



Strategies for the gradual elimination of  
discards in European fisheries

# DiscardLess



- EU Horizon 2020 Program
- 31 partners in 12 countries
- Coordinated by
  - Clara Ulrich DTU - Aqua



# DiscardLess

- make best use of unwanted catches
- estimate the ecosystem effects of the removal of biomass hitherto discarded at sea
- How to control and monitor compliance with the landing obligation
- avoid unwanted catches

# WP3 -Avoidance through technological changes

- Manual of trawl selectivity
- Fact sheets of selectivity trials
- Meta analysis of selectivity data
- Using light to modify selectivity

# SELECTIVITY IN TRAWL FISHING GEARS

F.G. O'Neill and K. Mutch

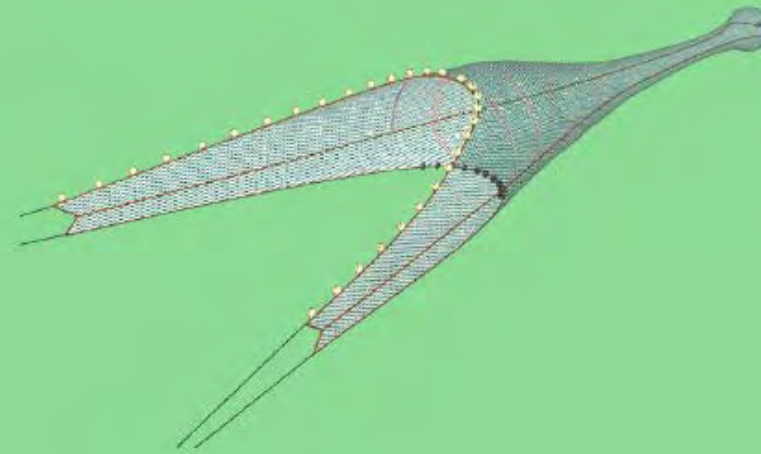


## INTRODUCTION

In this manual we describe the different stages of the fish capture process, highlight how different parts of the gear may influence selection and identify possible design changes which can alter the selectivity of the gear. The intention is to make fishermen, net makers and fisheries managers more aware of the possible modifications that can be made to their gears so that they can design and develop gears with a selective performance suitable for their particular fishery.

We have also assembled a catalogue of fact sheets which provide brief descriptions of many of the catch comparison and selectivity trials that have taken place in the North Atlantic and adjacent seas. This is again to highlight the potential gear modifications that can be made and to provide an indication of their likely effect. It is important to bring together this type of information and to disseminate it as broadly as possible. Not only will the preferred selective performance differ at a fishery by fishery level, it may also vary at a vessel by vessel level, as individual fishermen may wish to tailor their gears to the specific catch and quota restrictions they may face and/or to optimise their response to the prevailing market forces.

Furthermore, the catalogue of factsheets is by no means exhaustive, indeed, it is just a starting point that needs to be added to and built upon.



# Factsheets of selectivity trials

About 70 from Turkey, Greece, Italy, Spain, Portugal, England, Scotland, Ireland, Belgium, Holland, Denmark, Germany available online

## Diamond and square mesh codends to improve selection and reduce discards in the Greek demersal trawl fishery

**TARGET SPECIES**  
Hake, red mullet, striped mullet, rose shrimp and nephrops

**AREA, VESSEL**  
1000

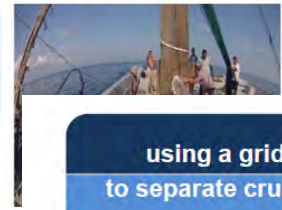


**GEAR MODIFICATION**  
The catching performance of codends made of  
i) 40 mm diamond mesh  
ii) 40 mm square mesh and  
iii) 50 mm diamond mesh

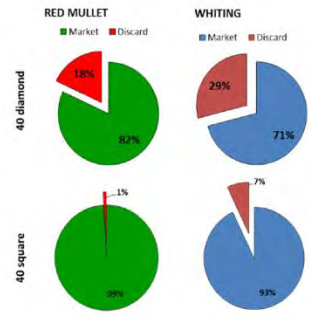
## Changing mesh shape and increasing mesh size to reduce discards in the bottom trawl fishery in the southern Black Sea, Turkey

**TARGET SPECIES**  
Whiting and red mullet

**AREA, VESSEL**  
21 covered codend hauls were carried out in the southern Black Sea during 2014.



**GEAR MODIFICATION**  
The catching performance of a standard commercial 40 mm diamond mesh codend is compared with the catching performance of  
(i) a 36 mm square mesh codend  
(ii) a 40 mm square mesh codend  
(iii) a 40 mm T90 mesh codend



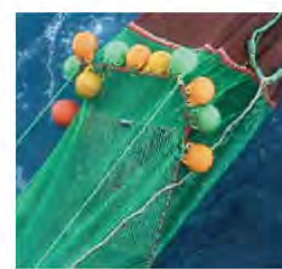
**FURTHER INFORMATION**  
Mustafa Zengin, Central Fisheries Research Institute, [muze5961@gmail.com](mailto:muze5961@gmail.com)



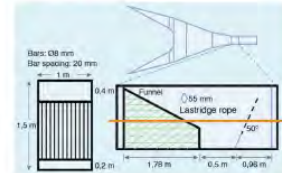
## using a grid in a crustacean fishery to separate crustaceans from fish bycatch

**TARGET SPECIES**  
Nephrops, rose shrimp

**AREA, VESSEL**  
18 hauls were carried out in the crustacean fishery on the Portuguese south coast on board the RV *Noruega* (47.5m, 1500 HP) during July 2005



**GEAR MODIFICATION**  
a grid connected to two sections is fitted in the extension section of a crustacean demersal trawl. The grid has a 20 mm bar spacing and is designed to separate crustaceans and fish into a lower and an upper codend where further selection can take place.



**RESULTS**  
30% of *Nephrops* were caught at the upper codend  
  
blue whiting was equally distributed between the two codends

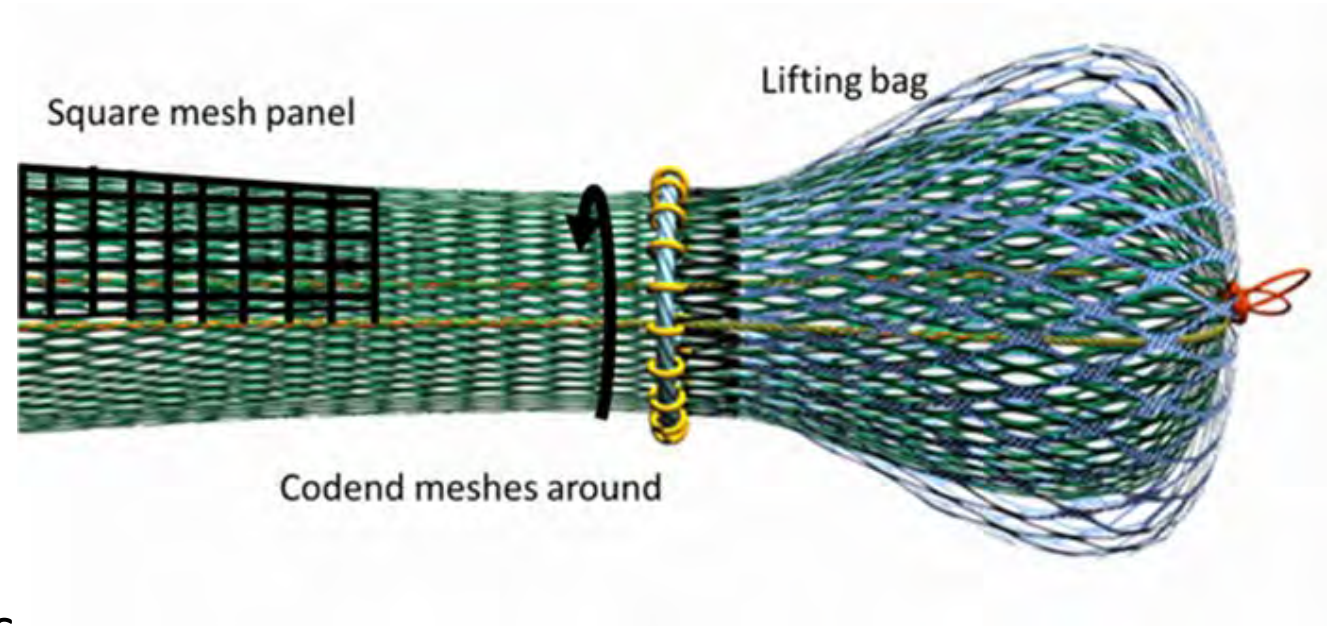
**FURTHER INFORMATION**  
Aida Campos – [acampos@ipma.pt](mailto:acampos@ipma.pt) and Paulo Fonseca – [pfonseca@ipma.pt](mailto:pfonseca@ipma.pt)



