



# MINOUW

Science, Technology, and Society  
Initiative to Minimize Unwanted  
Catches in European Fisheries

## 1. The problem of discards

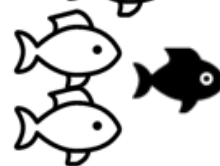
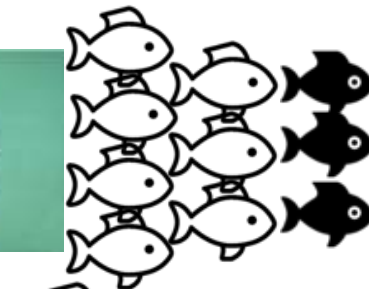
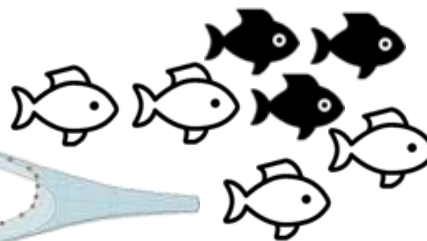
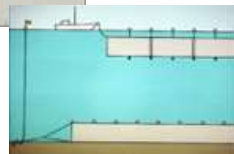
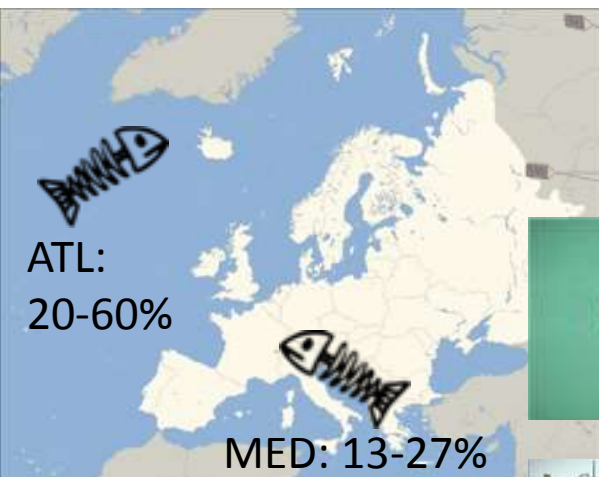
COLUMBUS – iSEAS  
“Science-policy  
dialogue with EFCA”  
2 Feb 2017, Vigo



Co-funded by the Horizon 2020  
Framework Programme of the European Union



# The fisheries discards problem:



## Discarding.

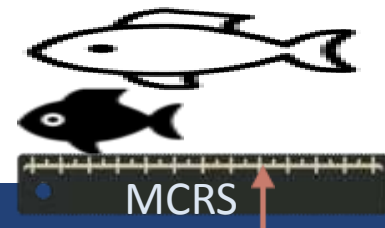
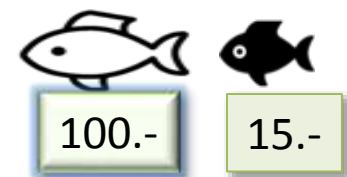
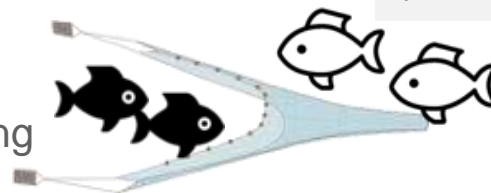
- 20-60% of total catch (in wt) in Atlantic fisheries
- 13-27% of total catch (in wt) in Mediterranean fisheries

## Variation across fishing gear:

- Highest discard ratio in trawl fisheries
- Lower discard ratio in purse seines —but important in total quantity
- some small scale fisheries have moderate to low discard ratios (trammel nets; longline).

