



Ifremer

A.M.O.P.



# Cartographie des captures et des rejets d'espèces commerciales et planification spatiale des pêcheries chalutières dans le golfe du Lion



DiscardLess



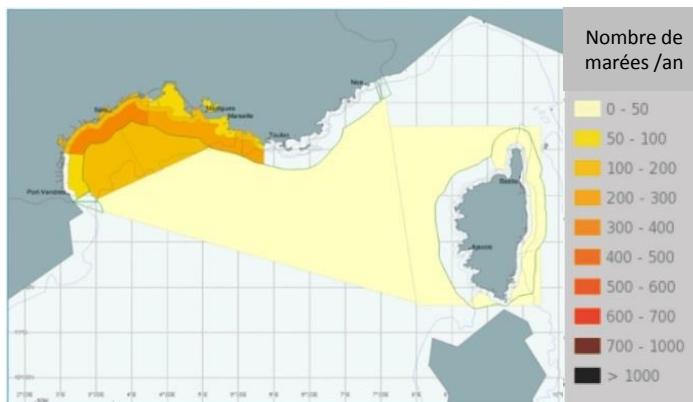
Crédit photo : site web du projet Galion



Sandrine Vaz, Anais Médieu, Angélique Jadaud

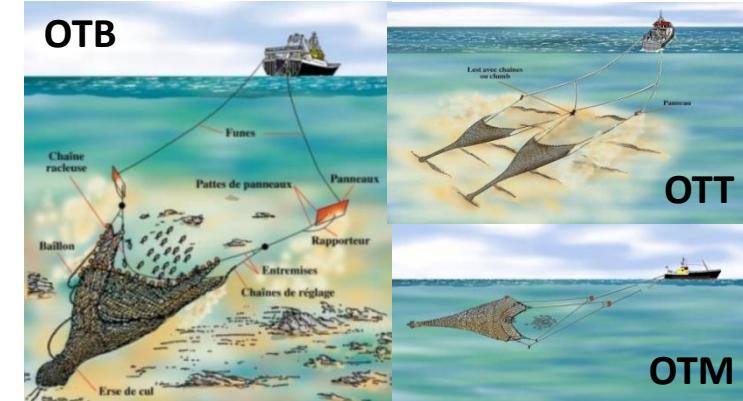
# Bottom trawl fisheries in the Gulf of Lions

➤ Mostly on the continental shelf



Source: SIH Ifremer, Synthèse des flotilles 2012

➤ Three types of gear



Source: Ifremer

➤ Multi-specific fishery

> 30 target species

➤ Not selective

40mm square mesh

➤ Regulation specificities

No TAC or quota

Only **minimum landing size (MLS)**

> 200 days at sea (control of effort)

Daily trip (14h max)

Now: landing obligation of species under MLS

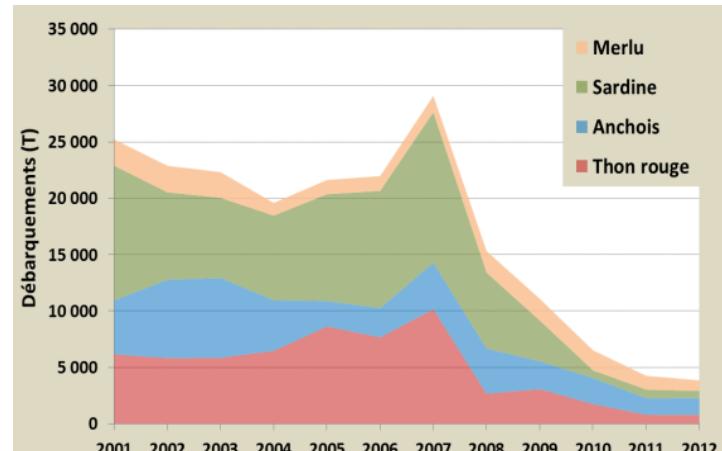
# Unsustainable fishery...

## ➤ Overexploitation of stocks

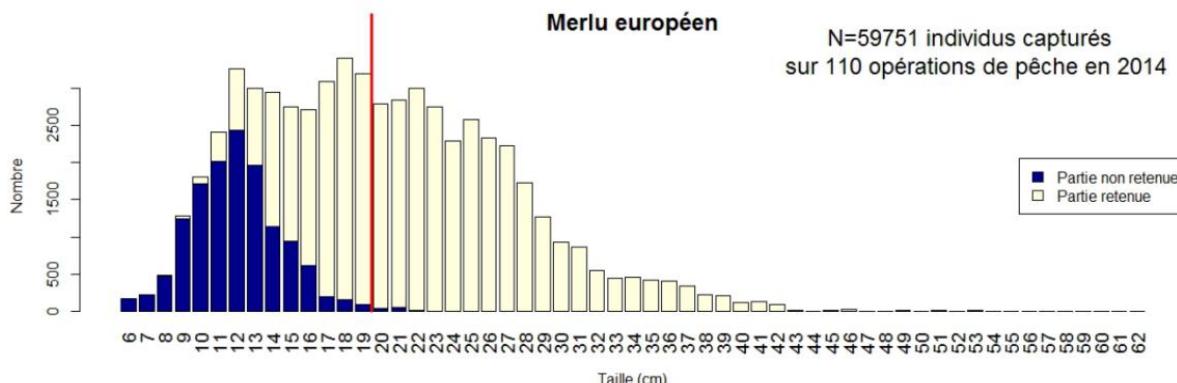
90% of assessed stocks are over exploited or ecologically unbalanced (sardines)

Shift from pelagic trawl to bottom trawl since 2009

Further effort reduction (day allocated) is expected



Source: Ifremer Sète



Source: Cornou & al. (2015)