# WP3 -Avoidance through technological changes

- Manual of trawl selectivity
- Fact sheets of selectivity trials
- **Meta analysis of selectivity data**
- Using light to modify selectivity

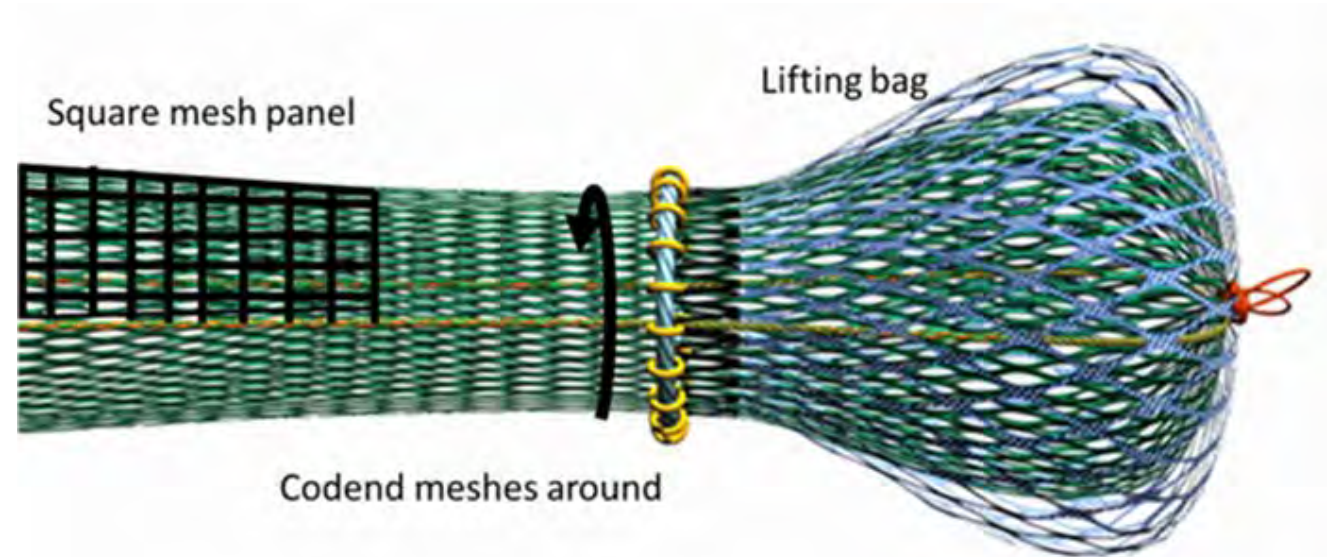
# meta-analysis of haddock selectivity data



- 38 sets of trials
  - 20 diamond mesh selection
  - 18 diamond mesh codend with a square mesh panel
- 614 individual hauls