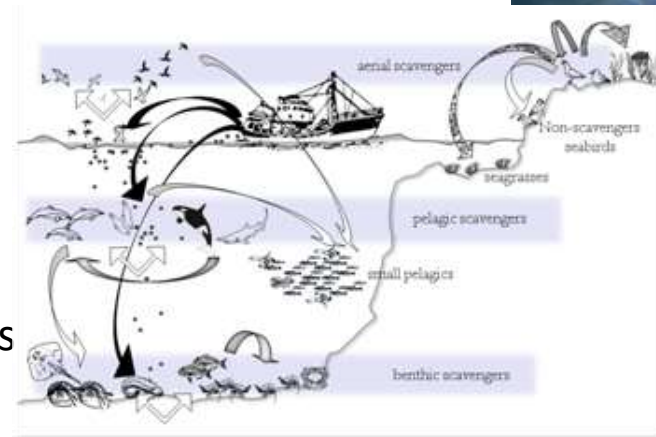
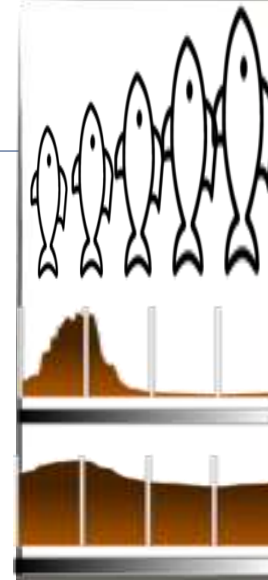
## Different reasons:

- technical reasons: low selectivity of fishing gear, limited storage capacity
- fishing strategy and fishing area
- fishers' behaviour
- market constraints (preferred products or sizes)
- fisheries regulations (quota, MCRS)



## Impacts of discarding fisheries

- Detrimental to the productivity of stocks, by killing juveniles before potential production is achieved (“production forgone”):  
undersize individuals in Med. fisheries;  
high-grading in Atl. fisheries
- Detrimental to ecologically sensitive or threatened species (marine mammals; sea birds; turtles)
- Changes to sea birds trophic web: certain species specialize in exploiting trawl discards and may outcompete other species
- Damage to sensitive habitats: maërl, sea-grass, cold coral





**1 Jan. 2015: Small pelagics**

**1 Jan 2016/2017:  
Demersal,  
species defining main  
fisheries**

**1 Jan. 2019: Demersal,  
all regulated species**

- European fisheries are transitioning to reducing discards and bringing all catches to land obligatorily: CFP EU Regulation 1380/2013 (landings obligation included in the “new CFP”), with amendments in the *Omnibus regulation* 812/2015.
- Progressive phasing-out of discards (2015 to 2019 depending on the type of fisheries; landings obligation for small pelagics entered into force Jan. 1 2015).
- Affects species subject to quota or MCRS only
- Exceptions:
  - demonstrated high survival of discards
  - unbearable economic cost to producer: *de minimis* exemption ~5% of catches can be discarded in small pelagic fisheries
  - Landings of UWC shall not produce benefit to the fishers
  - Landings of UWC cannot be marketed for human consumption

# H2020 MINOUW Project (2015-2019)

Science, Technology, and Society Initiative to minimize Unwanted Catches in European Fisheries

[HOME](#)[ABOUT](#)[OUR WORK](#)[RESULTS](#)[BLOG](#)

