

# Analyse des interactions entre distributions spatiales des communautés de poisson et des flottilles de pêche



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Ifremer



# Eastern English Channel



Multiple activities:

→ High traffic  
(materials and  
humans)

→ Fisheries

→ Extraction

## Eastern English Channel / fisheries

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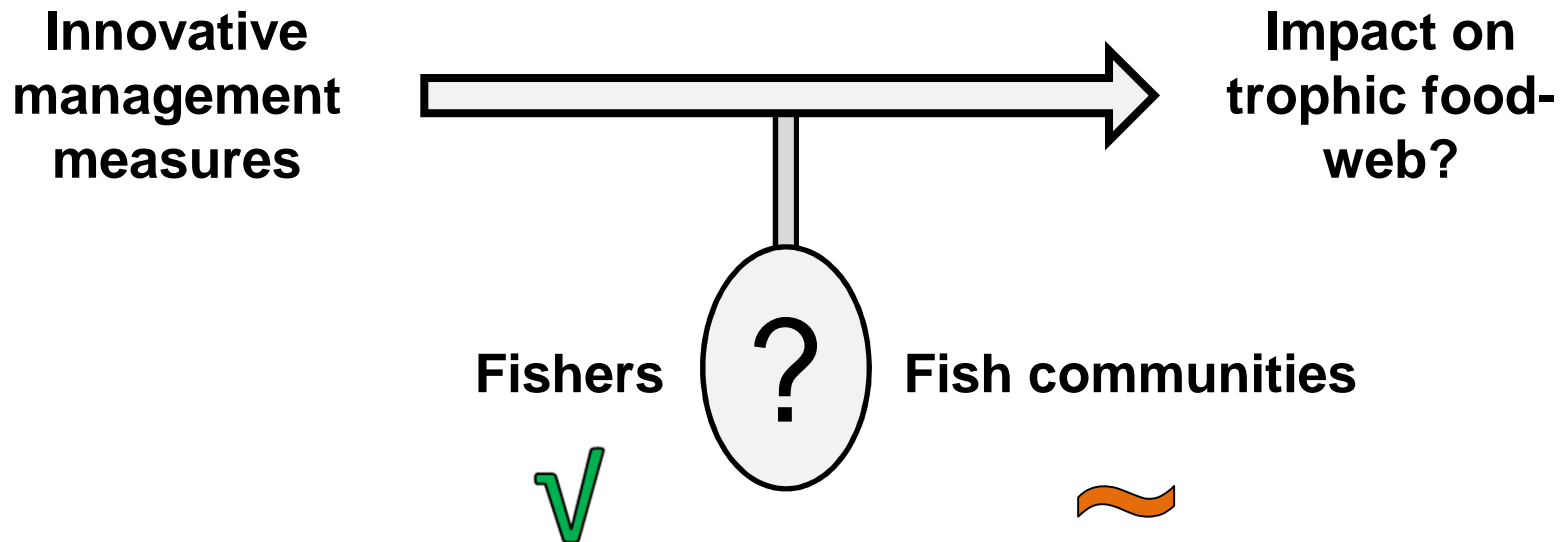
Most of exploitation since 20<sup>th</sup> century

Great diversity of fleets: trawls, gillnets, seine,...

Some species already managed by quotas (e.g. *Solea solea*, *Pleuronectes platessa*)

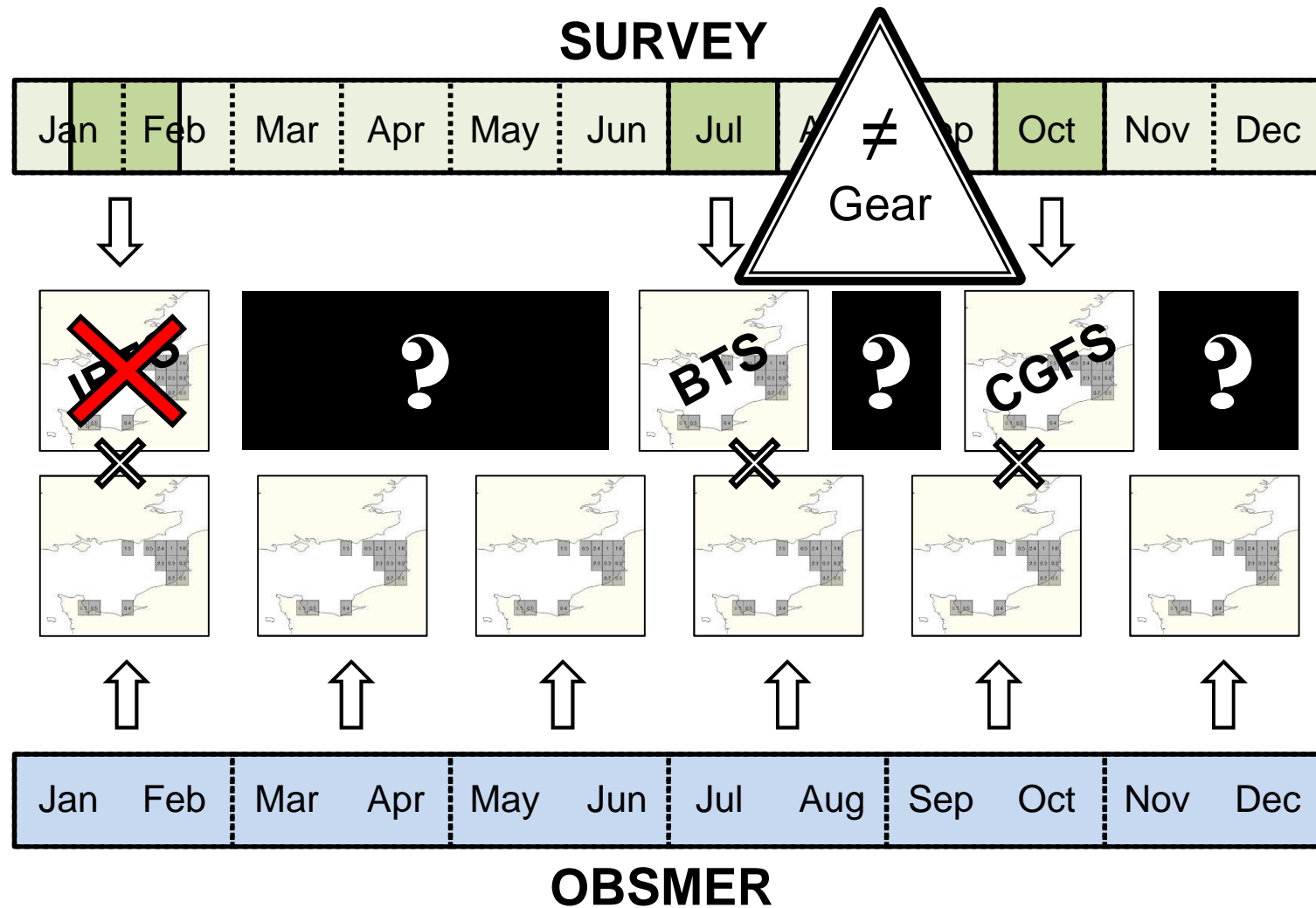
Completed by landing size limitations and spatial restrictions