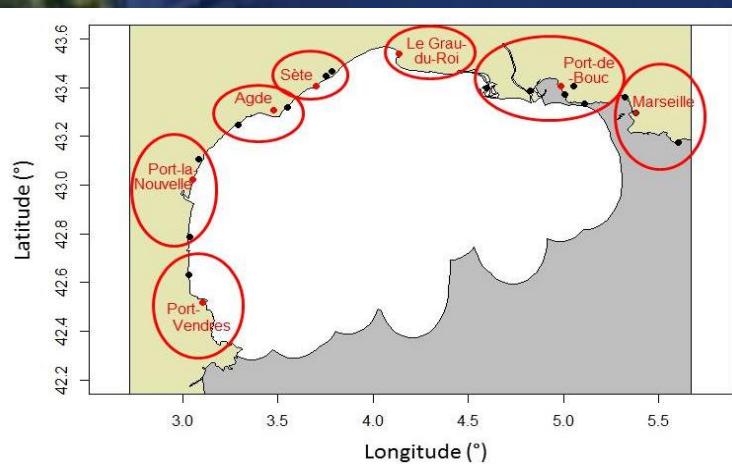
## ➤ High discard rate (~ 20%)

Should be even higher but marketing of undersize fish is also common

## 2. Data

# Area and target species

### ➤ Gulf of Lions: 7 main fishing harbours



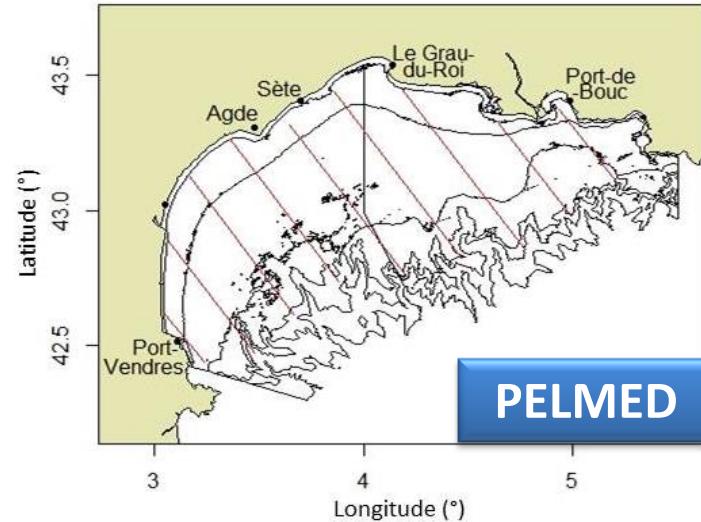
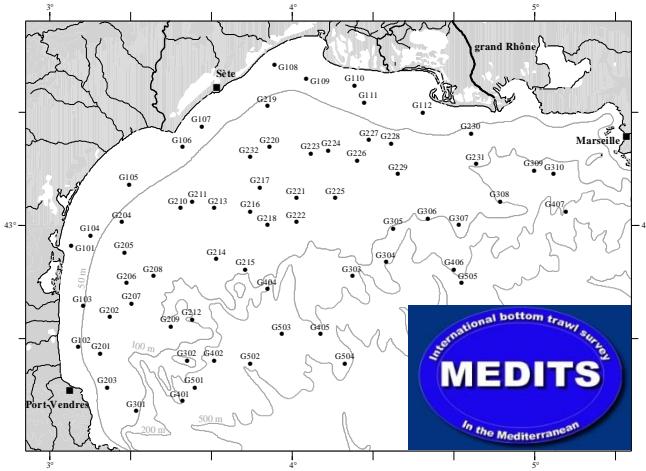
### ➤ Species under MLS

NOM SCIENTIFIQUE	NOM VERNACULAIRE	TMC (cm)
<b>1. Poissons</b>		
<i>Dicentrarchus labrax</i>	Loup (Bar)	25
<i>Diplodus annularis</i>	Sparaillon	12
<i>Diplodus sargus</i>	Sar à museau	23
<i>Diplodus vulgaris</i>	Sar à tête noire	18
<i>Lithognathus mormyrus</i>	Marbré	20
<i>Merluccius merluccius</i>	Merlu	20
<i>Mullus barbatus</i>	Rouget barbet de vase	11
<i>Mullus surmuletus</i>	Rouget barbet de roche	11
<i>Pagellus acarne</i>	Pageot acarne	17
<i>Pagellus bogaraveo</i>	Dorade rose	33
<i>Pagellus erythrinus</i>	Pageot commun	15
<i>Scomber colias</i>	Maquereau blanc d'Atlantique	18
<i>Scomber scombrus</i>	Maquereau commun	18
<i>Solea vulgaris</i>	Sole commune	20
<i>Sparus aurata</i>	Dorade royale	20
<i>Trachurus mediterraneus</i>	Chinchard de Méditerranée	15
<i>Trachurus trachurus</i>	Chinchard commun	15
<i>Engraulis encrasicolus</i>	Anchois	9
<i>Sardina pilchardus</i>	Sardine	11
<b>2. Crustacés</b>		
<i>Nephrops norvegicus</i>	Langoustine	20 mm CL
<i>Parapenaeus longirostris</i>	Crevette rose du large	20 mm CL

