



Mediterranean Workshop, 9 March 2017

Experiences to reduce discards in the Mediterranean: bottom trawl selectivity and fishing strategies

Western Mediterranean case study



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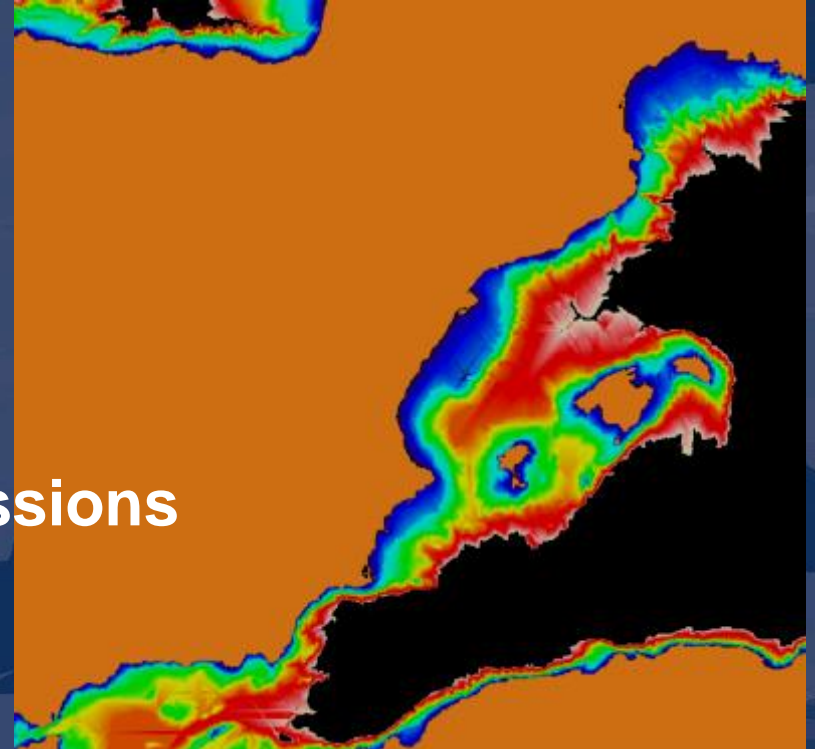
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- Previous *DiscardLess* sessions

3. *DiscardLess* results

- WP3: Adaptation of gear technology
- WP4: Adaptation of fishing strategies

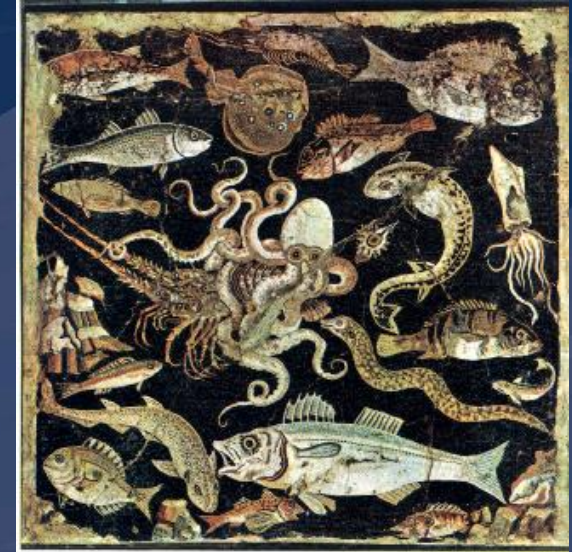
Western Mediterranean case study



1. *The fishery*

Western Mediterranean bottom trawl

- Main demersal fishery (fleet power and catch)
- Multi-specific (~100 species in landings)
- No clear target species at some depths
- Wide depth range (50-800 m)
- Different fishing tactics



REGULATIONS

- Fishing periods: days/week, h/day
- Engine power
- Depth range
- Minimum landing size (MLS)
- Cod-end mesh size, shape & twine thickness
- Protected habitats
- Discards ban and landing obligation (species under MLS)

2. The Landing Obligation

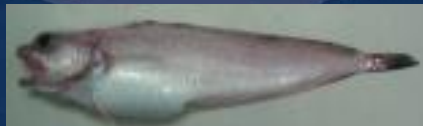
DiscardLess kick-off meeting (Bilbao, 22 April 2015)