# meta-analysis of haddock selectivity data

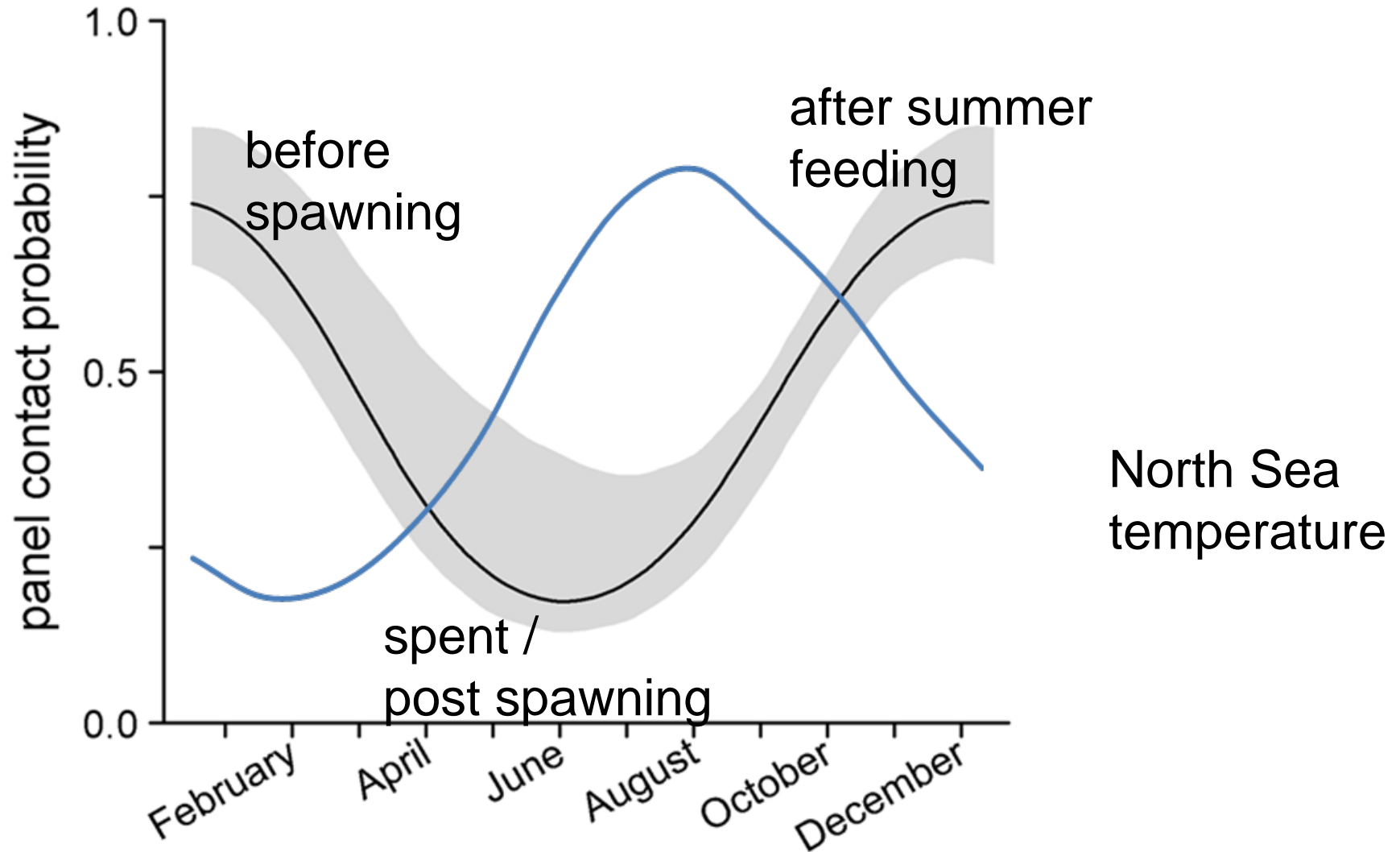


codend selectivity  $\sim$  mesh size + meshes around + twine diameter

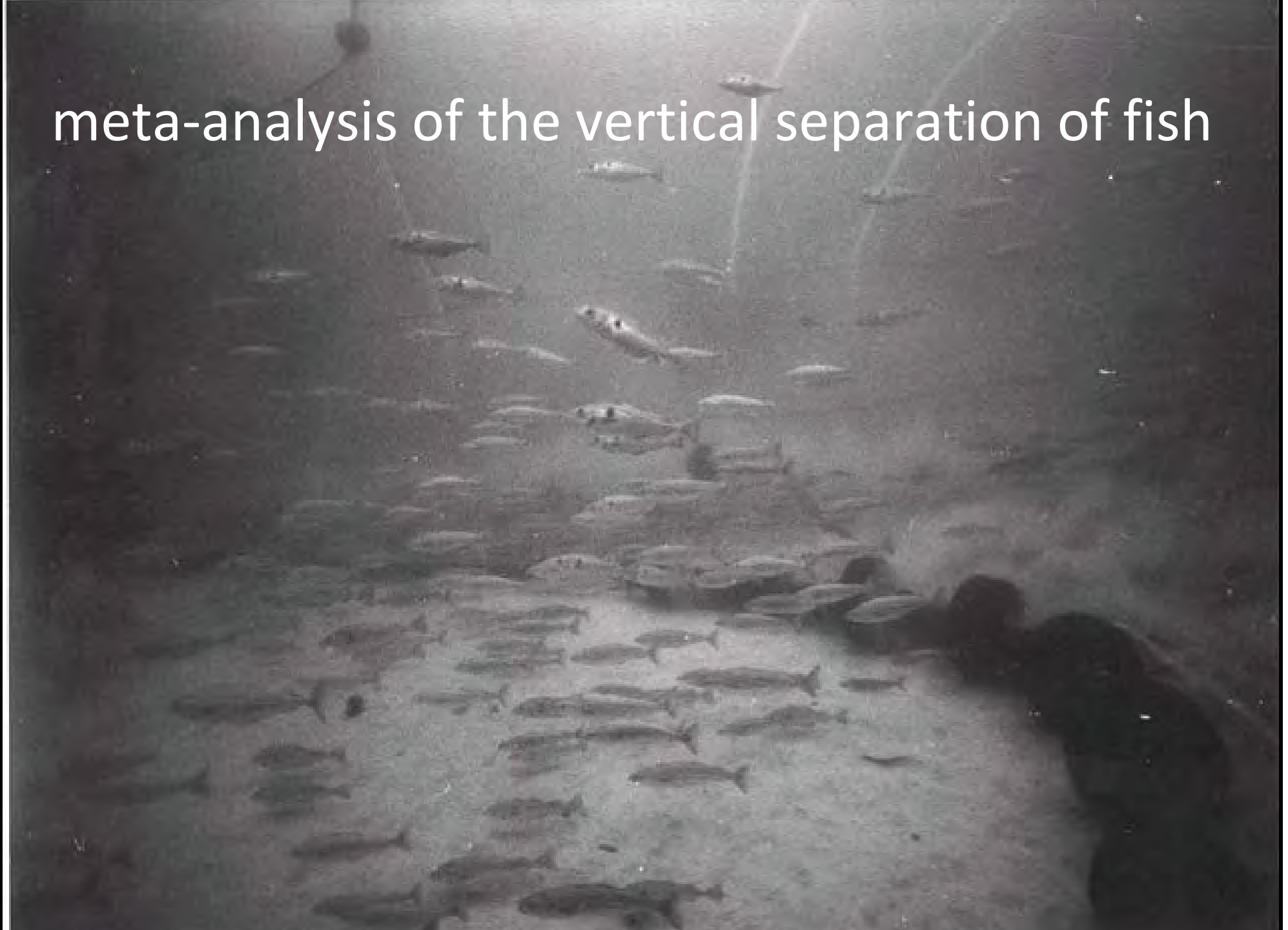
panel selectivity  $\sim$  panel mesh size

panel efficiency  $\sim$  panel position + s(month)