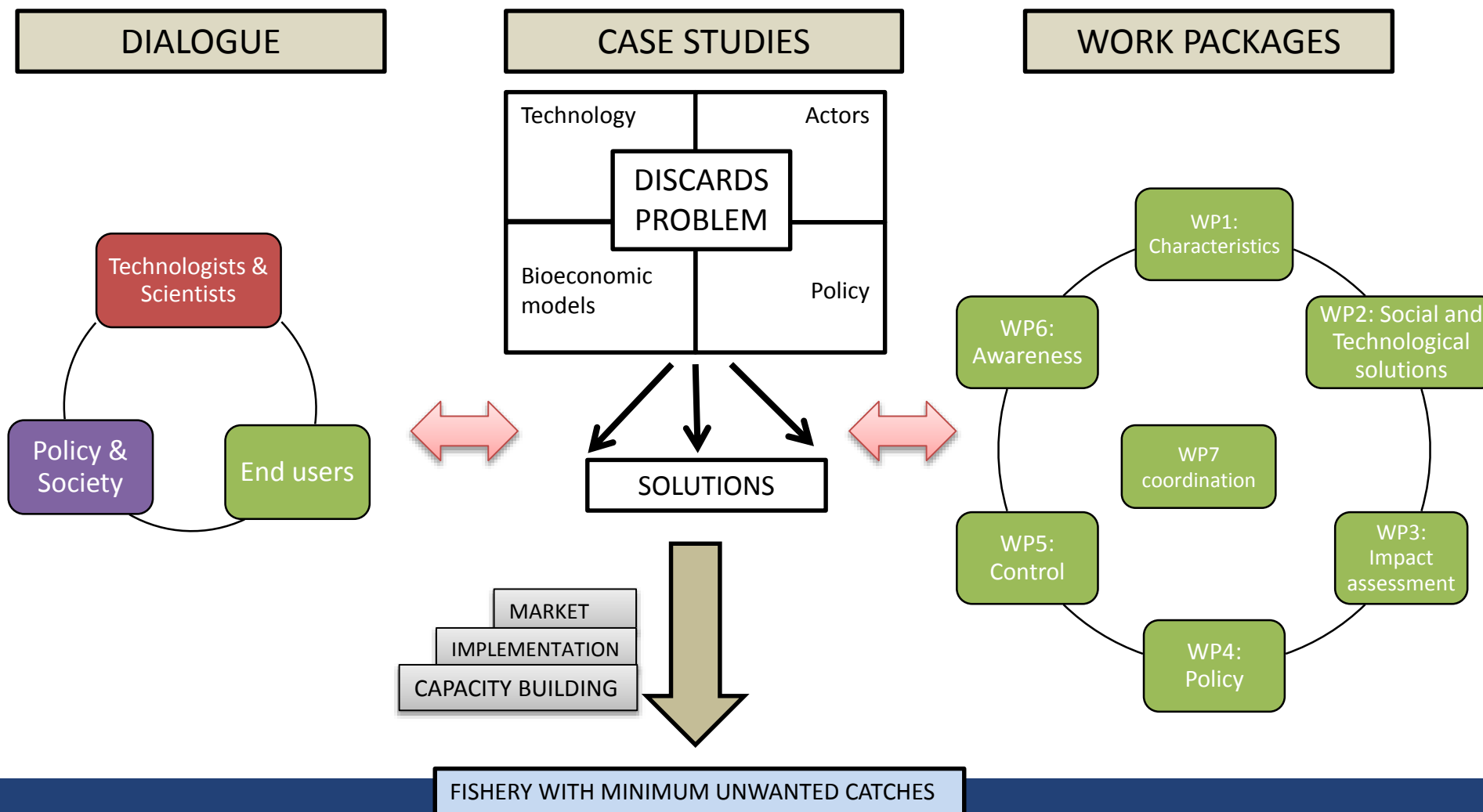
## Minouw Project

Applying science, innovation and partnership to reduce discards in European fisheries.

[Learn More](#)