# Ecosystem Approach to fisheries



Analyze the interactions between fishers and exploited species at thin scale in Eastern English Channel

# Methods / use of OBSMER data to obtain a spatial abundance index at thin temporal scale (bimester)



## Methods / Data

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### Survey data:

- + . Standardized
- + . Weak selectivity
- + . Large cover of the area
- . 1 month by year

### OBSMER data:

- . Different fleets
- . Higher and diverse selectivity
- . Cover dependant of fishing activities
- + . Whole year

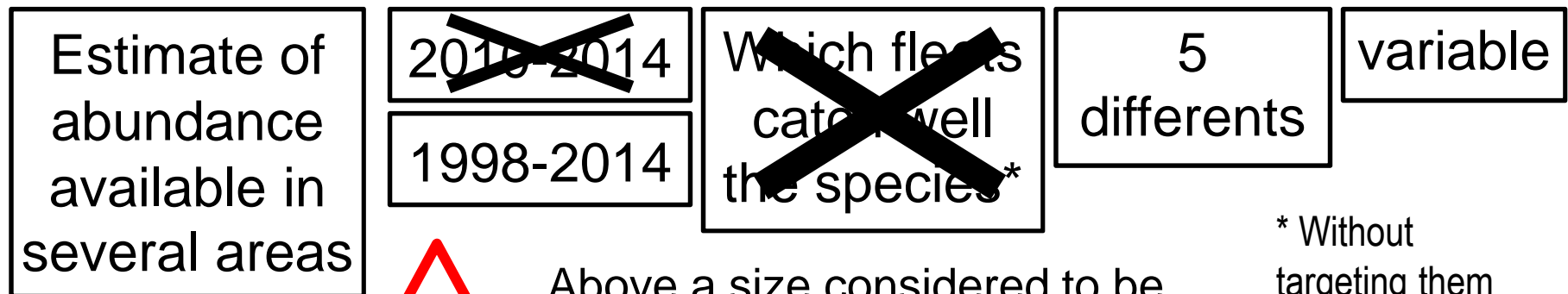
## Methods / the model

**Survey**

Delta-glm on OBSMER data:

$p(>0) \rightarrow \underline{\text{Area}} * \cancel{\text{Bimester}} + \underline{\text{Year}} + \cancel{\text{Fleet}} * \cancel{\text{Vessel length}} + \underline{\text{sediment}} + \underline{\text{depth}}$

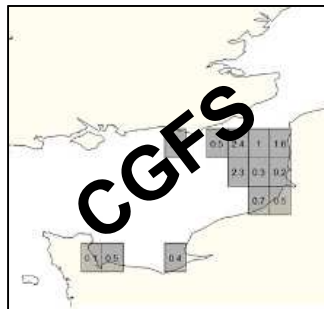
IA  $\rightarrow \underline{\text{Area}} * \cancel{\text{Bimester}} + \underline{\text{Year}} + \cancel{\text{Fleet}} * \cancel{\text{Vessel length}} + \underline{\text{sediment}} + \underline{\text{depth}}$



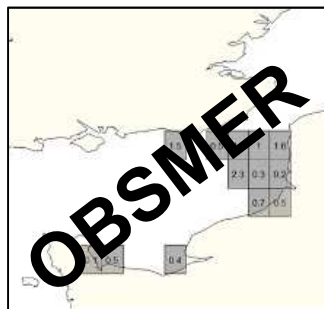
Above a size considered to be fully selected by fleets  $\approx$  SSB