# meta-analysis of haddock selectivity data

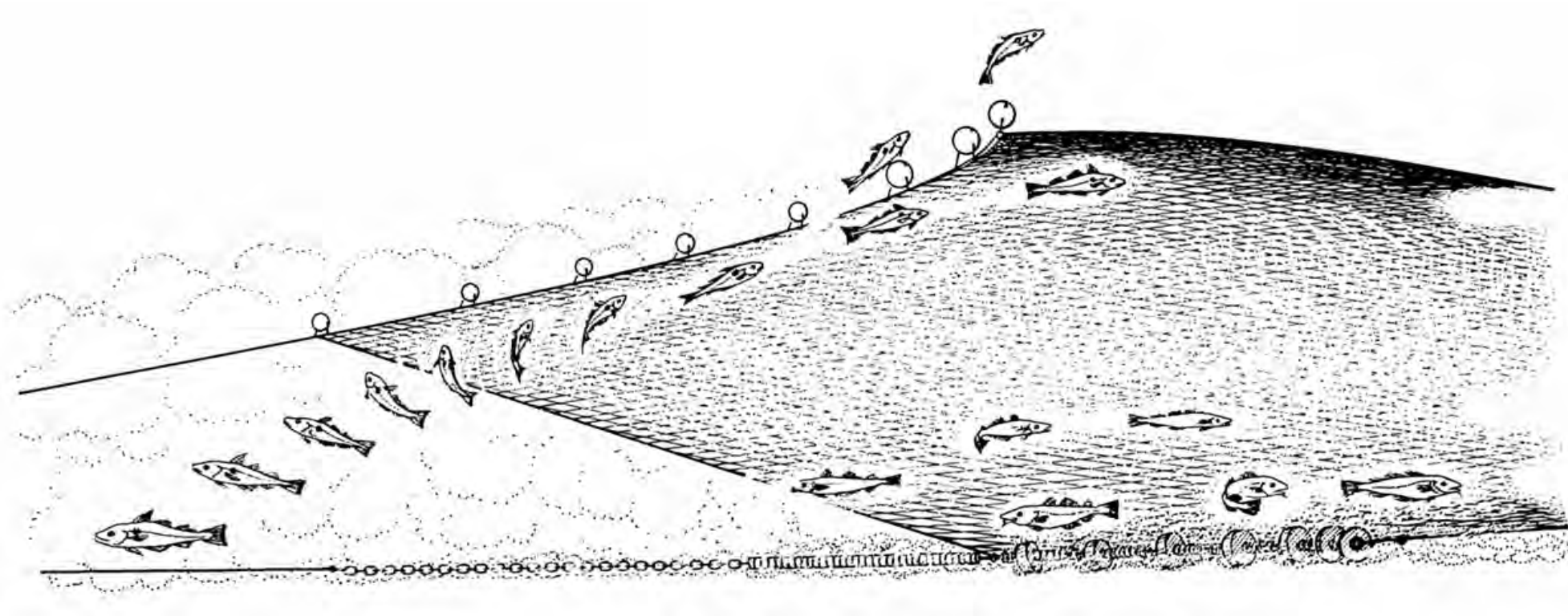


# meta-analysis of the vertical separation of fish



# DiscardLess - WP3

meta analysis of the vertical separation of fish



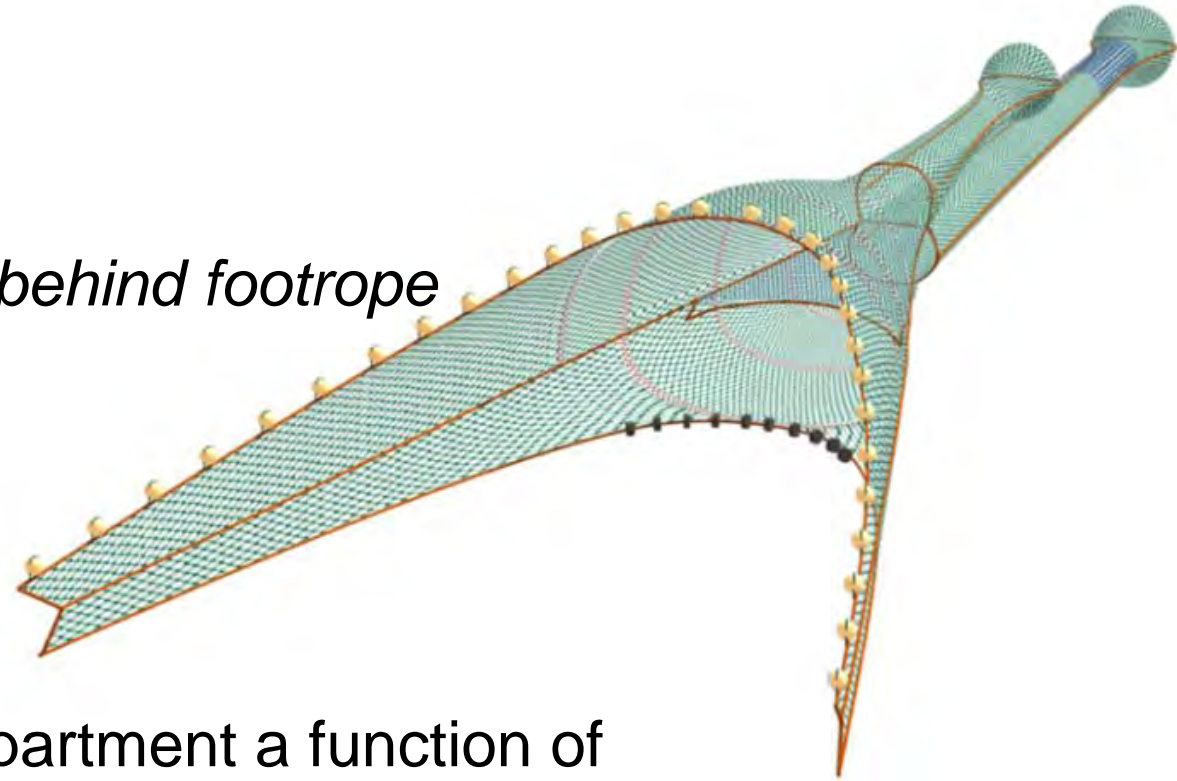
20 trips

38 panel configurations

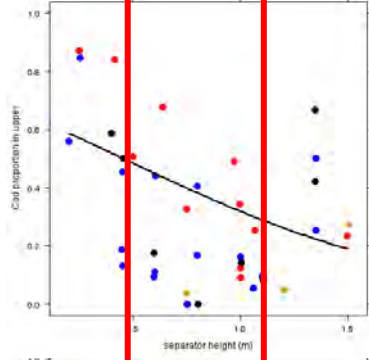
*height, distance behind footrope*

haddock, whiting, cod,  
flat fish, monk ...

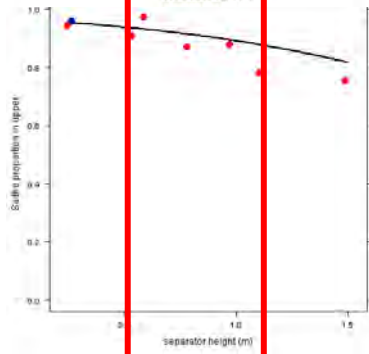
proportion in each compartment a function of  
*height, distance behind footrope.*



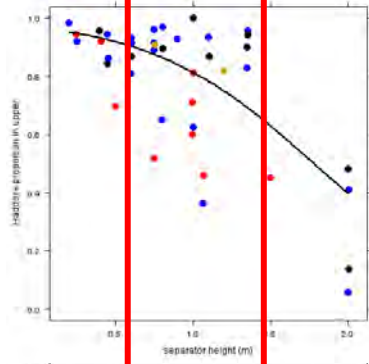
Cod



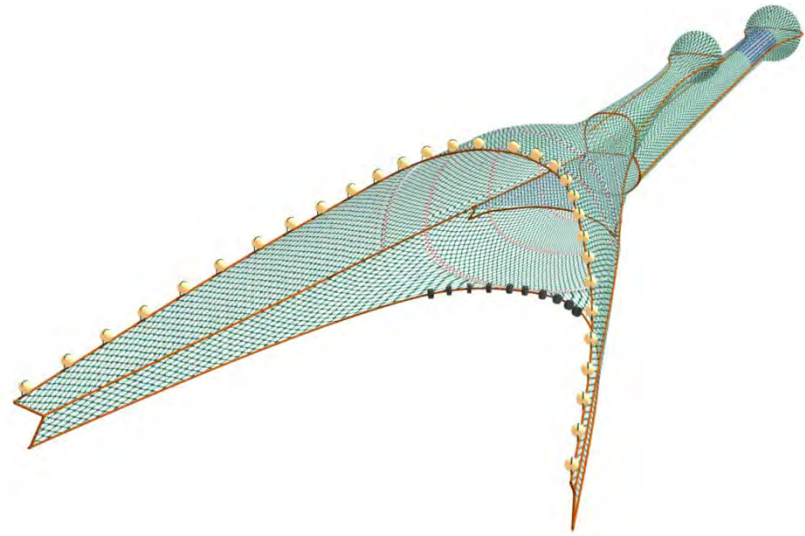
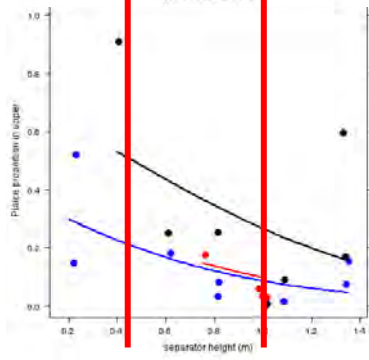
Saithe