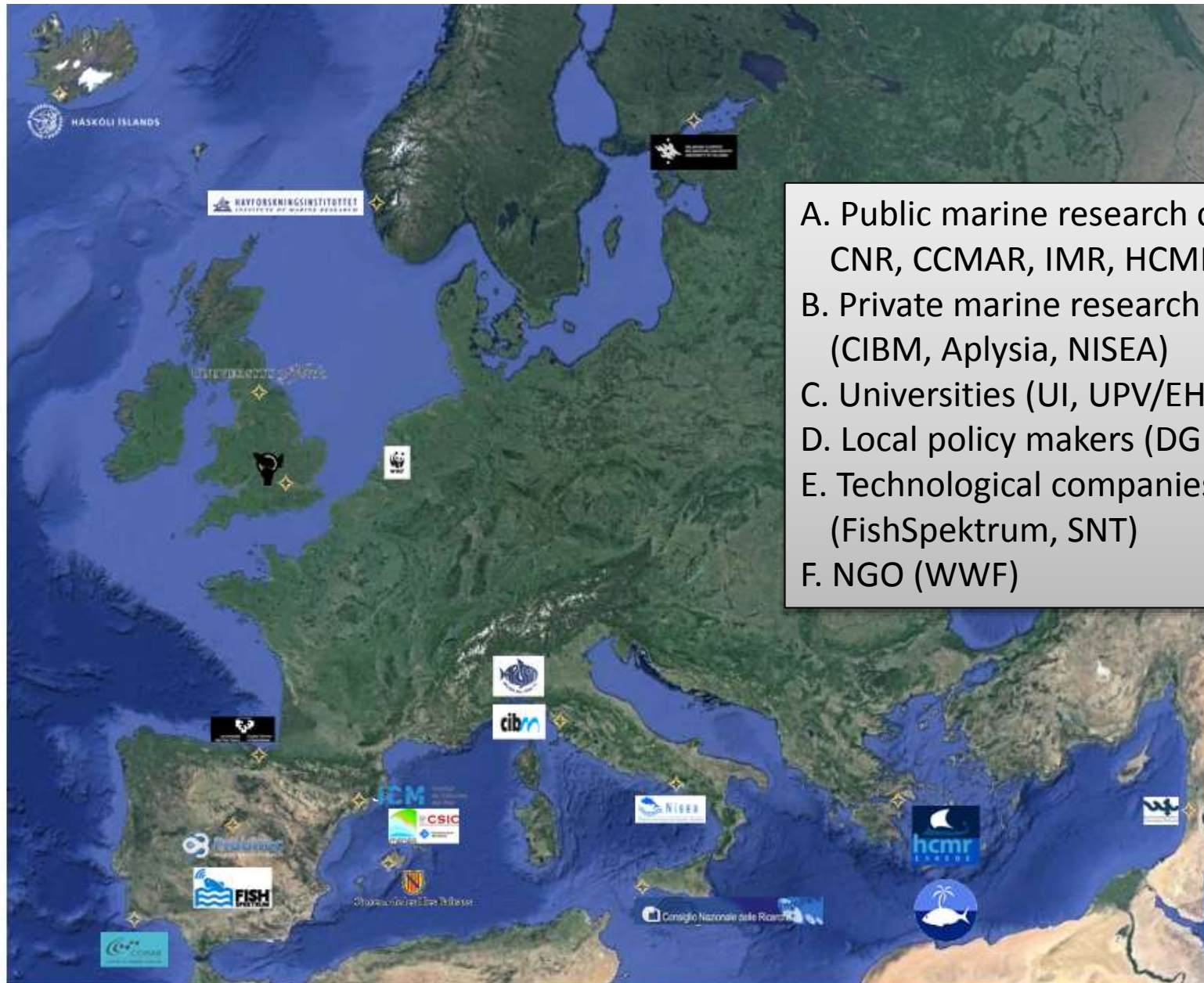
<http://www.minouw-project.eu>

- Project organized in 6 scientific workpackages
- 18 case studies
- focus on:
  - a) dialogue, and
  - b) addressing the problem under the perspective of different actors





## Consortium composition



- A. Public marine research centers (CSIC, CNR, CCMAR, IMR, HCMR, IOLR)
- B. Private marine research centers (CIBM, Aplysia, NISEA)
- C. Universities (UI, UPV/EHU, UY, UH)
- D. Local policy makers (DGMRM)
- E. Technological companies (FishSpektrum, SNT)
- F. NGO (WWF)

# Discards estimates



Total catch = Unwanted catch (UWC) + target  
Discards = regulated species + other