\* Without targeting them

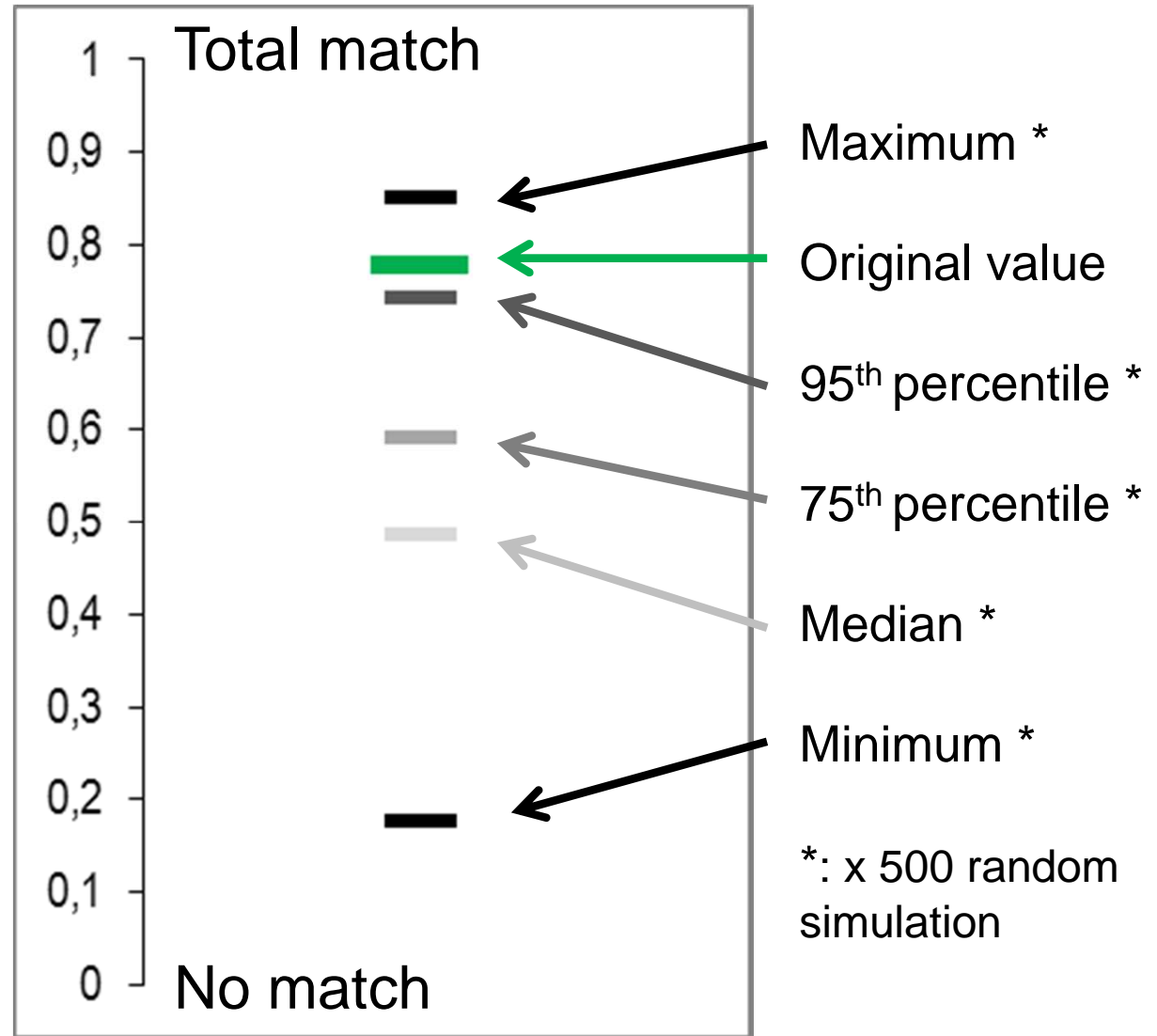
# Horn Index



vs

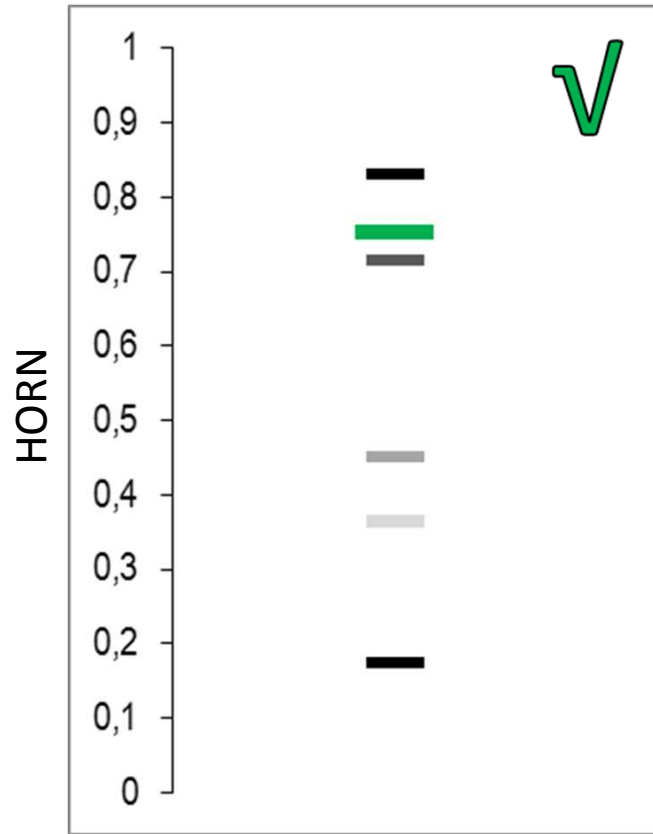


HORN



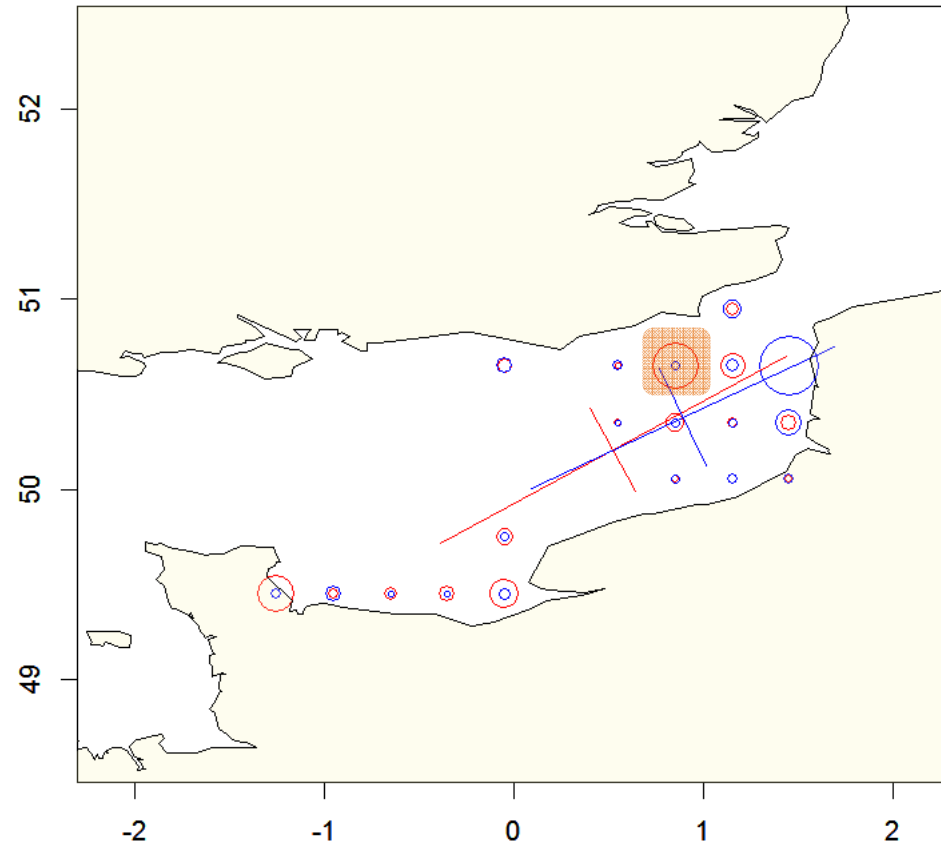


*Pleuronectes platessa*



Random x 500