Some stakeholders conclusions

- General opposition to LO implementation
 - It should be taken advantage of LO for a general decrease of discards, not only for species under MLS
 - As management of discards on land will generate problems, stakeholders agreed that measures to apply were:
 - **Improvement of gear selectivity**, not only to eliminate discards of species under MLS, but also to recover fishing exploitation scheme of target species
 - **Spatio-temporal closures**, based on scientific criteria
- **Need to increase length of catches, because most assessed demersal stocks in MED are growth overfished**

3. *The DiscardLess results*

Improvement of bottom trawl selectivity



3. The DiscardLess results

Improvement of bottom trawl selectivity: **fishing gear**



- Studies have made:

- Increasing cod-end mesh size
- Changing cod-end mesh geometry
- Square mesh panels
- Sorting grids
- Twine thickness
- “Pelagic” doors

DiscardLess SHEETS

- [40Dvs40S.pdf](#)
- [50Dvs40S.pdf](#)
- [Grids.pdf](#)
- [Panels_Shelf.pdf](#)
- [Panels_Slope.pdf](#)



www.discardless.eu/



DISCATCH project (2014-2015) identified measures, including gear characteristics, to mitigate/eliminate by-catch of unwanted species and discards

<http://en.med-ac.eu/progetti.php>

3. The DiscardLess results

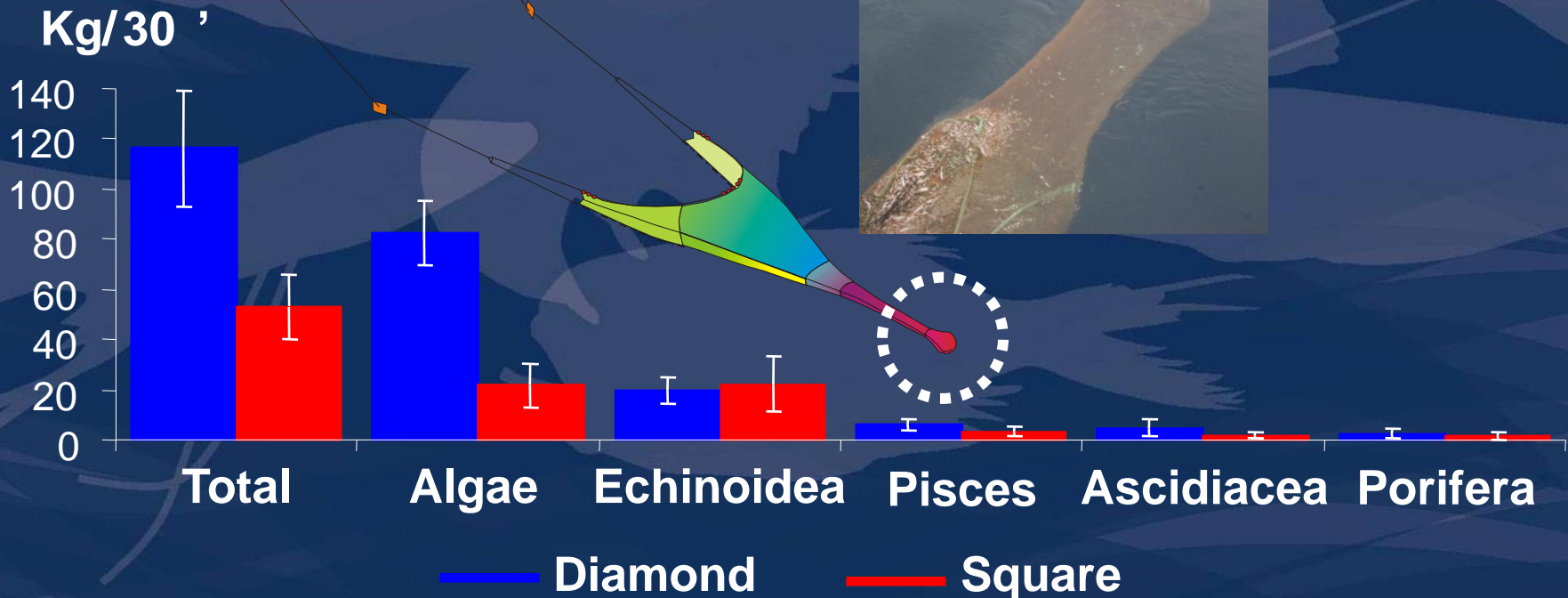
Improvement of bottom trawl selectivity: **fishing gear**