# Data from own field surveys



Case Study	AREA			FISHERY			SPACE		TIME			units of effort	A	A'	B	B'	C	C'	D	D'
	Country	Region	ICES / GFCM	Fishery (descriptor)	Gear type (descriptor)	Gear specifications	depth range (m)	habitat or bottom type	year	season	month		TOTAL CATCH N/u.e. kg/u.e.	TOTAL CATCH N/u.e.	LANDED N/u.e.	LANDED kg	TOTAL	TOTAL DIS	of which reg	of which reg
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	1995	summer		hours			87.78		54.48		33.30	cannot estimate from info
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	1995	autumn		hours			157.75		121.78		35.98	cannot estimate from info
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	1996	winter		hours			29.53		23.78		5.75	cannot estimate from info
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	1996	spring		hours			26.98		16.72		10.23	cannot estimate from info
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	2001	winter		hours			22.85		18.31		4.54	1%
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	2001	spring		hours			36.27		28.74		7.53	18%
CS1.4	Spain	Catalonia	GSA06	Mixed demersal bottom trawl fishery	OTB	DM40-256	50-350	sandy mud	2001	summer		hours			19.46		16.28		3.18	11%
CS3.4	Spain	Catalonia	GSA06	Bottom Longline hooksize <5	LLS	HOK_it_5	5-25	sandy / rock	2004	annual		000 hooks * h			8.30		7.38		0.92	1%
CS3.4	Spain	Catalonia	GSA06	Gill net ≥50 mm and <100 mm	GNS	SM_5_to_10	5-25	sandy / rock	2004	annual		000 m net * h			8.02		5.91		2.11	5%
CS3.4	Spain	Catalonia	GSA06	Trammel net <40 mm	GTR	SM_it_4	5-25	sandy / rock	2004	annual		000 m net * h			3.59		2.19		1.41	7%
CS3.4	Spain	Catalonia	GSA06	Trammel net ≥40 and <60	GTR	SM_4_to_6	5-25	sandy / rock	2004	annual		000 m net * h			5.38		2.25		3.13	4%
CS3.4	Spain	Catalonia	GSA06	Trammel net <40 mm	GTR	SM_it_4	5-25	sandy / rock	2009	annual		000 m net * h			194.04	32.11	20.83			9%

- overall amount of discards is substantial, even for “small scale fisheries” (trammel net)  $C' / A'$
- data does not allow always to estimate % discards of regulated species
- discards of regulated species in OTB in spring is high (18%)
- discards of regulated species in “small scale fisheries” is usually <10%

# Data from own field surveys



## Some detail on OTB...

CAT	continental shelf				shelf break - upper slope			
CS1.4 BOTTOM TRAWL	spring	summer	autumn	winter	spring	summer	autumn	winter
Boops boops	67.36%	54.68%	59.23%	47.17%	23.76%	72.47%	42.36%	37.60%
Merluccius merluccius	2.00%	5.86%	6.71%	5.19%	0.84%	0.29%	0.55%	0.52%
Micromesistius poutassou	0.68%	2.26%	7.96%	7.63%	21.11%	2.51%	2.30%	0.13%
Mullus barbatus	1.88%	0.79%	0.11%	0.79%	0.00%	0.53%	2.61%	0.00%
Trachurus spp					100.00%	100.00%	40.75%	100.00%
Trachurus trachurus	22.31%	17.30%	16.20%	20.40%				
Trachurus mediterraneus	18.57%	14.12%	23.38%	19.85%				