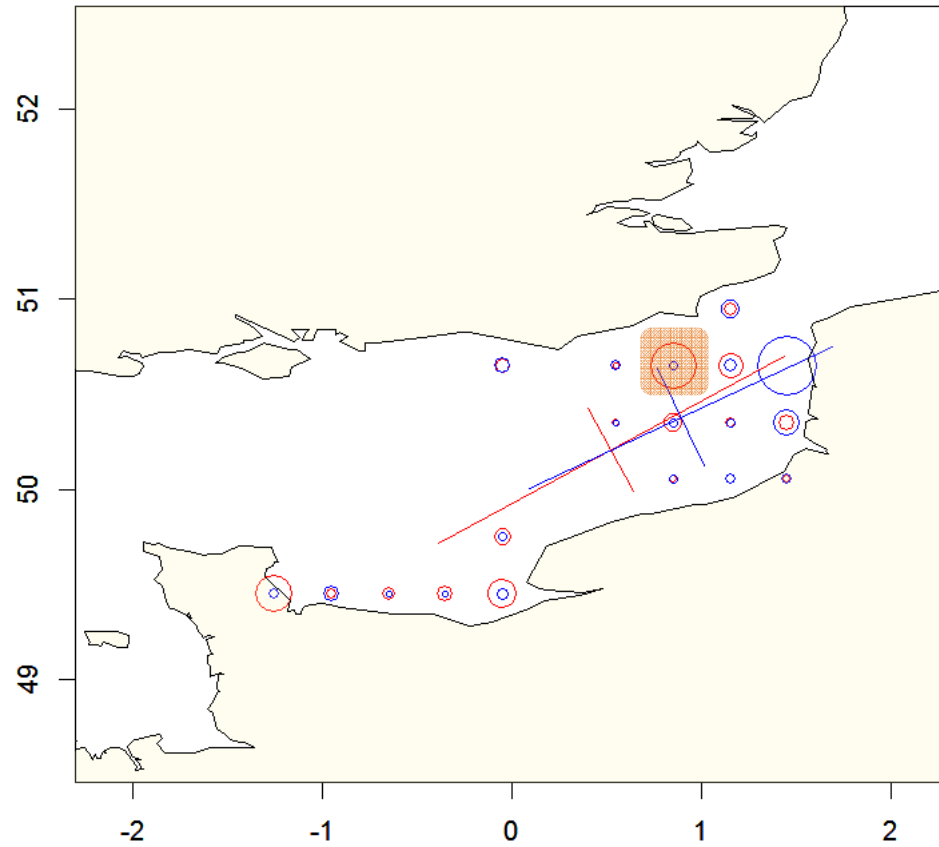
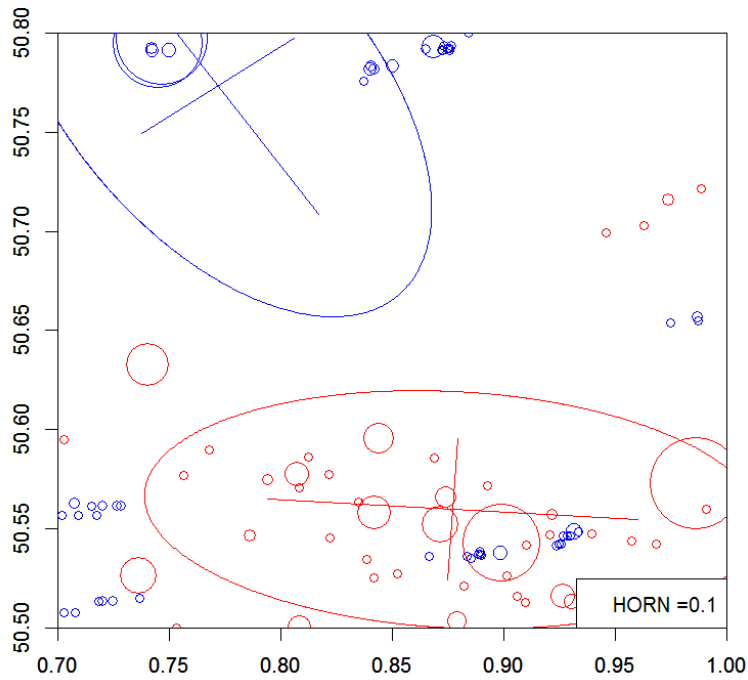
$\geq 27$  cm



○ Survey (CGFS)

○ OBSMER

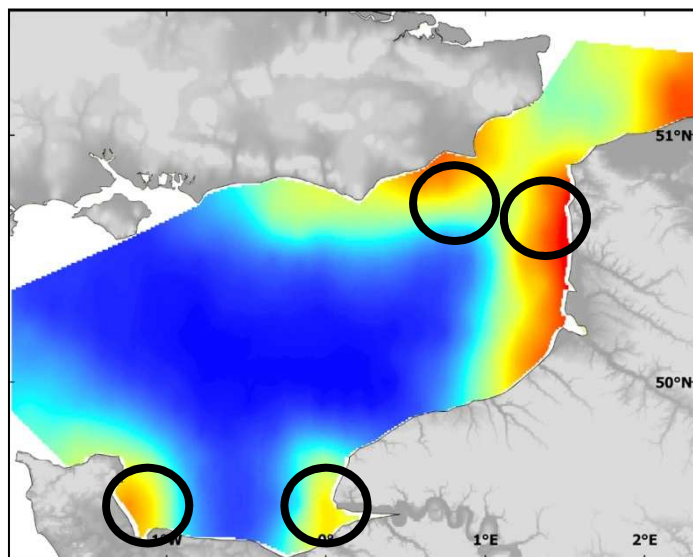
*Pleuronectes platessa*



○ Survey (CGFS)