Balearic Islands

40 mm Diamond vs. 40 mm Square

↓ DISCARDS



3. The DiscardLess results

Improvement of bottom trawl selectivity: **fishing gear**

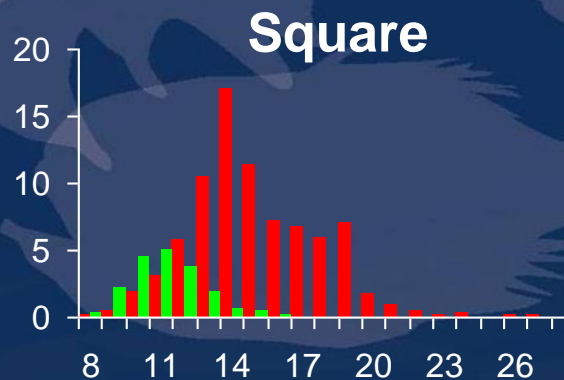
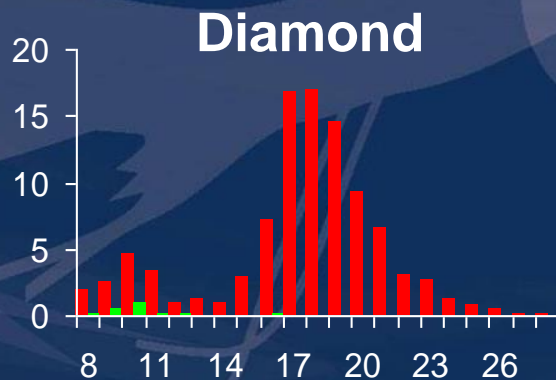


Balearic Islands

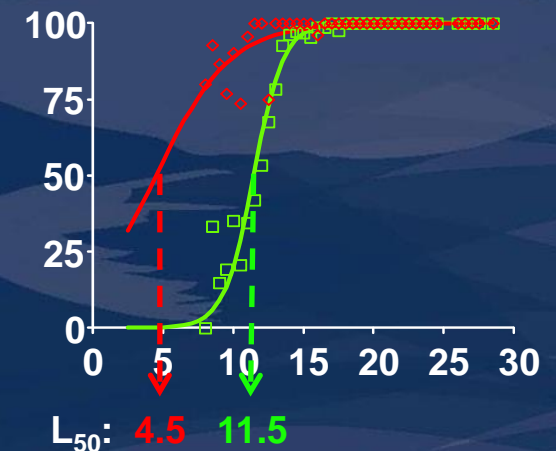
40 mm Diamond vs. 40 mm Square



Mullus surmuletus



Length First Capture (L_{50})



L_{50} : 4.5 11.5

■ Cover ■ Cod-end — Diamond — Square

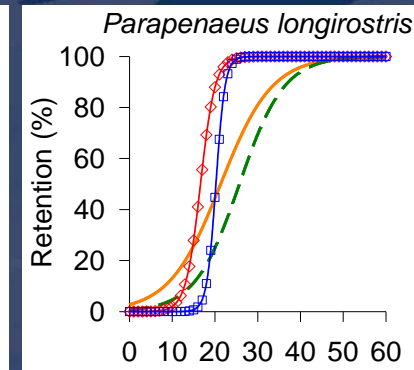
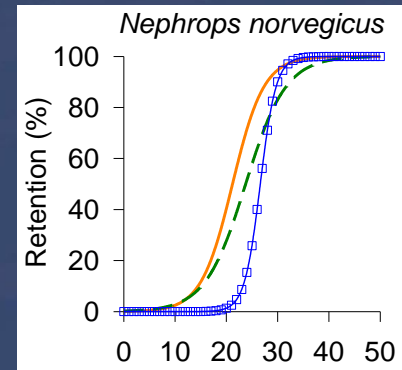
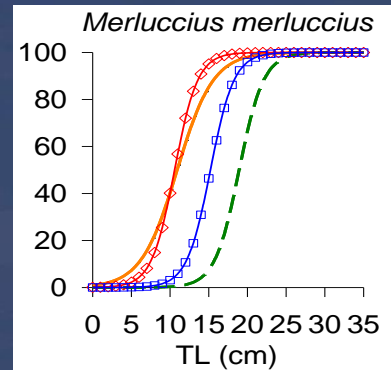
3. The DiscardLess results