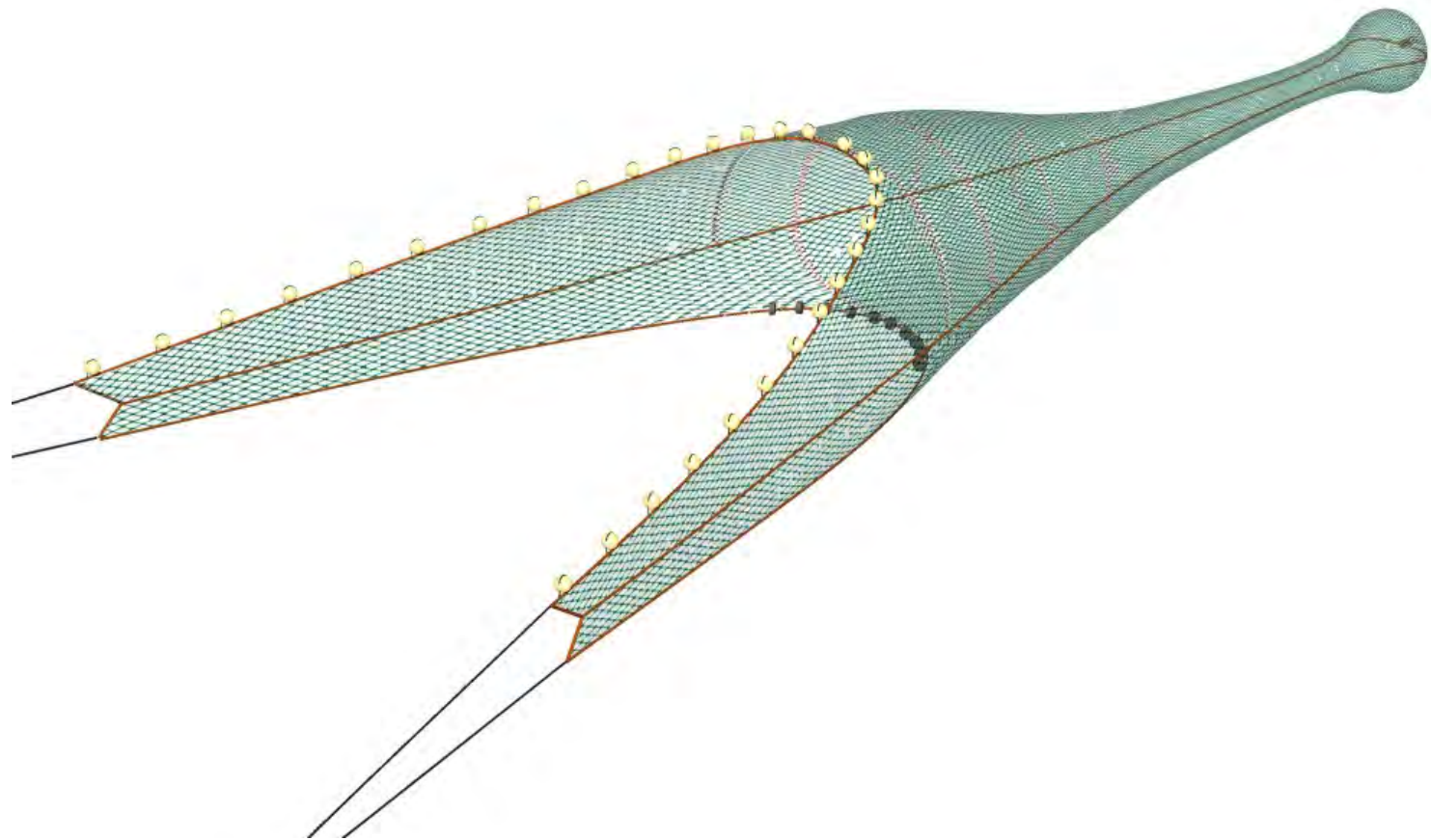


Haddock



plaice



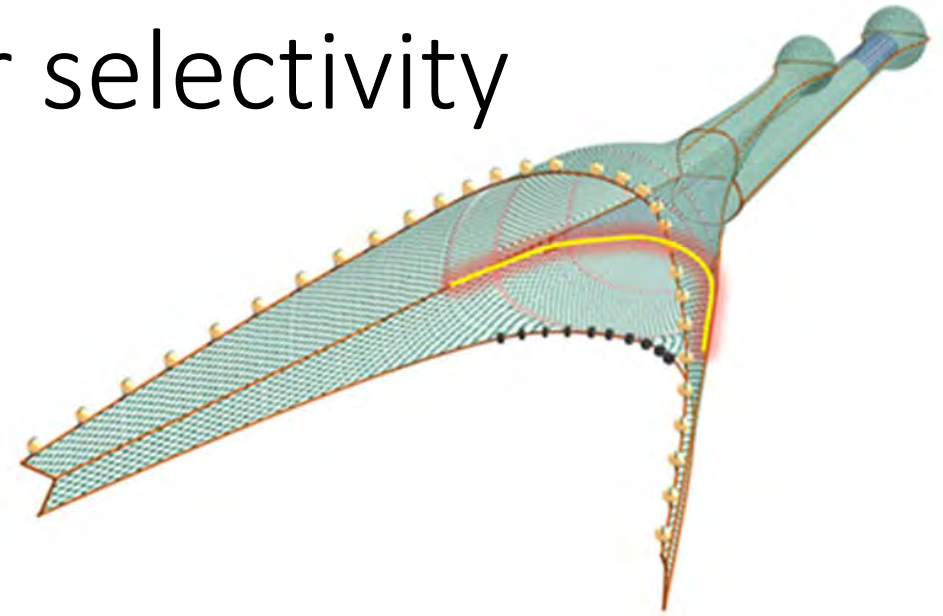


# WP3 -Avoidance through technological changes

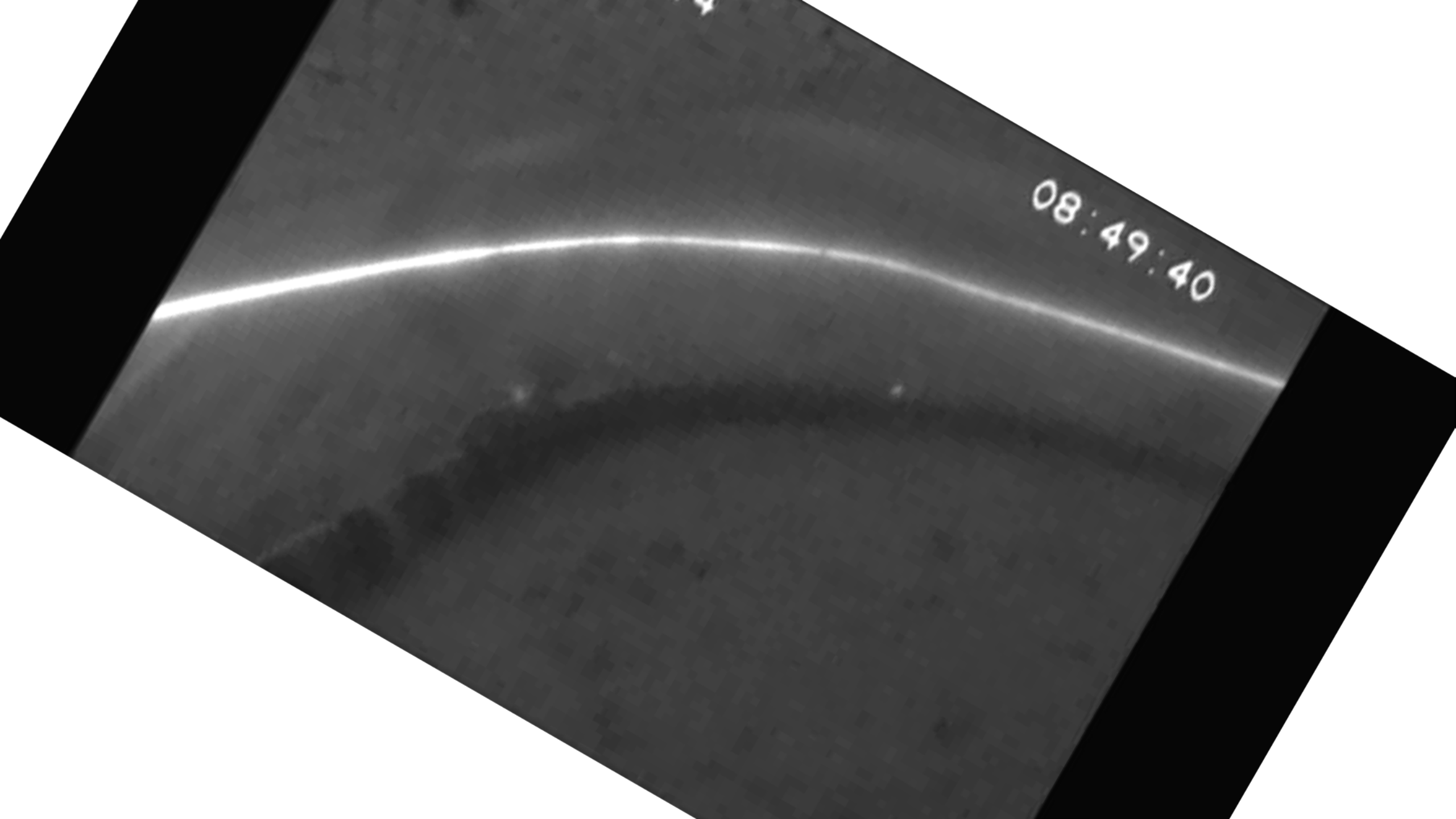
- Manual of trawl selectivity
- Fact sheets of selectivity trials
- Meta analysis of selectivity data
- Using light to modify selectivity