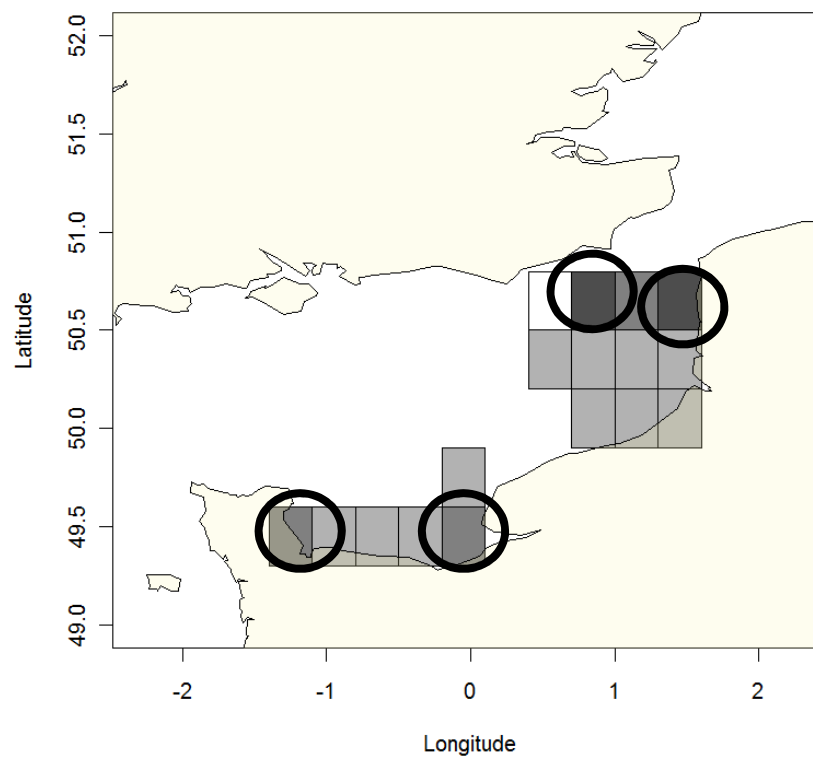
○ OBSMER

*Pleuronectes platessa*



CHARM II

OBSMER *Pleuronectes platessa* Bimester 5

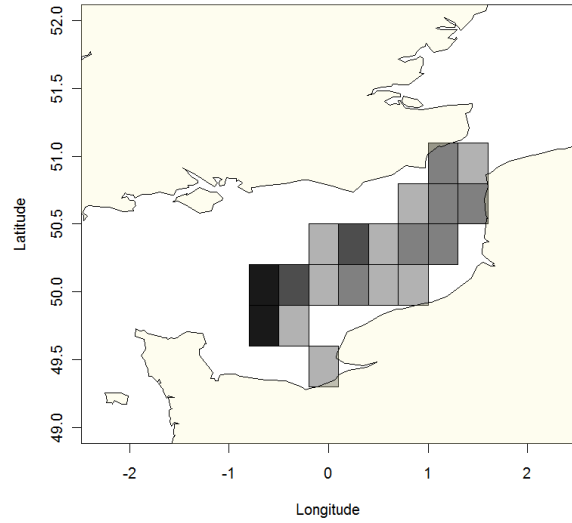


$\geq 27$  cm

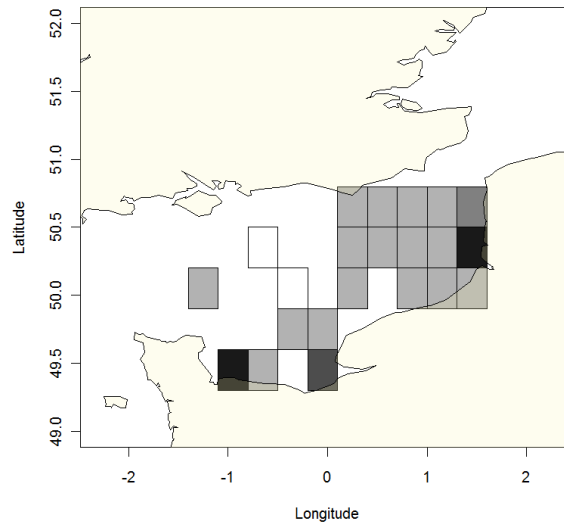
# *Pleuronectes platessa*



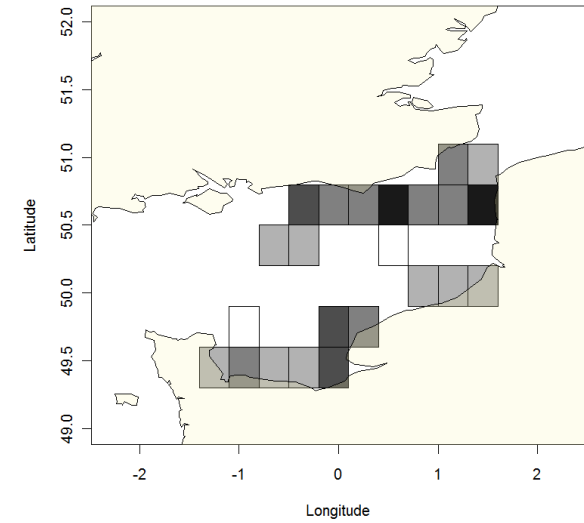
### Bimester 1



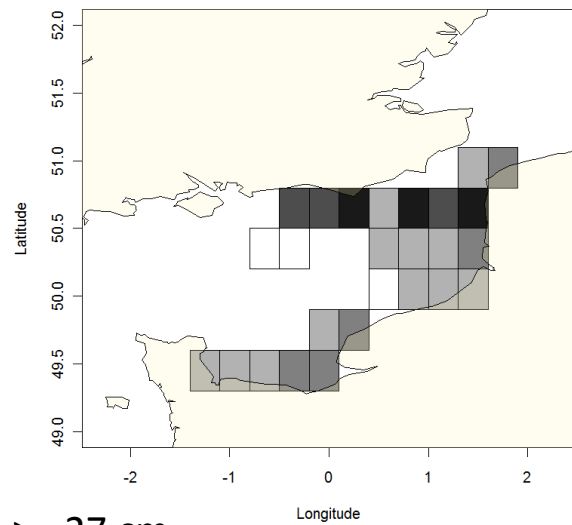
### Bimester 2



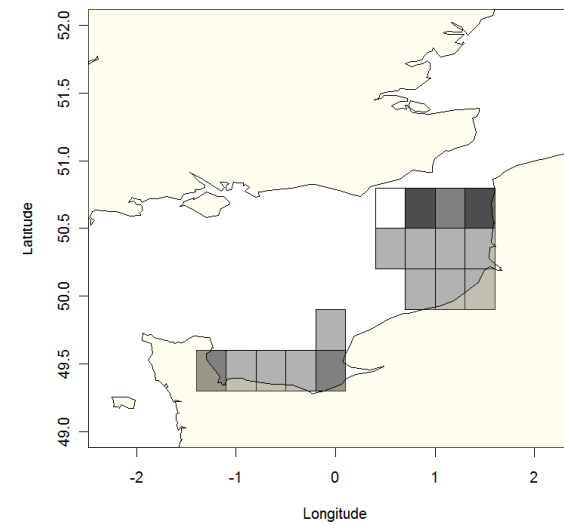