Improvement of bottom trawl selectivity: **fishing gear**

Balearic Islands

Size selectivity models:

- ✓ 16 fishes
- ✓ 5 crustaceans
- ✓ 3 cephalopods



DM 

SM 

SG15 

SG20 

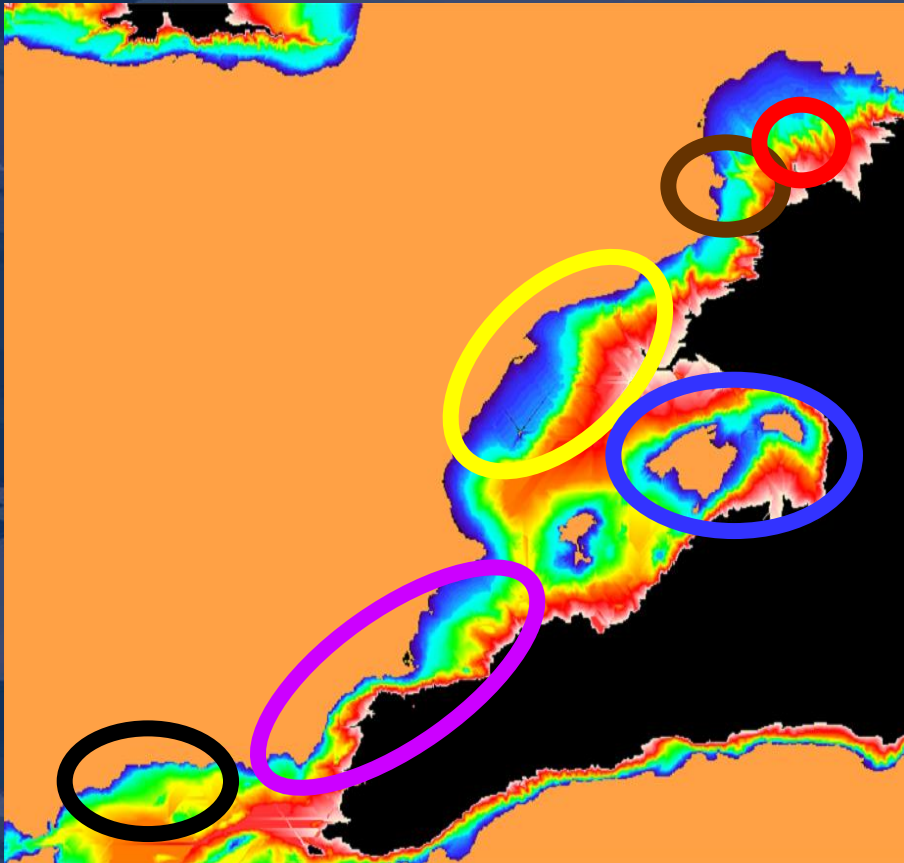
Species	MLS	40 mm diamond			40 mm square			SG15		SG20	
		L ₅₀	SR	<MLS	L ₅₀	SR	<MLS	L ₅₀	SR	L ₅₀	SR
<i>Merluccius merluccius</i>	20	10.6	3.3	4	15.2	3.3	39	10.9	5.1	18.9	3.4
<i>Mullus surmuletus</i>	11	4.5	5.8	14	11.5	2.3	75				
<i>Pagellus acarne</i>	12			0	9.4	4.2	31				
<i>Pagellus erythrinus</i>	12			0	10.4	2.0	55				
<i>Spicara smaris</i>	11	9.0	5.1	26	17.1	6.9	97				
<i>Trachurus mediterraneus</i>	12	12.1	3.1	36	15.2	5.2	90				
<i>Parapenaeus longirostris</i>	20	16.6	3.8		20.2	2.3		21.4	13.2	25.7	11.4
<i>Nephrops norvegicus</i>	20				26.6	2.5		21.2	6.7	23.8	8.6

<MLS: % escapees <MLS; Fishes: total length (cm); Crustaceans: carapace length (mm)