## 2. Data

# Observation data

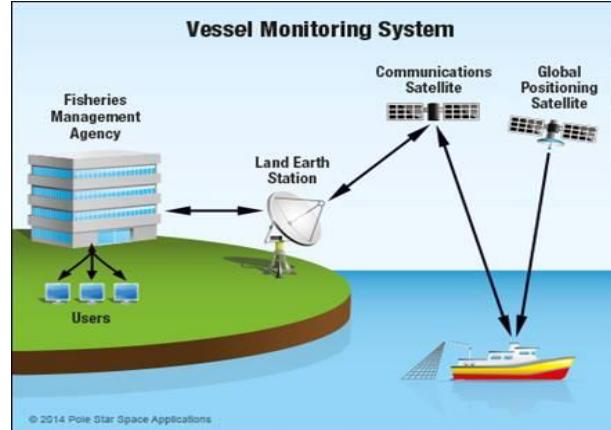
### ➤ Scientific surveys



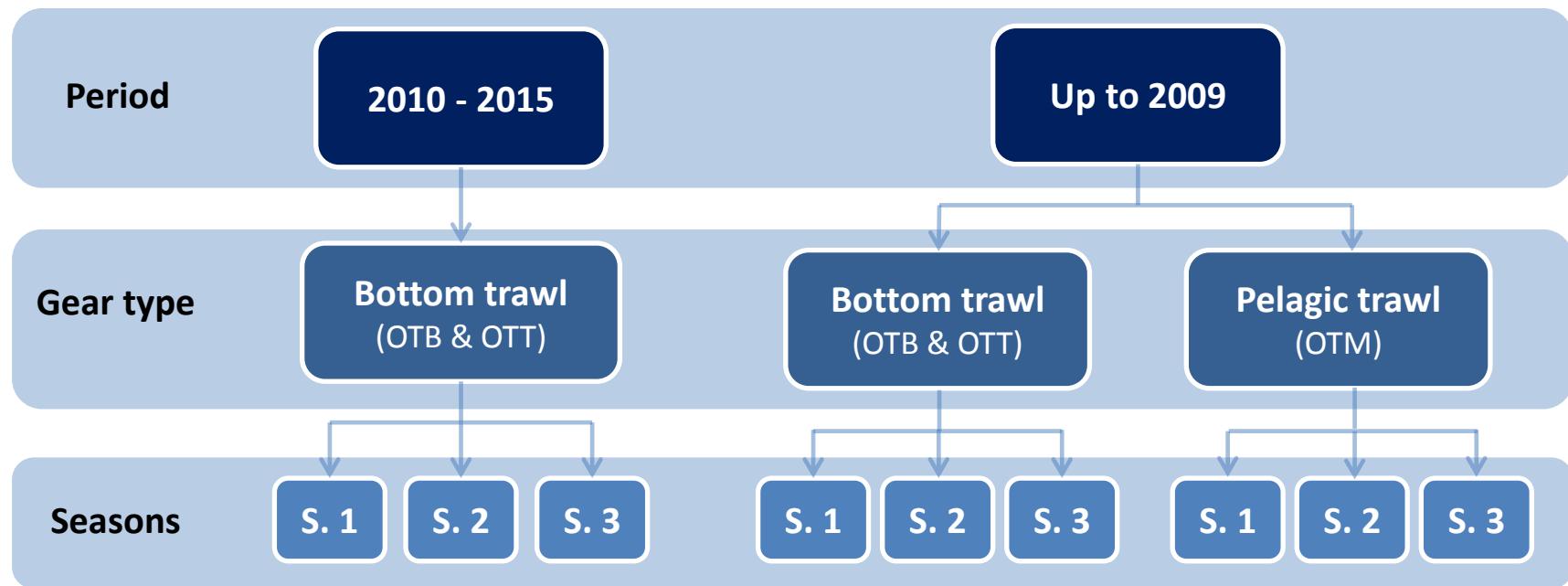
### ➤ Observations at sea



### ➤ VMS coupled to landings



# Period and season considered

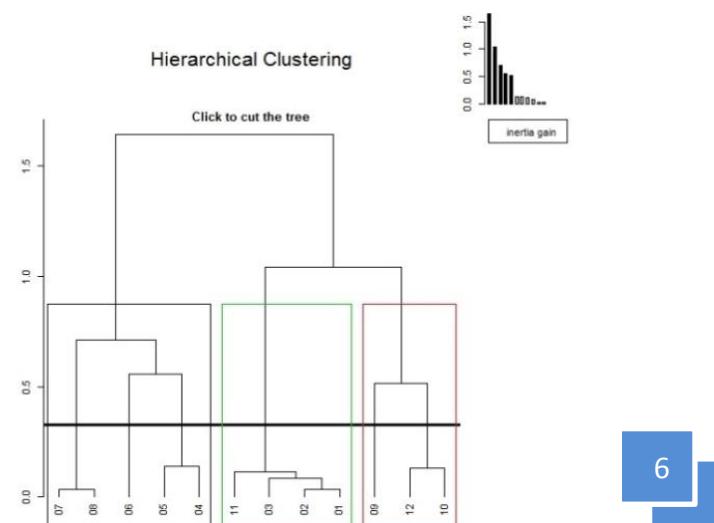


Based on discard rates of all available demersal species