### Bimester 3



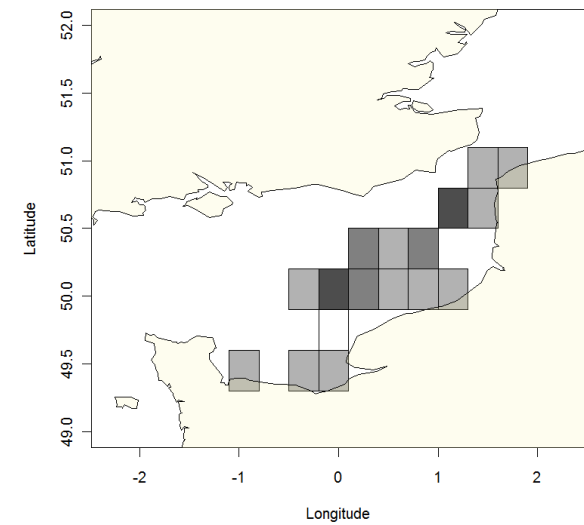
### Bimester 4



### Bimester 5

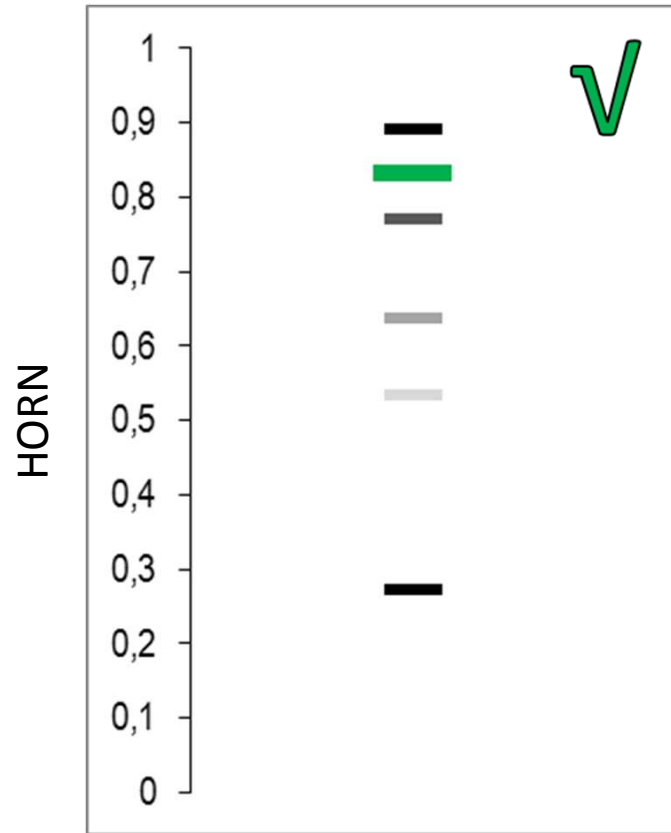


### Bimester 6



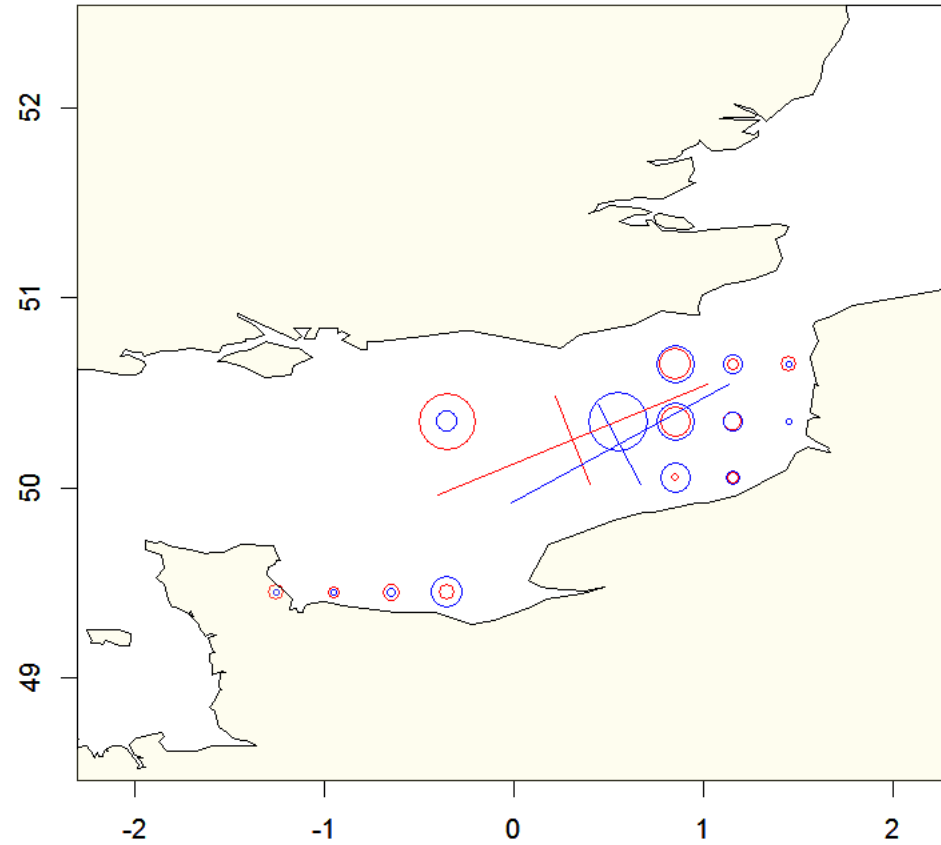
$\geq 27$  cm

# *Sepia officinalis*



Random x 500

$\geq 13$  cm



○ Survey (CGFS)

○ OBSMER

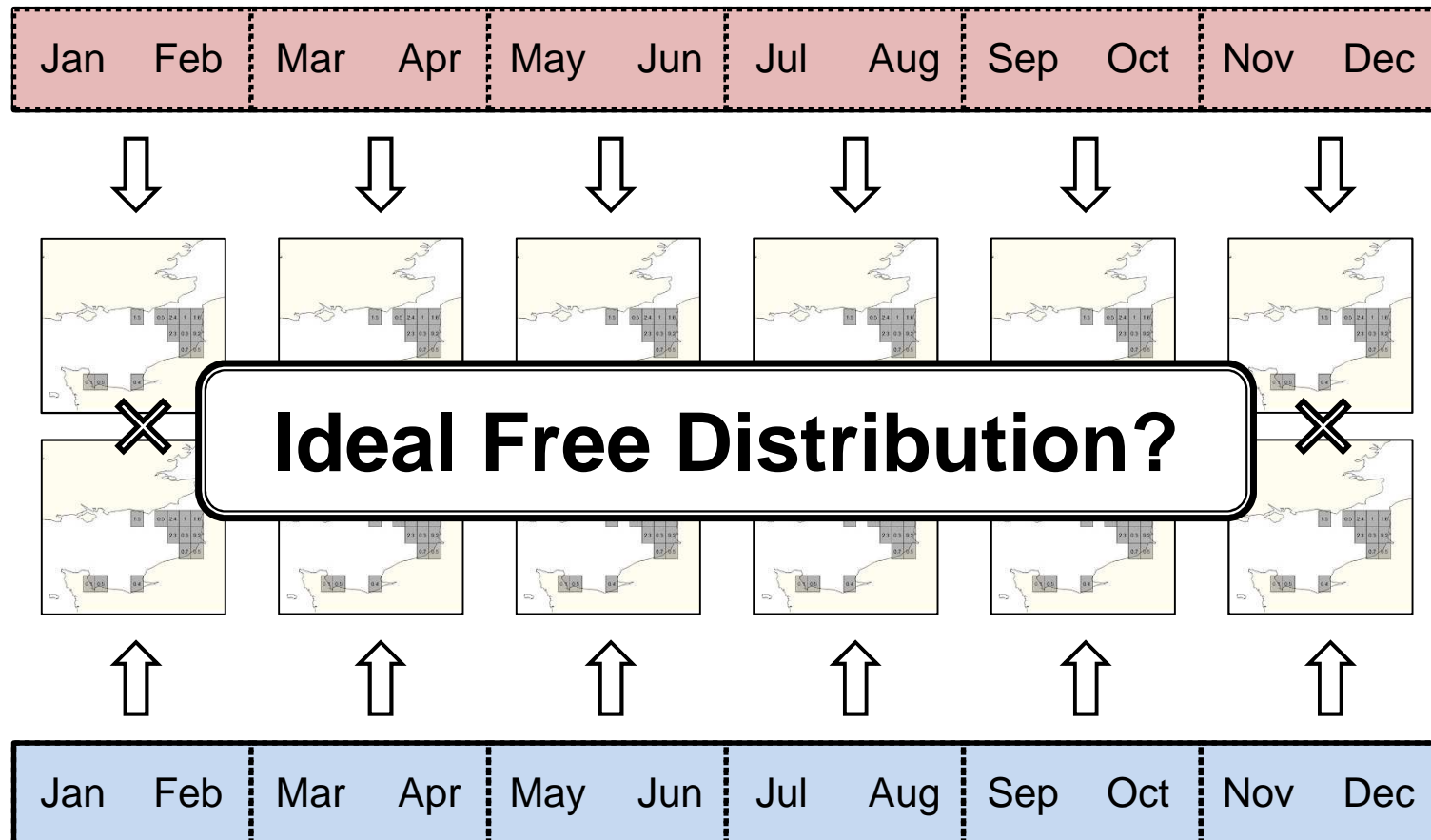
## Discrepancies between survey and obsmer data

