past studies
- improving the design methodologies
- getting a better understand of the physical impacts
- designing gears for two case study fisheries
- assessing the environmental and economic performance of these new gears



WP1 Review of studies that reduce fuel consumption and seabed contact



WP2 Establishing scale modelling rules for demersal trawls

WP3 Impact of gear components in contact with seabed

WP4 Mediterranean case study

WP5 Northern European case study

WP6 Environmental evaluation

WP7 Economic evaluation

WP8 Project management and dissemination

the design methodologies

Flume tanks are one of the main ways used for designing fishing gears

the scale modelling rules (Tauti, 1934) used to interpret the small-scale observations at the full-scale is an inexact science

- for geometric similarity, need a constant Froude number

- for dynamic similarity, need a constant Reynolds number

- these two conditions cannot be met simultaneously,

- compromise rules have been developed (Hu et al, 2001; Ferro et al, 1996)

$$F = \frac{U}{\sqrt{gL}} \qquad Re = \frac{UL}{\nu}$$

the design methodologies

Furthermore, these rules do not consider contact forces

in a sense they are only relevant for pelagic gears

RightFish will revisit the scale modelling methodology and include contact forces

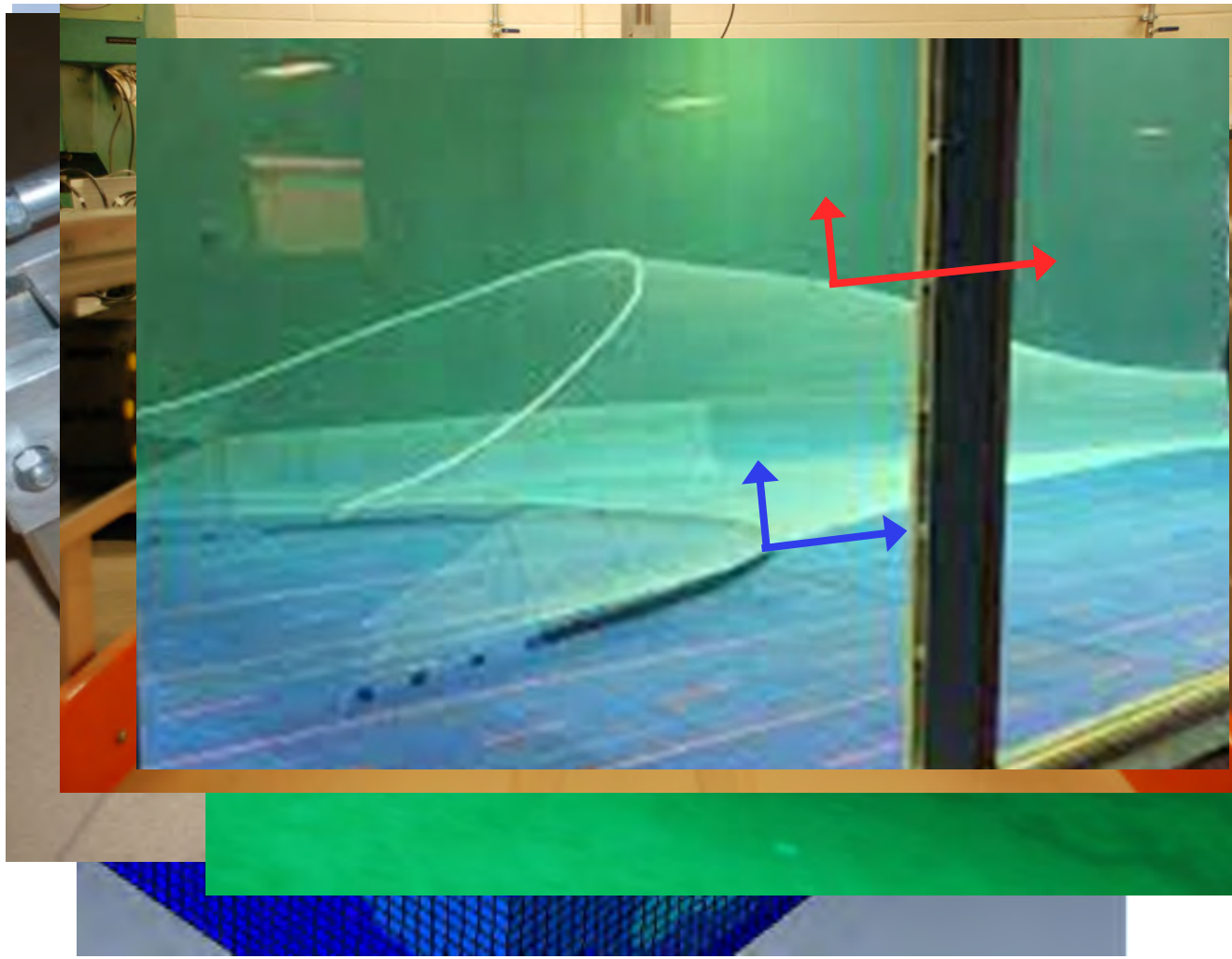
Understanding the physical impacts WP1 – WP3

- Penetration
- Displacement
- Compaction
- Contact drag

- towing speed
- sediment type
- component geometry and weight

Inevitably we will come up with a more complicated set of unachievable conditions