Season 1 : november, january, february and march

Season 2 : April to august

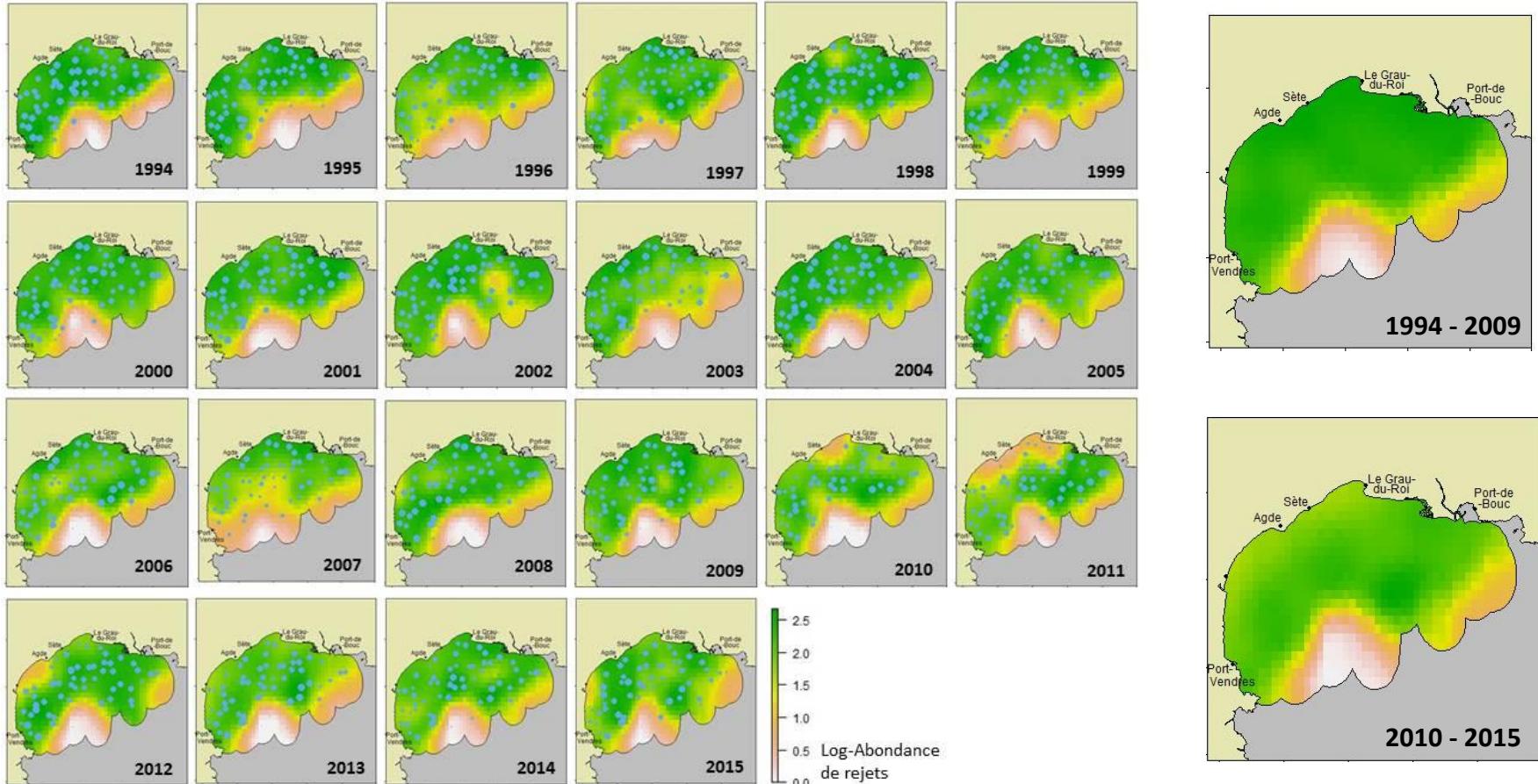
Season 3 : september, october and december



### 3. Distribution

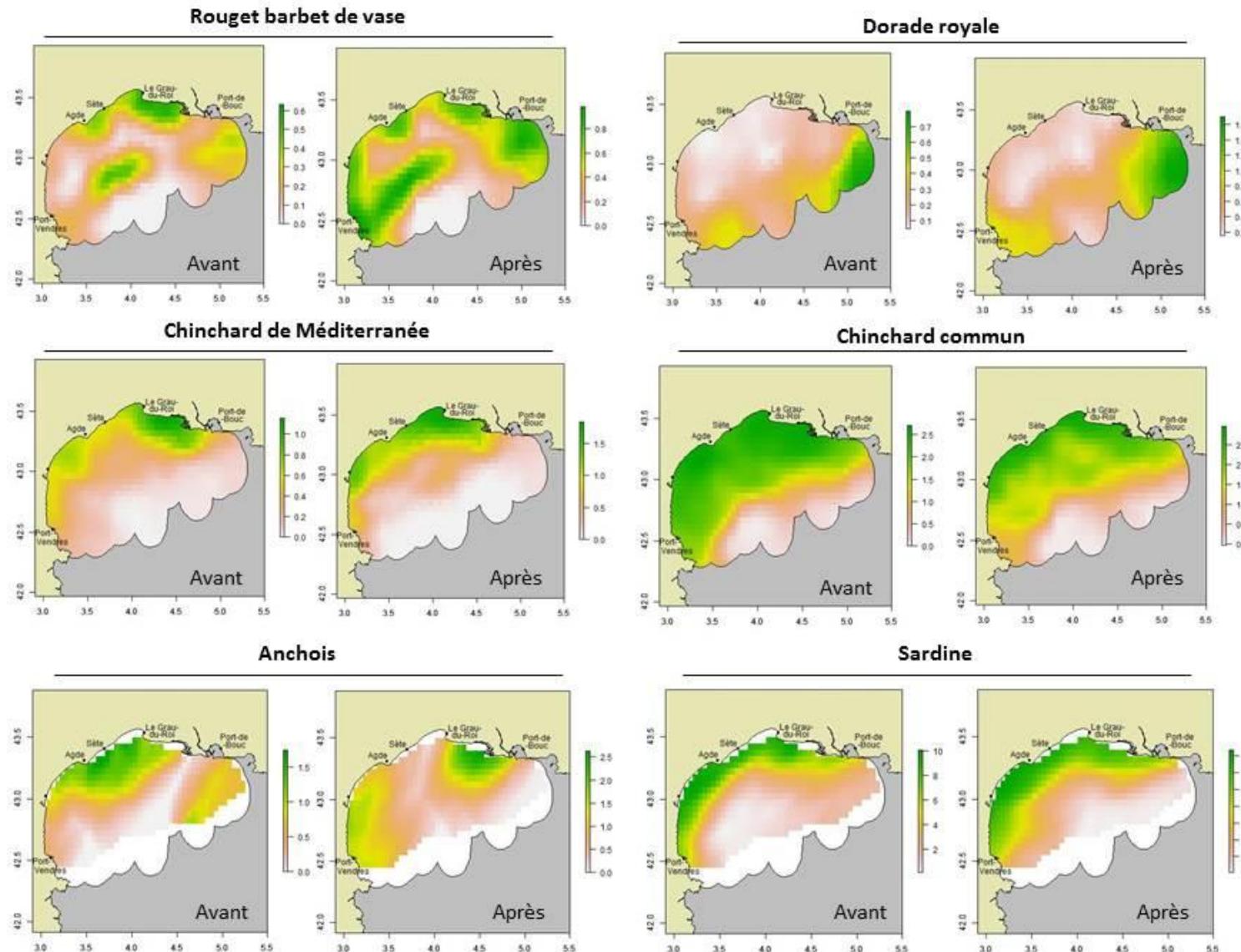
# Maps of theoretical discard from scientific surveys MEDITS ( $\text{nb}/\text{km}^2$ ) and PELMED ( $\text{nb}/\text{mn}^2$ )