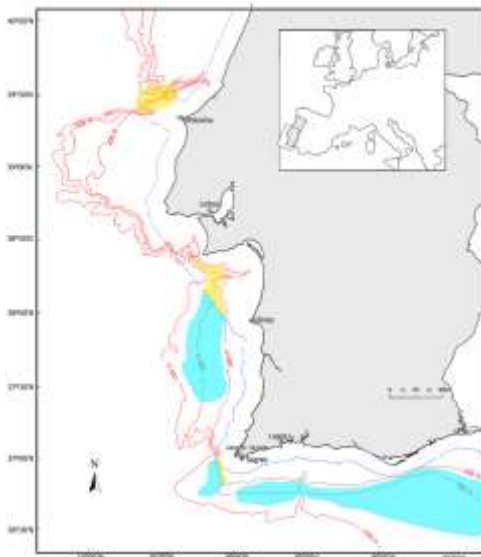
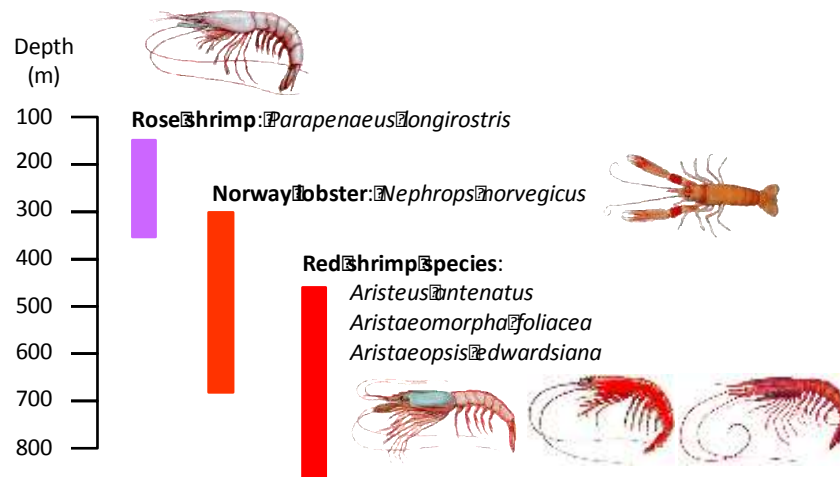
Total discards (i.e. all non-comm. fish and invert.) can be high in OTB (30-50% of catch volume)

## FOR REGULATED SPECIES

- substantial amount of discards of (locally) regulated species: *Boops boops*, *T. trachurus*, *T. mediterraneus*
- High amounts of discards of *M. merluccius* and *M. poutassou* (varies intra- and inter-annually)

# Data from own field surveys

## South Portugal demersal crustacean fishery (mainly OTB)



Project	Main fishing grounds	Discards	% discarded	Reasons to discard
Project Bydiscard Mar1996-June1997 (Borges et al., 2001)	Rose shrimp	Small-spotted dogfish Rays Conger eel Boarfish	15% 15% 10% 6%	No commercial value No commercial value Low commercial value No commercial value
EU Project 96-063 June1998-Oct1999 (Monteiro et al., 2001)	Nephrops and red shrimp	Blue whiting Silvery pout Slimehead Grenadiers Blackmouth shark	34% 10% 8% 8% 5%	Low commercial value No commercial value No commercial value No commercial value No commercial value
IPMA-DCF 2009 (Prista, 2012)	Rose shrimp	Horse mackerel Hake Blue jack mackerel	42% 20% 7%	Max.% target sp Under MLS Max.% target sp
	Nephrops	Blue whiting Conger eel Blue jack mackerel	44% 11% 9%	Low commercial value Under MLS Max.% target sp

# Data from own field surveys



- “small scale fisheries” can produce high amounts of discards (in %, not in absolute value)
- i.e. striped seabream, sole in trammel net or spotted seabream in all fishing gears

CS3.4		000 hooks * h	000 m net * h	000 m net * h	000 m net * h
<i>number of individuals per unit effort</i>		Bottom Longline hooksize <5	Gill net ≥50 mm and <100 mm	Trammel net <40 mm	Trammel net ≥40 and <60
<b><i>Bolinus brandaris</i></b> (2.5 cm shell height)	catch CPUE	-	-	2.56	20.30
	undersize CPUE	-	-	0	0
	% undersize	-	-	0%	0%
<b><i>Dicentrarchus labrax</i></b> (25 cm TL)	catch CPUE	0.86	0.46	1.33	2.73
	undersize CPUE	0	0	0	0.22
	% undersize	0%	0%	0%	8.0%
<b><i>Lithognathus mormyrus</i></b> (20 cm TL)	catch CPUE	0.01	6.22	2.51	2.76
	undersize CPUE	0	0	0	1.38
	% undersize	0%	0%	0%	49.9%
<b><i>Merluccius merluccius</i></b> (20 cm TL)	catch CPUE	-	13.21	-	-
	undersize CPUE	-	0.10	-	-
	% undersize	-	0.7%	-	-
<b><i>Mullus surmuletus</i></b> (11 cm TL)	catch CPUE	-	2.74	20.02	1.51
	undersize CPUE	-	0	0	0
	% undersize	-	0%	0%	0%
<b><i>Pagellus bogaraveo</i></b> (33 cm TL)	catch CPUE	0.14	7.00	1.59	0.31
	undersize CPUE	0.14	7.00	1.59	0.31
	% undersize	100%	100%	100%	100%
<b><i>Pagellus erythrinus</i></b> (15 cm TL)	catch CPUE	0.78	20.62	4.76	1.53
	undersize CPUE	0	0	0	0
	% undersize	0%	0%	0%	0%
<b><i>Solea vulgaris</i></b> (20 cm TL)	catch CPUE	-	1.81	3.83	2.04
	undersize CPUE	-	0	0.23	0.63
	% undersize	-	0%	6%	31%
<b><i>Sparus aurata</i></b> (20 cm TL)	catch CPUE	4.88	6.10	0.60	0.75
	undersize CPUE	0	0	0	0
	% undersize	0%	0%	0%	0%