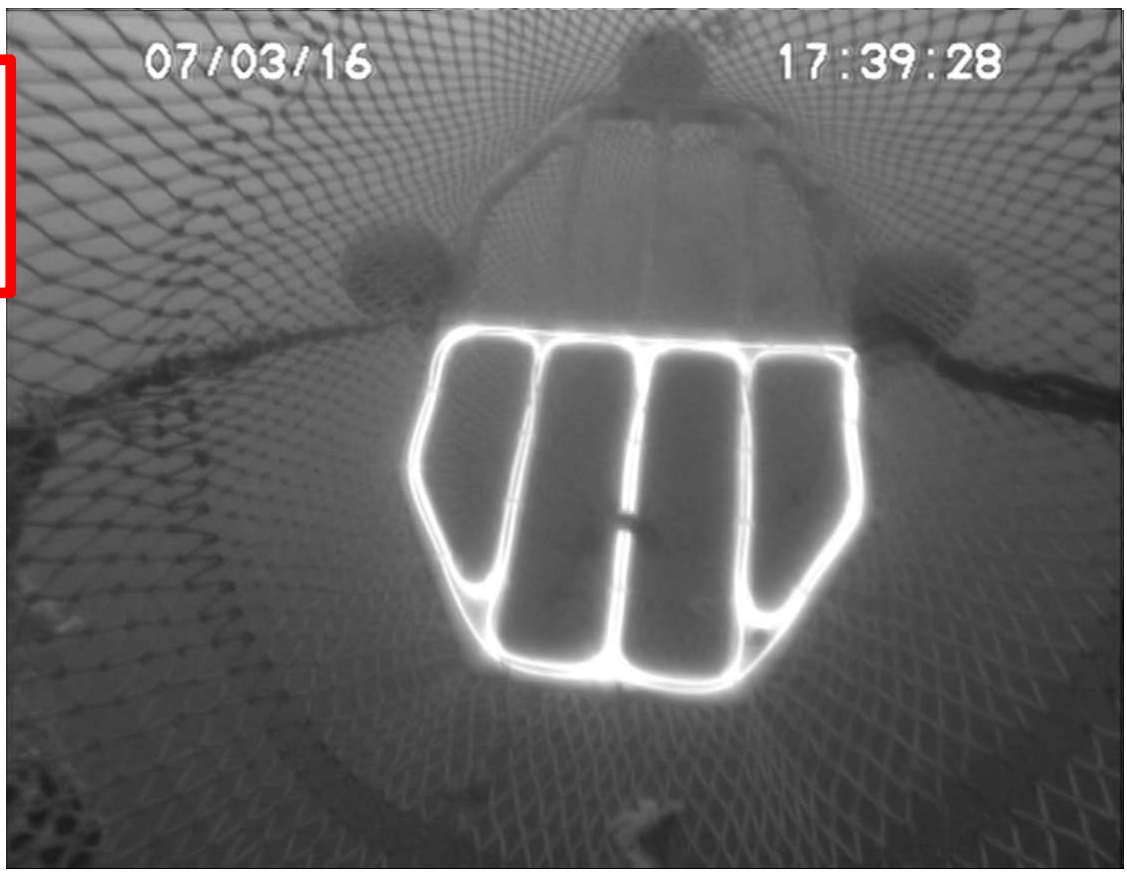
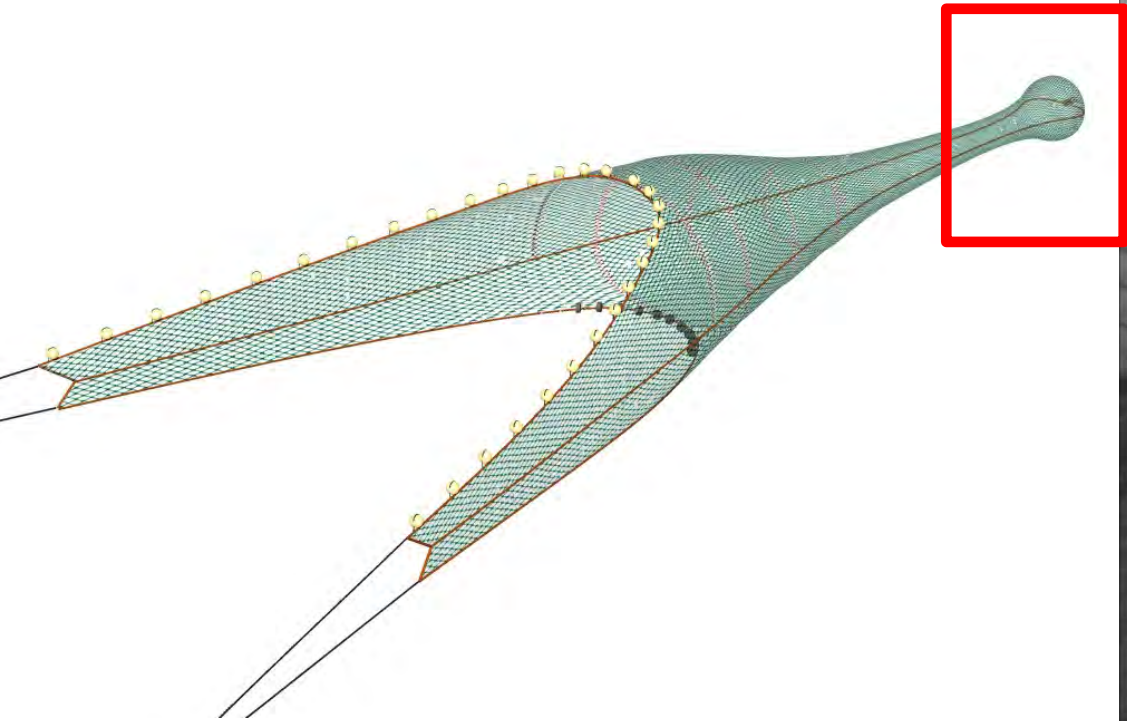