## Hake (MEDITS)



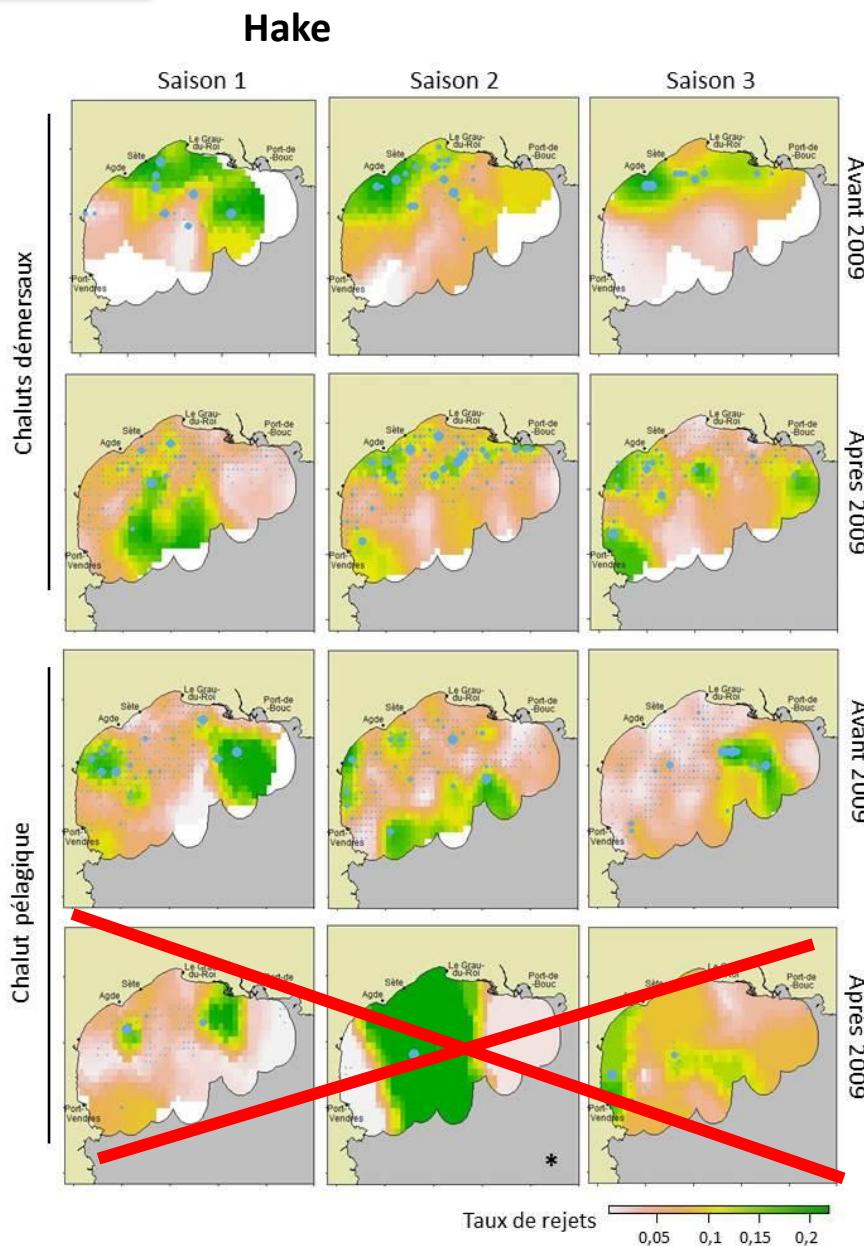
### 3. Distribution

# Maps of theoretical discard from scientific surveys MEDITS (nb/km<sup>2</sup>) and PELMED (nb/mn<sup>2</sup>)



### 3. Distribution

## Discard mapping using observations at sea (discard rate)

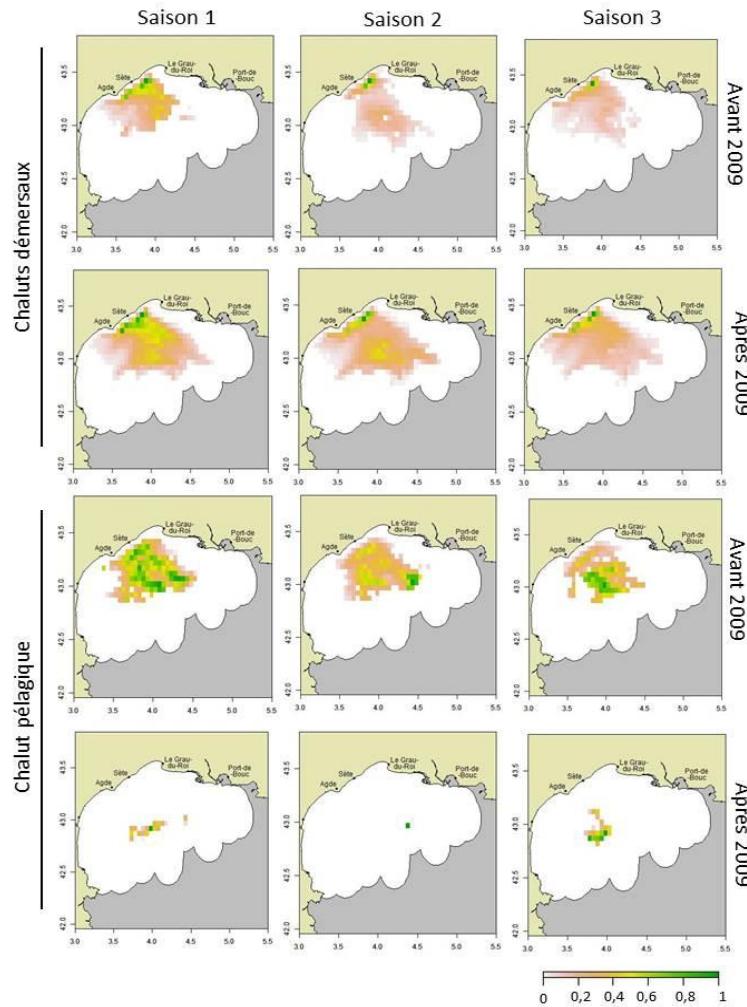


- Discard rate very heterogeneous, due to data variability
- More observation near coast than offshore, poor representation of offshore discard rates.

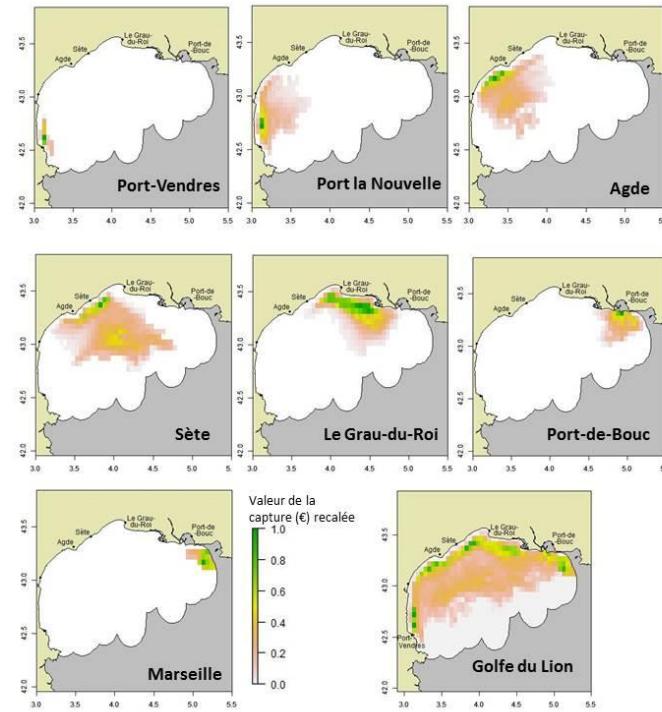