3. *The DiscardLess results*

Improvement of bottom trawl selectivity: **fishing gear**

Scientific knowledge: sea trials



- High variability in results (distinct conditions, gears, nets, vessels, methods, areas, depths, seasons), but:
 - L_{50} with 40 mm SM cod-end and SG20 are higher than 40 mm DM cod-end and SG15
 - 40 mm SM cod-end was more efficient than SG20, except for hake in Balearic Islands
 - Selection range of SG were wider than SM cod-end

3. The DiscardLess results

Improvement of bottom trawl selectivity: **fishing gear**

Balearic Islands

Species	MCRS	First capture		First Maturity
		40 mm □	SG20	
<i>Merluccius merluccius</i>	20	15.2	18.9	28-32
<i>Mullus surmuletus</i>	11	11.5		15-16
<i>Pagellus acarne</i>	12	9.4		15.8
<i>Pagellus erythrinus</i>	12	10.4		17.4
<i>Spicara smaris</i>	11	17.1		15.3
<i>Trachurus mediterraneus</i>	12	15.2		15.0
<i>Parapenaeus longirostris</i>	20	20.2	25.7	27-29
<i>Nephrops norvegicus</i>	20	26.6	23.8	30



✓ **40 mm □ and SG 20 mm reduce discards and catches of <MLS and immature of many target and by-catch species, without decreasing most yields, but:**

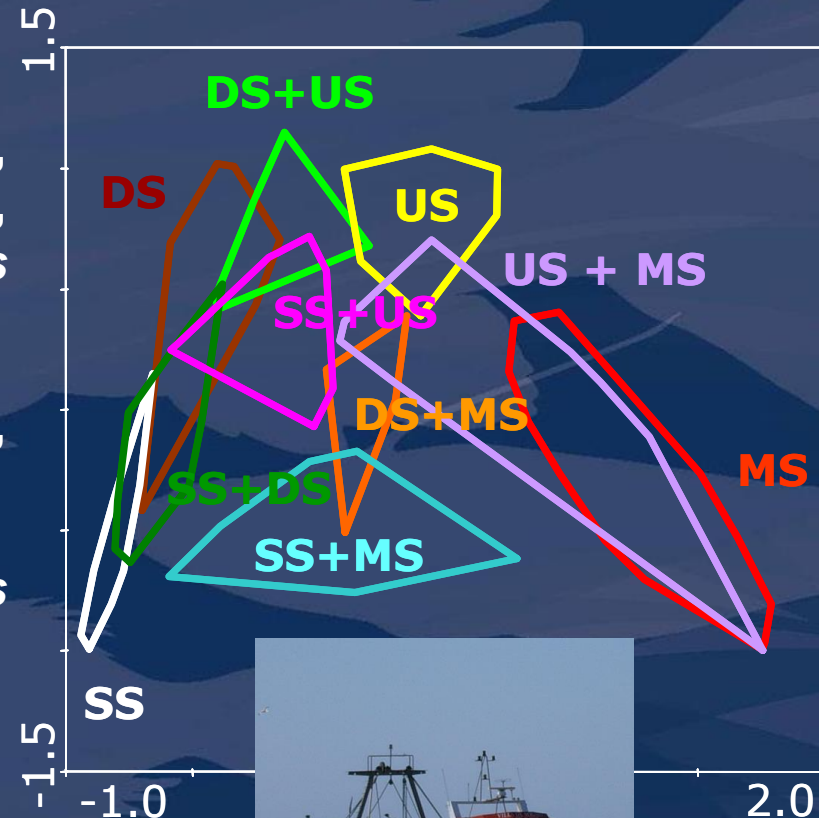
- ✓ **size at first capture still is below first maturity for most species**
- ✓ **does not allow escapees of important fishes: *Lophius*, *Raja* & *Zeus***

3. The DiscardLess results

Improvement of bottom trawl selectivity: **fishing strategy**

Balearic Islands

- Four fishing tactics (same daily trip):
 - Shallow shelf (SS): *Mullus surmuletus*, *Spicara smaris*, Sparidae, Triglidae, Serranidae, Scorpaenidae, *Octopus vulgaris* and *Loligo vulgaris*
 - Deep shelf (DS): *Merluccius merluccius*, *Mullus barbatus* and *Zeus faber*
 - Upper slope (US): *Nephrops norvegicus* and *Parapenaeus longirostris*,
 - Middle slope (MS): *Aristeus antennatus*