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- . Few number of hauls to accurately predict the probability of presence  $p(>0)$ 
  - Find a number limit based on outputs
- . No match in small scale (intra area) distribution of hauls
- . Movement during bimester
- . Potential inter-annual movement (e.g. *Mullus surmuletus*)

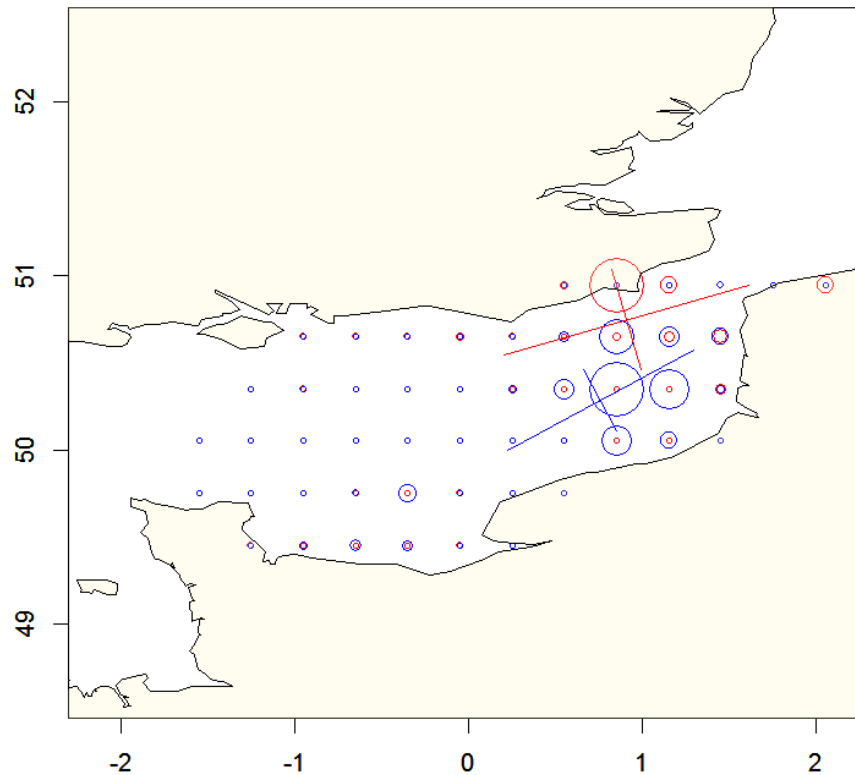
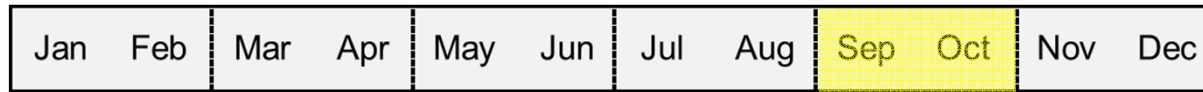
**Methods** / temporal comparison of the spatial superposition of fishing effort and abundance index estimates from ①

## Logbooks + VMS → spatialized Fishing Effort



**OBSMER**  
**(Fish distribution)**

# Fishing effort and abundance distribution / CGFS



Otter beam trawlers targeting *Merlangius merlangus*

Abundance distribution from **CGFS**

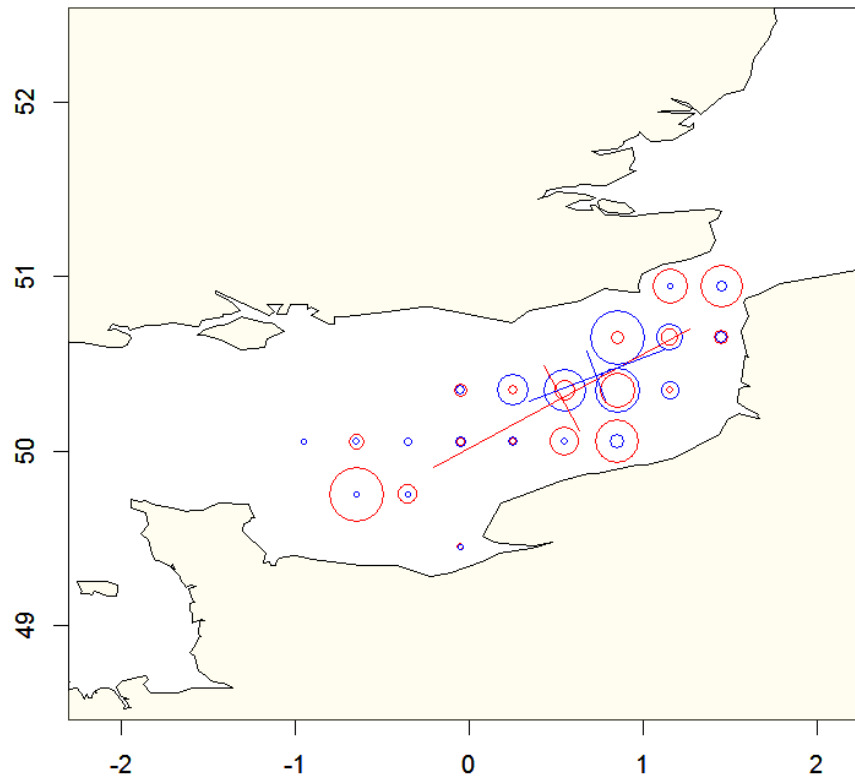
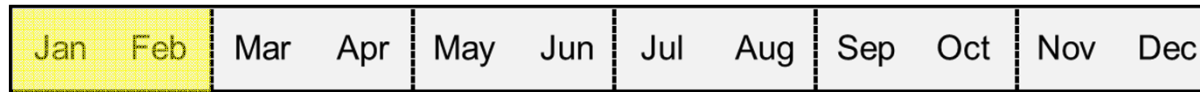
## Possible discrepancies:

- . Fishers are not free to move between areas without costs
- . Mixed fisheries
- . Fishery regulations
- . Limited exchange of information between fishers
- . Interannual movements or mortality of the resource
- . Measurement error

...