### 3. Distribution

# Mapping of catches from VMS-landing data (standardised monetary values per harbour)

#### ➤ Sète



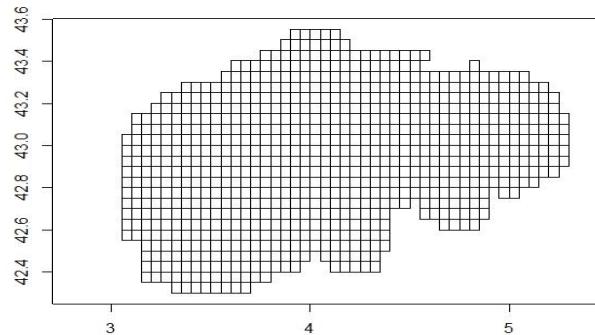
#### ➤ Bottom trawl, actual period, season 2



- Report of pelagic effort to demersal activity from 2010 onward
- Catches are localised near landing harbour

# Methods

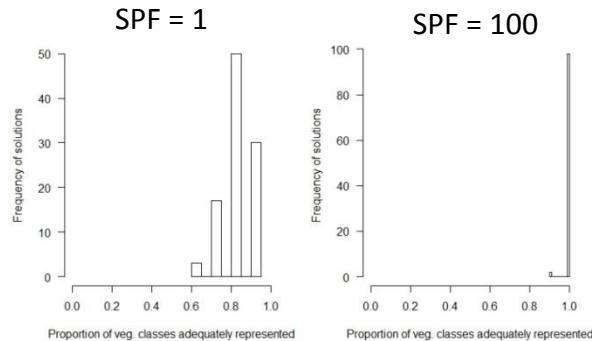
- A 764 planification units (PUs) grid (3'x3')



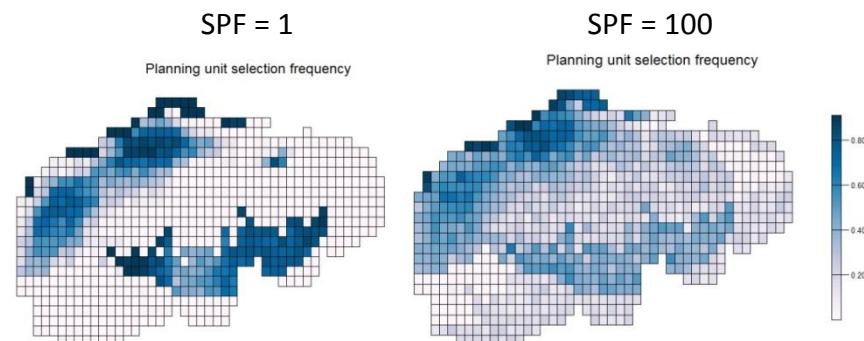
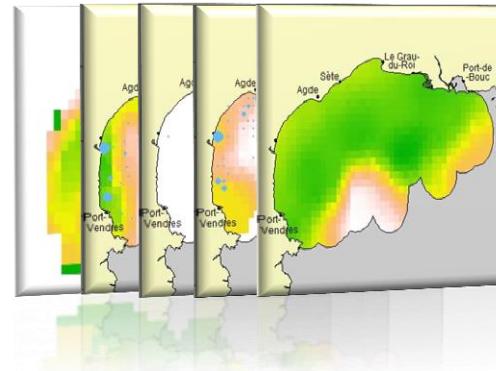
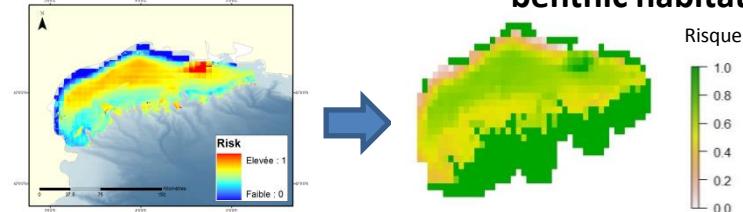
- Protection target: 30%