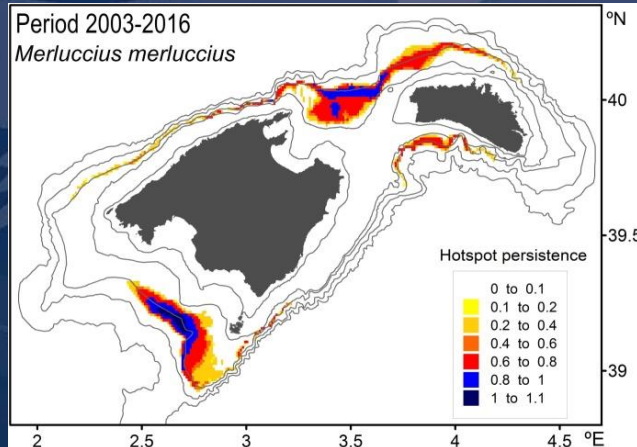
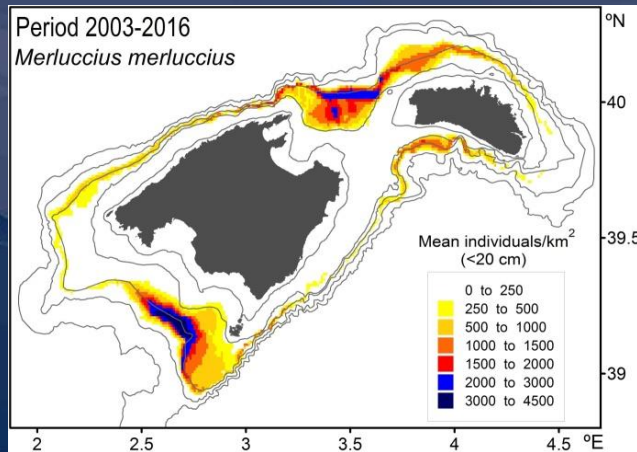


3. The DiscardLess results

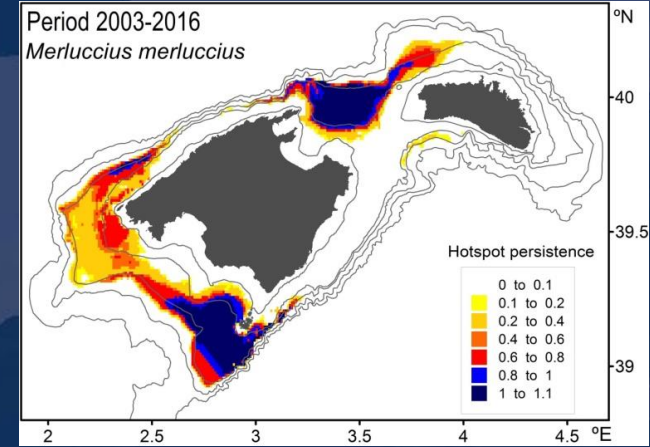
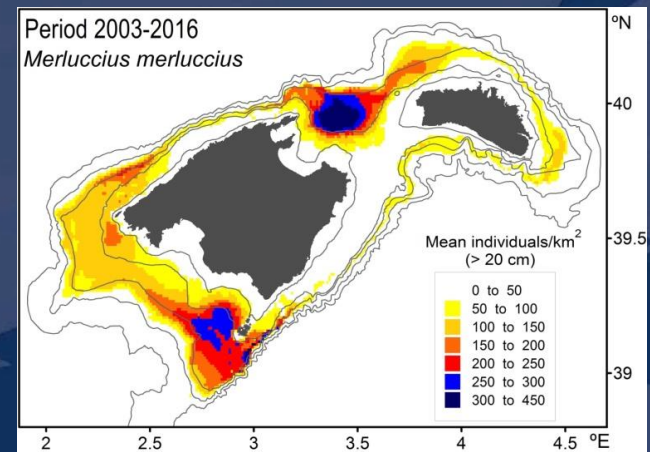
Improvement of bottom trawl selectivity: **fishing strategy**

Balearic Islands (scientific surveys)

Hake <MLS (20 cm)