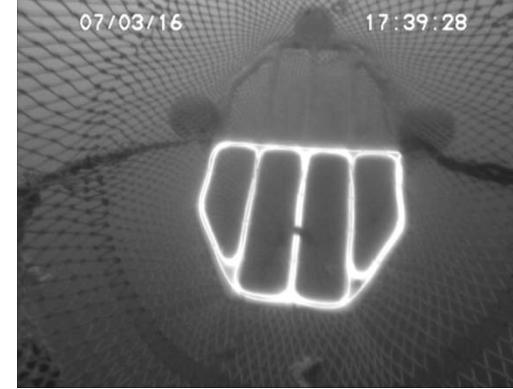
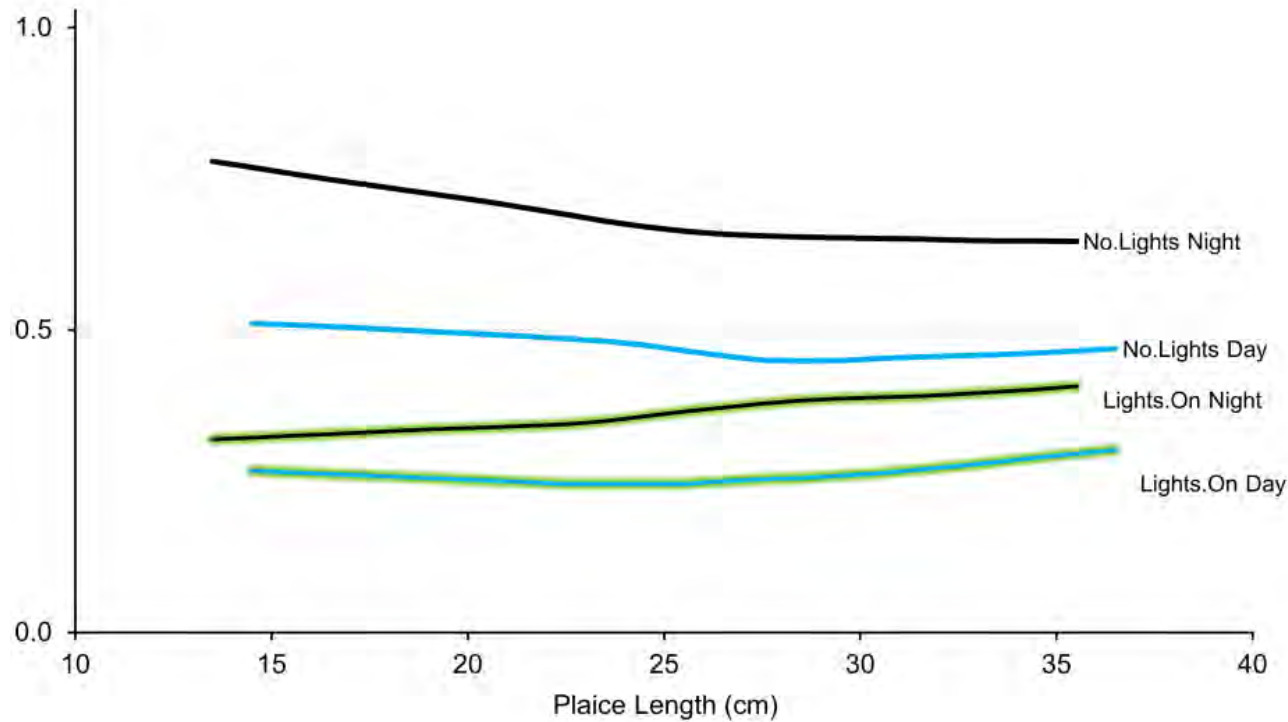
using light to modify trawl gear selectivity



08:49:40





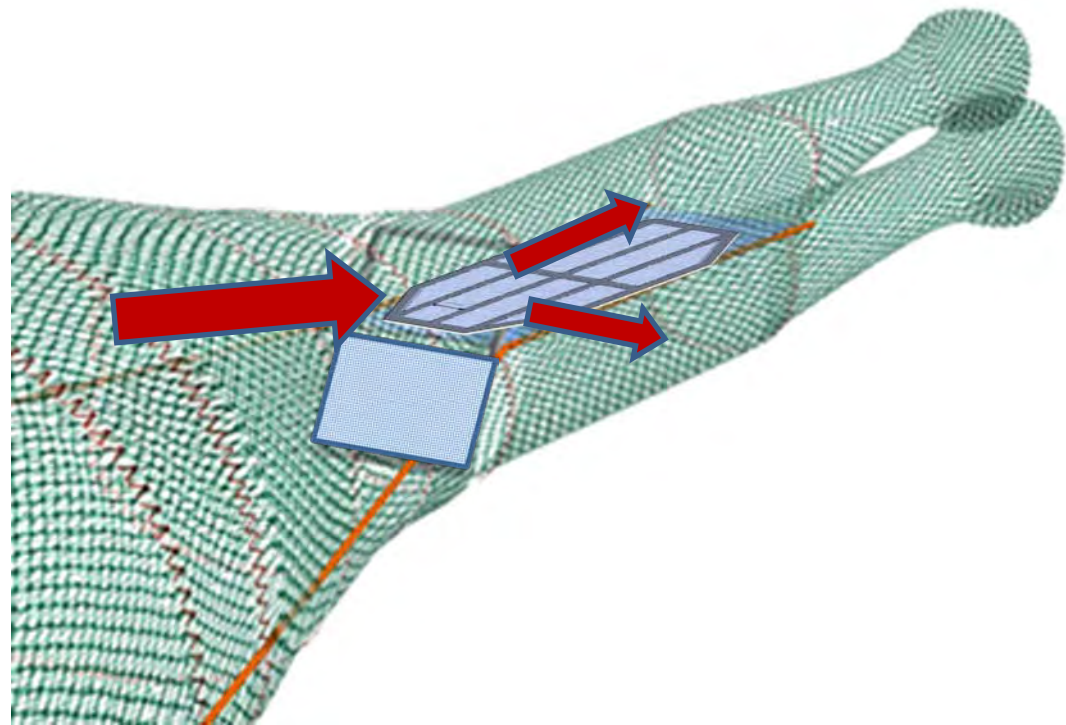
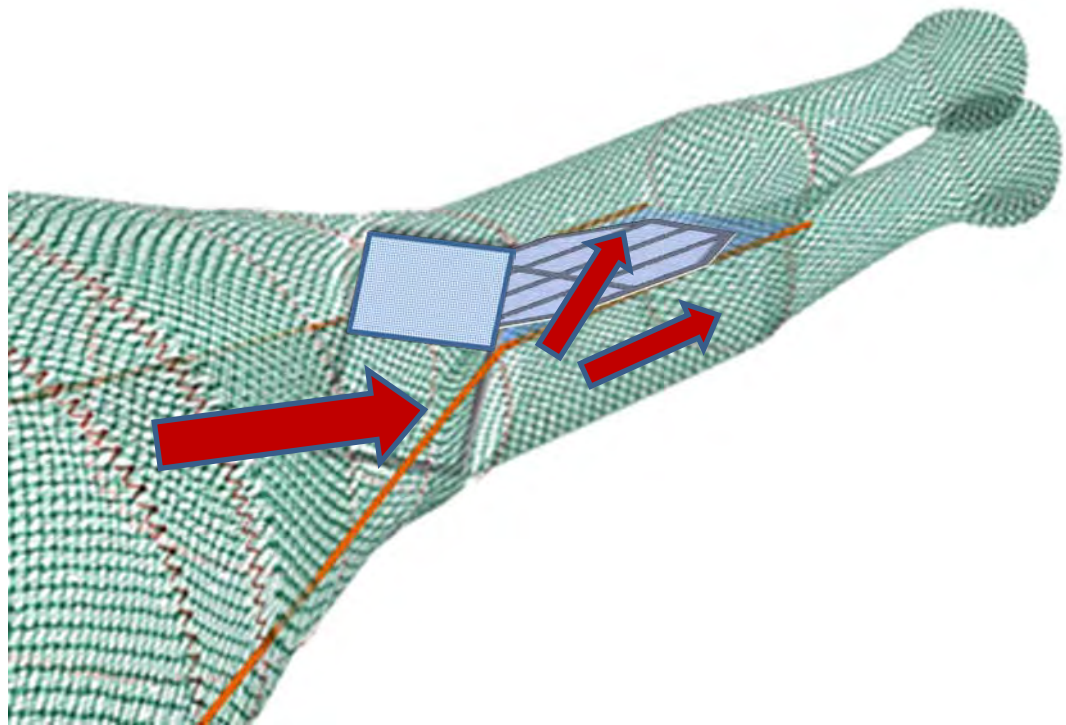