Our goal will be to identify a useful and workable compromise

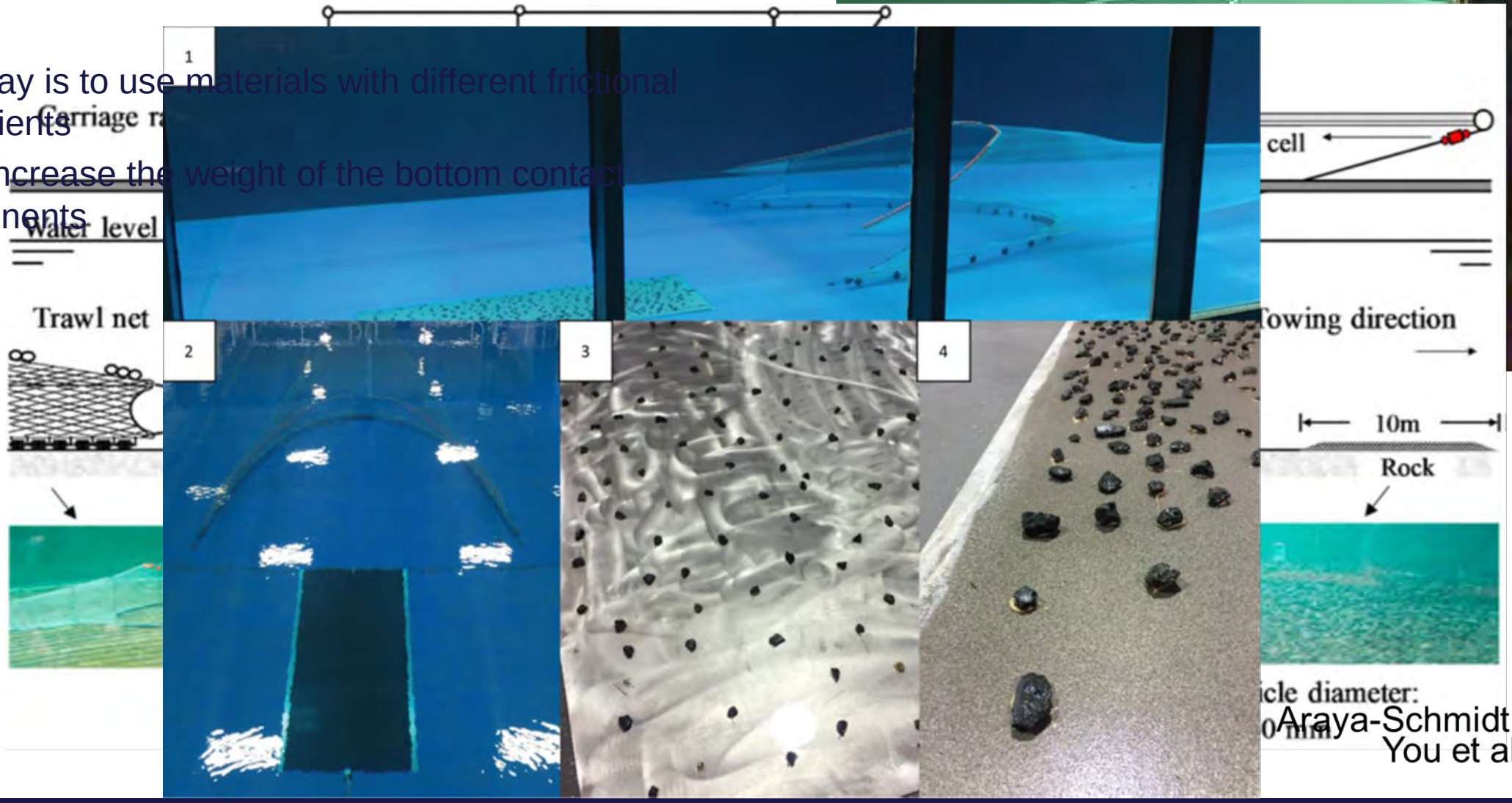


the design methodologies

We will also need to be able to vary seabed interactions

One way is to use materials with different frictional coefficients

Or to increase the weight of the bottom contact components



Araya-Schmidt et al 2021
You et al 2021

Case studies WP4 and WP5

Using the results of WP1 – WP3 we will have two case studies to design and test environmentally friendly trawls

small-scale modelling, flume tank trials, full-scale engineering and fishing trials

focus on netting, net design and groundgears

WP4 Mediterranean case study

WP5 Northern European case study

(i) The Mediterranean Sea – single trawl on sandy sediment

(ii) The North Sea – a twin trawl on muddy sediment

Assessment and Evaluation WP6 and WP7

Environmental assessment

- fuel efficiency and emissions of the new gears
- the amount of sediment mobilised into the water column
- the penetration of the trawl gear into the seabed
- define indicators for characterizing impact on seabed
- Explore the potential emission reduction by adopting the new gears at a fleet level

WP6 Environmental evaluation

WP7 Economic evaluation

Economic assessment

- Catch loss/gain, Fuel savings, added value, willingness to pay

- Fishing trial data, cost benefit analysis and consumer surveys and interviews

Industry Involvement

HAMPIÐJAN

- world leader in the design and development of fishing gear for trawlers and purse seiners.

- 28 companies in the Hampidjan Group

- They are strategically committed to reducing the environmental impact and greenhouse gas emissions in commercial trawl fisheries

- they will be users of the methods developed in RightFish to design gears that achieve these goals

Human Capacity Building

RightFish will actively support Early Career Researchers develop their skills and broaden their experience

A PhD will be linked to RightFish with supervision from DTU Aqua, SINTEF and CNR.

They will carry out experimental trials at the Flume Tank and on the DTU Aqua and CNR research vessels

They will have opportunities for research stays at partner institutes and to visit the facilities of Hampidjan, Iceland

MSc projects will be carried out in relation to the experimental trials in the Flume Tank and during the development and testing of the case study gears

Thank you for your attention