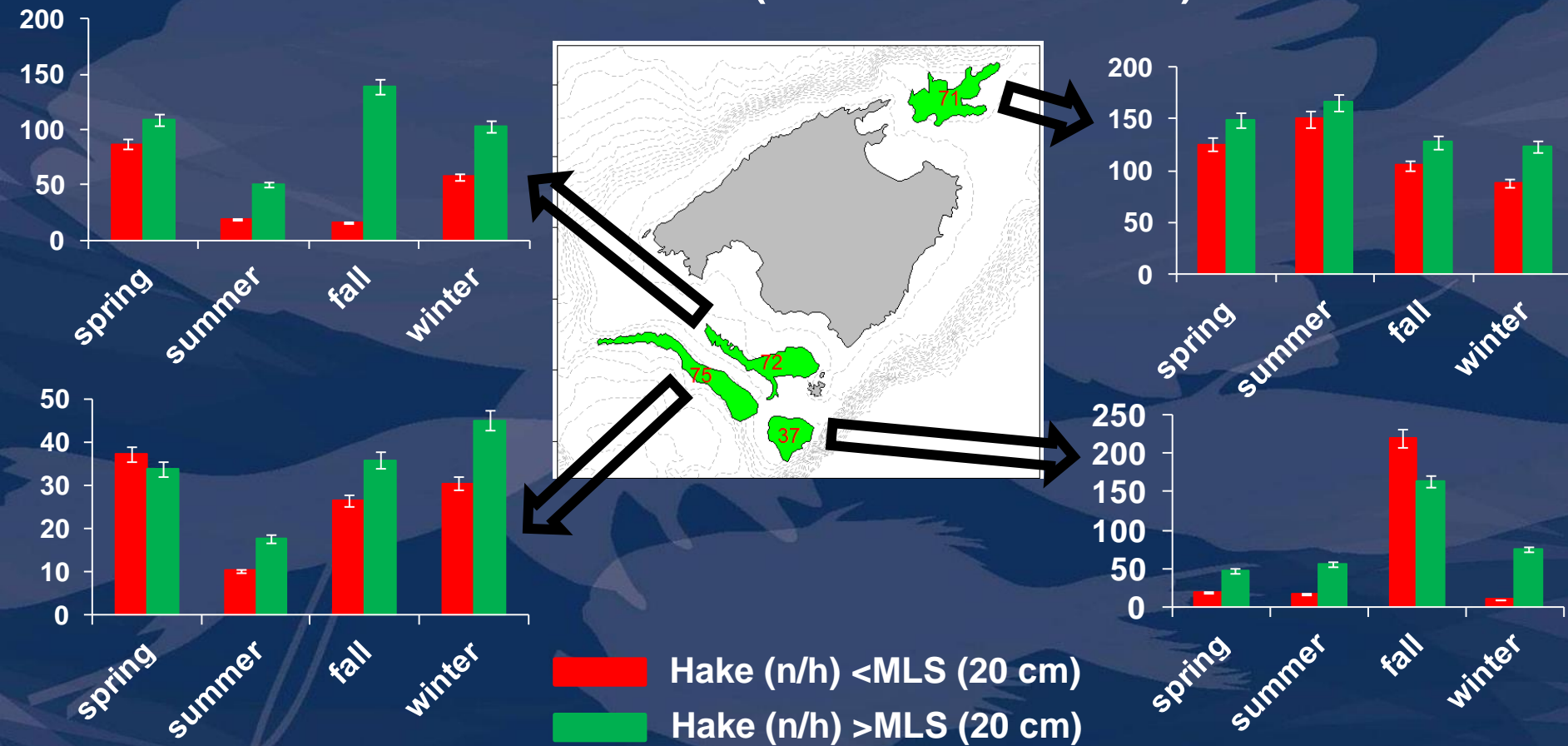
Hake >MLS (20 cm)