fish do not seem to be attracted to or repulsed by the light

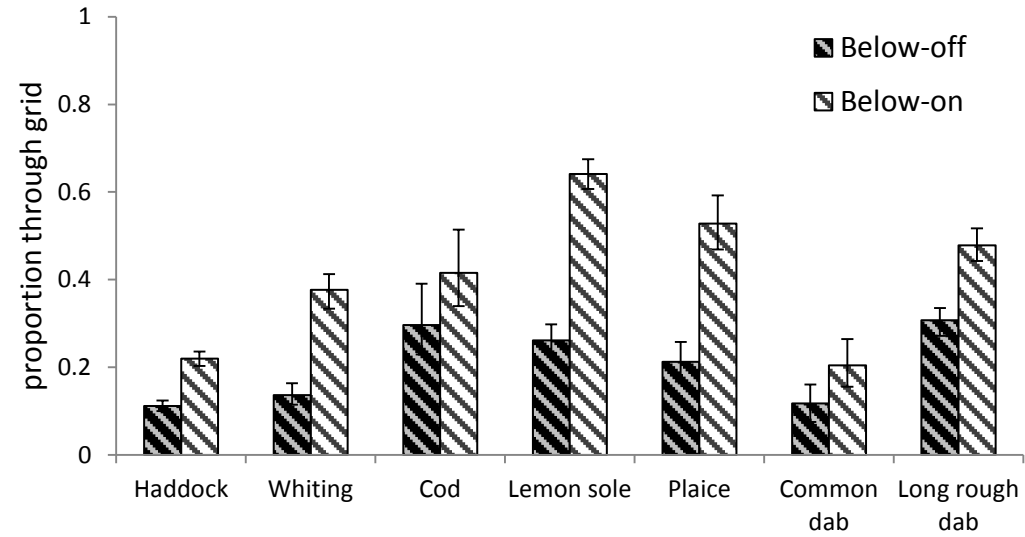
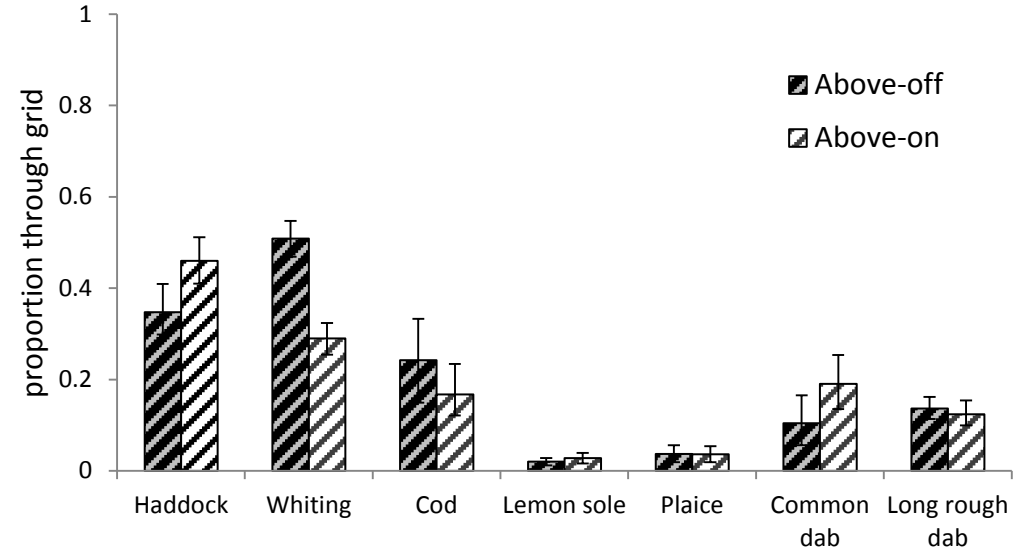
but behave differently when there is light

seem to remain/go lower when there is more light

day/artificial light







starting to identify behavioural differences that can be harnessed to design species selective gears

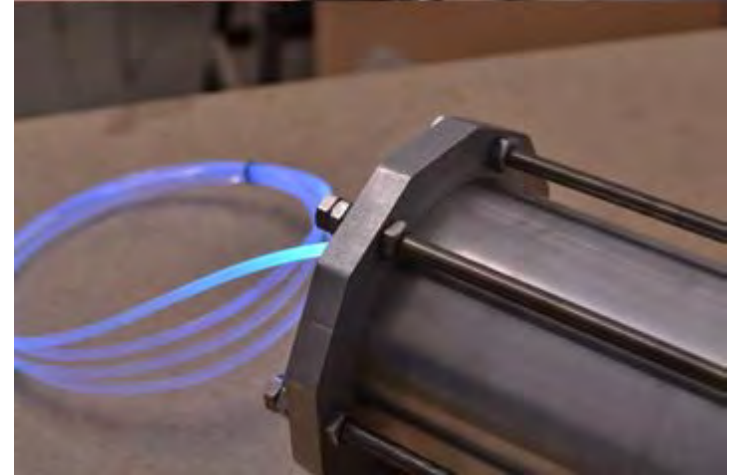
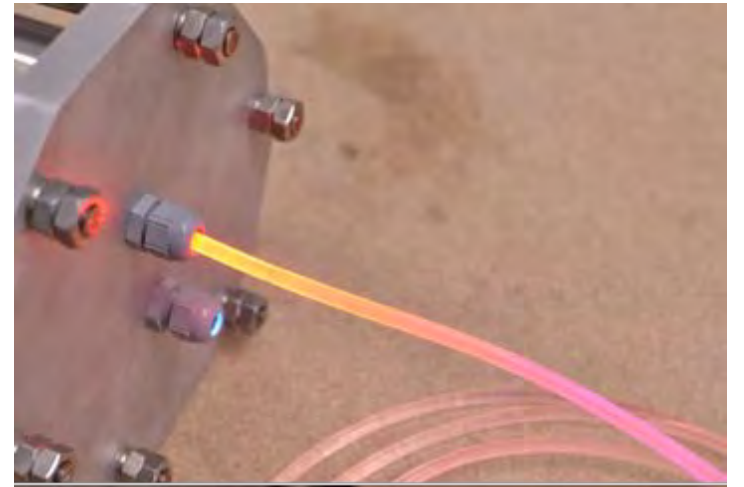
We need a more systematic approach

A better understanding of how the light parameters will effect fish behaviour

wavelength

intensity

flashing/strobe





# laboratory experiments