- Various parameter tuning

Compromise to meet target and obtain realistic (aggregated) solution



- Protected features: discards (<MLS) + sensitive benthic habitats



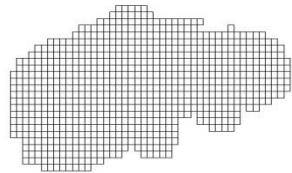
## 4. Spatial planning

# Methodes

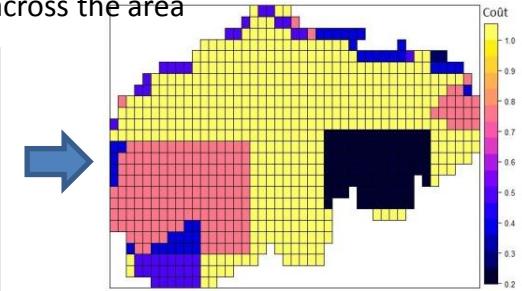
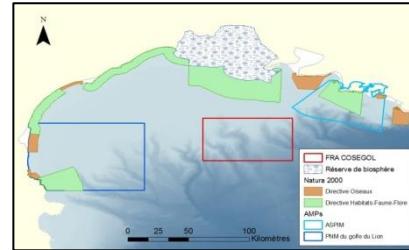
- **cost:** can be used to integrate existing MPA or fishery restricted area

Not taken into account:

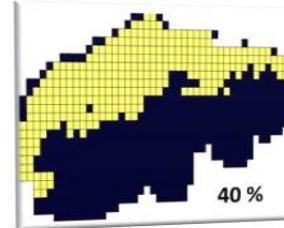
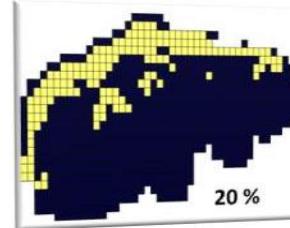
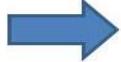
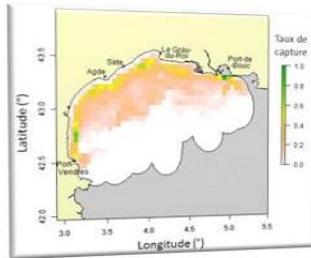
**Identical cost for all cells**



With existing MPAs: cost varies across the area



- **PUs blocked to maintain fishing activities on most profitable fishing grounds**



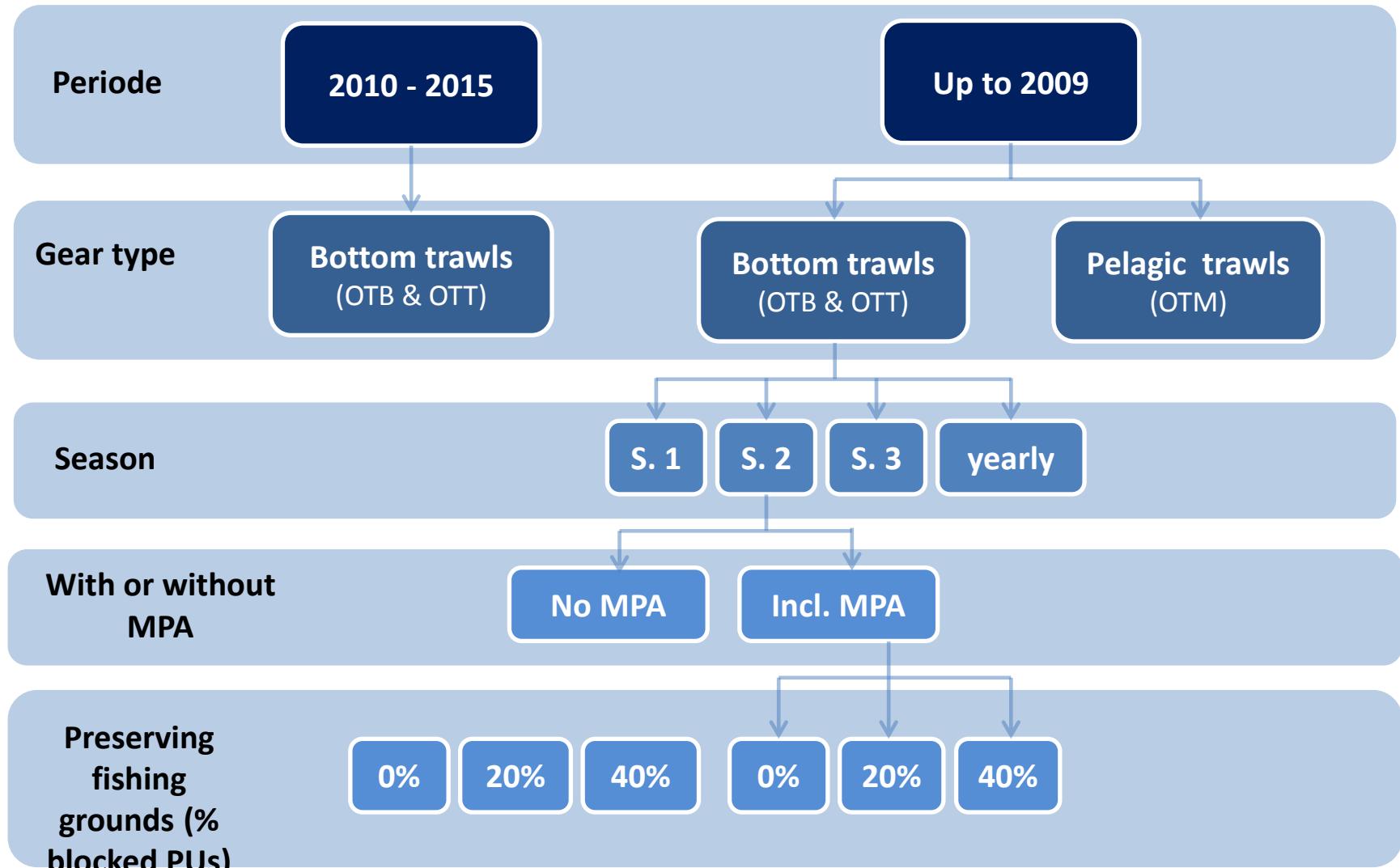
- **optimisation algorithm test 100 solutions for each scenario**