3. The DiscardLess results

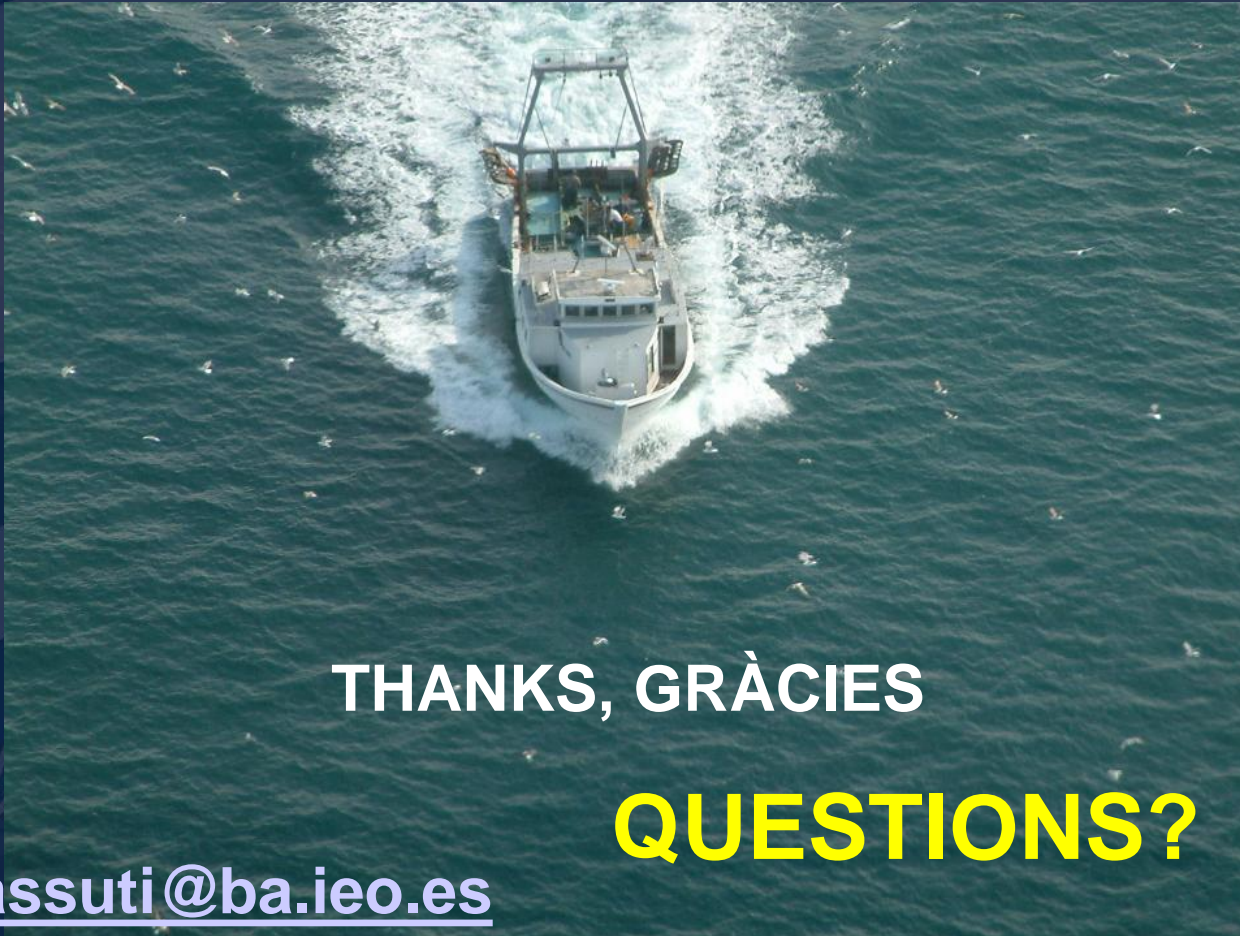
Improvement of bottom trawl selectivity: **fishing strategy**

Balearic Islands (observers on board)



Remarks on LO implementation in WMED bottom trawl

- ✓ Difficult to improve trawl selectivity while maintaining yields
- ✓ 40 mm square (SM) improved selectivity, but:
 - ✓ some fleet use 50 mm DM cod-end, not as selective
 - ✓ need to define and implement cod-end dimensions
- ✓ L_{50} with 40 mm SQ reaches MLS for some species (red mullets, horse mackerels, pink shrimp, Norway lobster), solving discards problem,
 - ✓ but not for hake, which requires:
 - ✓ additional measures as 20 mm sorting grids
 - ✓ spatio-temporal closures
- ✓ Even so, the problem of immature catches will remain unsolved for most species and MLS are too low



THANKS, GRÀCIES

QUESTIONS?

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