# Fishing effort and abundance distribution / OBSMER



Otter beam trawlers targeting *Merlangius merlangus*

Abundance distribution from **OBSMER**  
in January-February

## Possible discrepancies:

- . Fishers are not free to move between areas without costs
- . Mixed fisheries
- . Fishery regulations
- . Limited exchange of information between fishers
- . Interannual movements or mortality of the resource
- . Measurement error
- ...

## Conclusions

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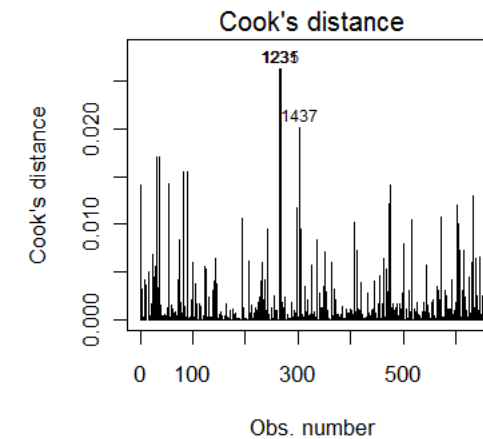
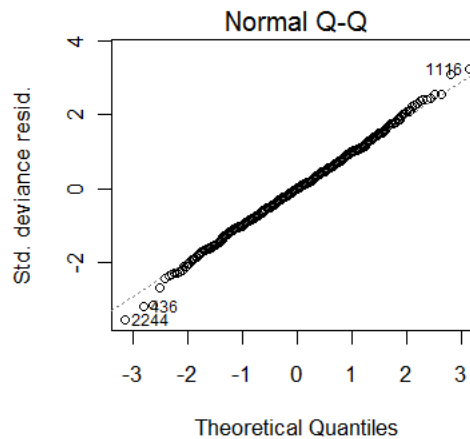
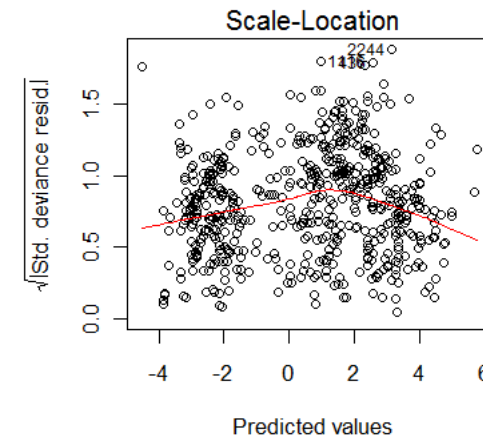
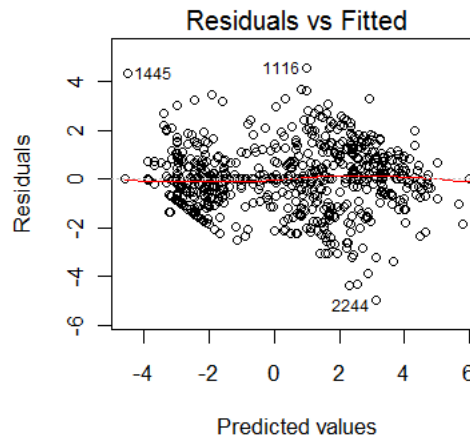
- . Observe the spatial abundance of diverse species in the Eastern English Channel at bimonthly scale
- . Future analysis of the relationships with effort distribution and movement during a year
- . Understand the discrepancies with Ideal Free Distribution in Eastern English Channel



# Merlangius merlangus

$R^2 = 0,77$

	<b>4908,1</b>		
<b>Area*Bimester</b>	<b>2466,12</b>	<b>50,2%</b>	<b>&lt; 2,2e-16</b>
<b>Fleet*Vessel lentgh</b>	<b>1090,96</b>	<b>22,2%</b>	<b>&lt; 2,2e-16</b>
<b>Sediment</b>	<b>113,59</b>	<b>2,3%</b>	<b>3.394e-10</b>
<b>Year</b>	<b>108,95</b>	<b>2,2%</b>	<b>9.077e-10</b>



$\geq 24$  cm

## Objective 2

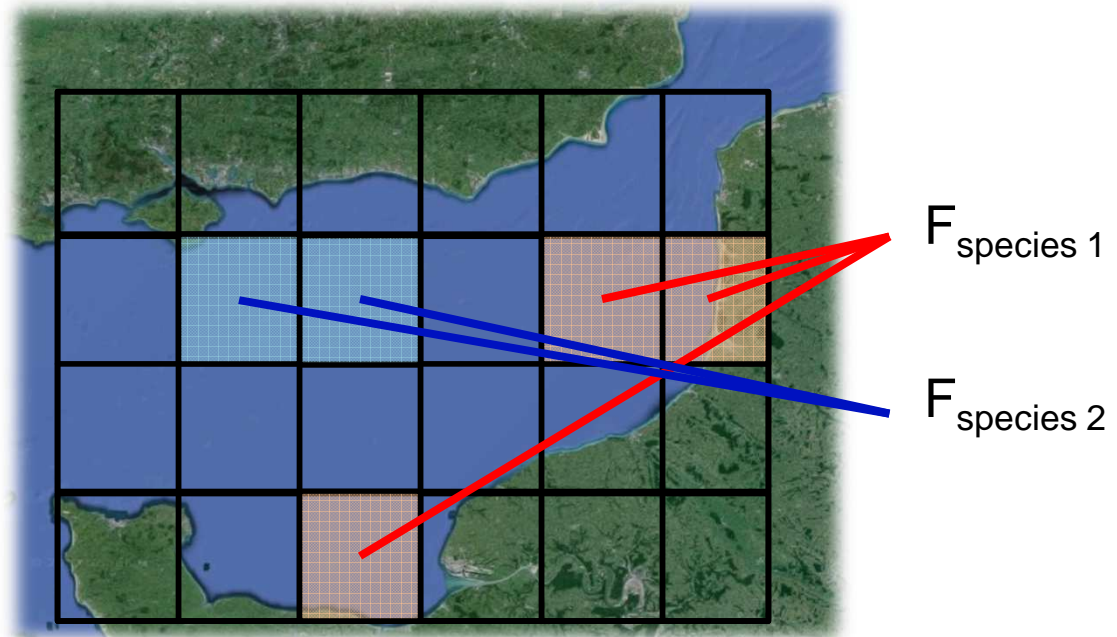
### 13 fish species :

Lesser spotted dogfish  
Red mullet  
Pouting  
Withing  
Poor cod  
Cod  
Dragonet  
Sole  
Plaice  
Horse mackerel  
Mackerel  
Herring  
Sardine

+

Squids  
(*Loligo vulgaris*)  
(*Loligo forbesii*)

Travers *et al.*, in prep.



- Mortality modulation  $\longrightarrow$  Effort modulation  
(more useful for managers)
- $F$  not independent (mixed fisheries)