$$\text{Score total} = \sum_{PUs} \text{Coût} + \left( BLM * \sum_{PUs} \text{Périmètre du réseau} \right) + \sum_{Eléments} SPF * \text{Pénalité}$$



## 4. Spatial planning

# Tested scenarios

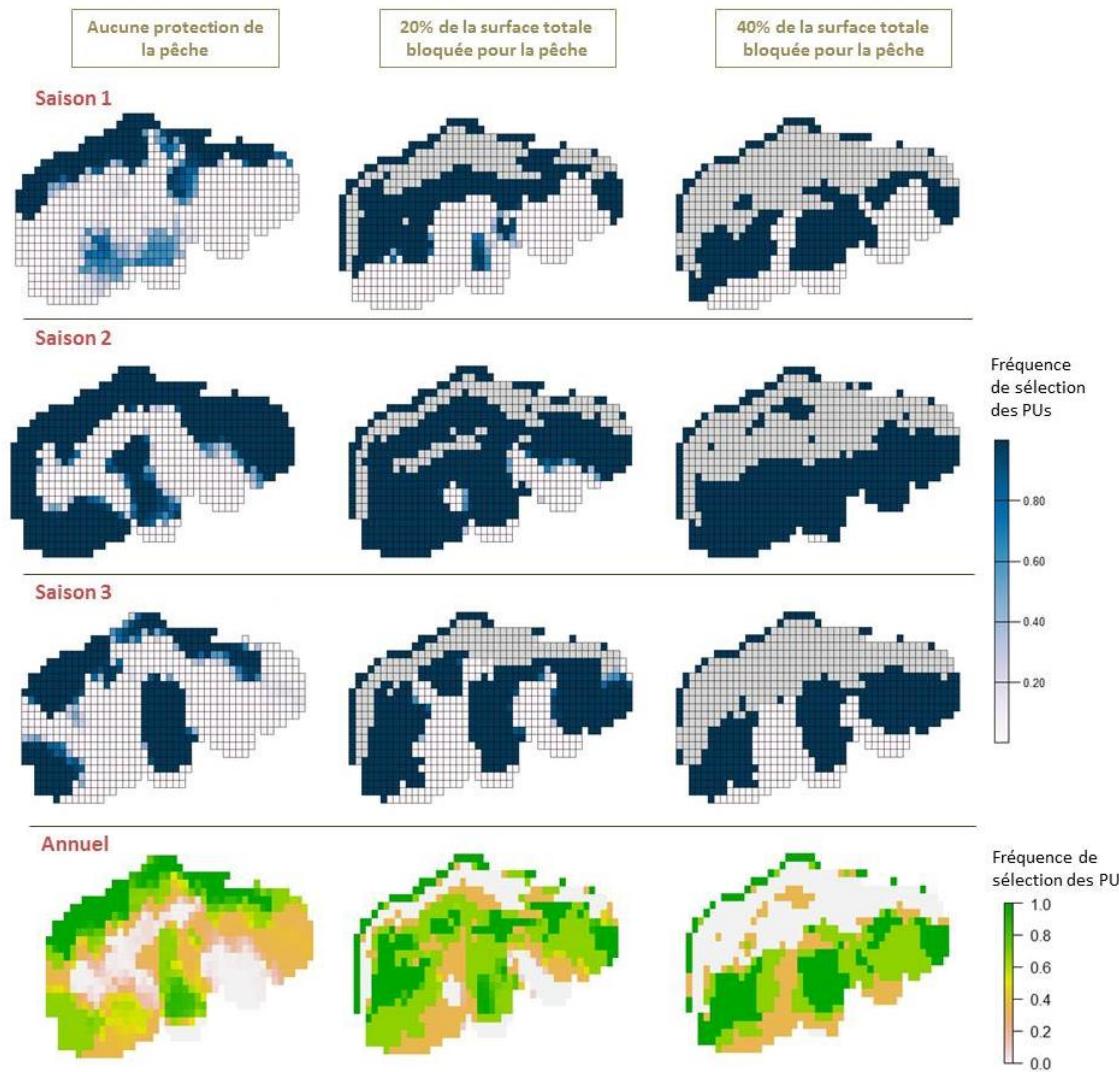


90 spatial planning scenarios

## 4. Spatial planning

# Results

- Bottom trawl, 2010-2015 periode , no MPA



## 5. Conclusions

- **Mapping:** 1 necessary step for spatial management of discard (avoidance strategies)
- **Planning scenarios:** serve as base for reflection
- **TMC** not always respected
- **Coastal area:** contradiction between main fishery ground and avoidance of discard
- Data quality: observation at sea often biased and under-estimate discard in certain areas: need to have fishery independant data
- **Simulation of scenarios effect** via dynamic modeling
  - effects of spatial measures on stocks and fleets

# Thanks for your attention