ignoring damaged fish, covered by the Omnibus Reg.

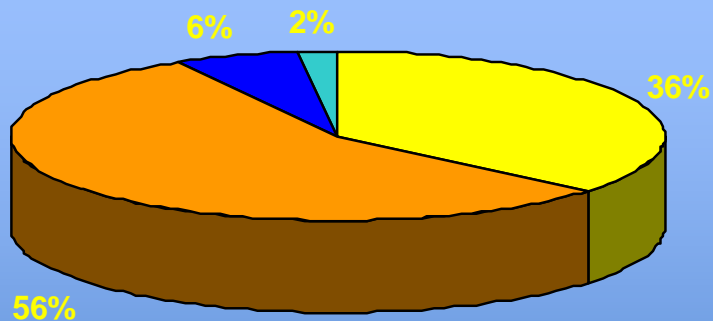


# Data from own field surveys

Discard in set net fishery: some examples

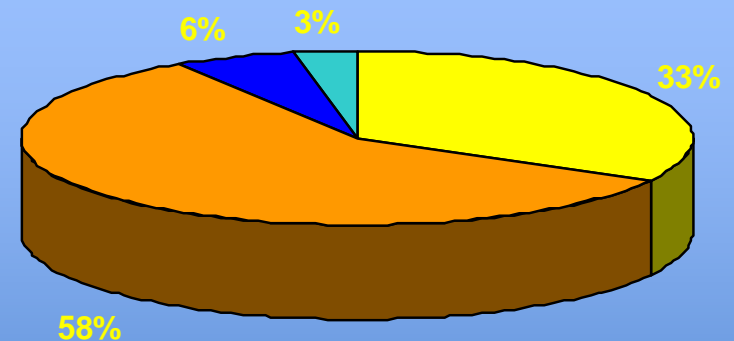
Gillnet fishery for Sole (*Solea solea*)

**Ligurian and north Tyrrhenian Sea**



- Target species (*Solea solea*)
- Other commercial species
- Discard of commercial species
- Discard of non commercial species

**Adriatic Sea**

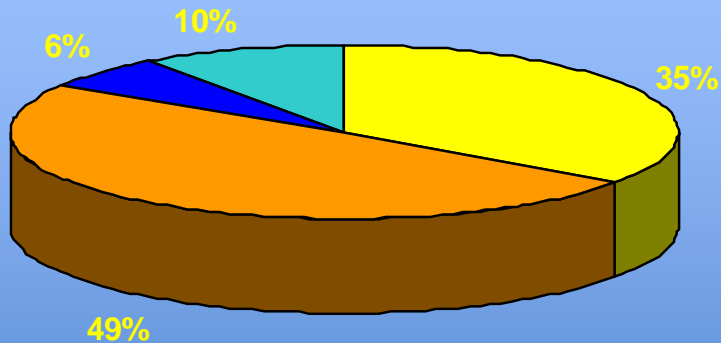


- Target species (*Solea solea*)
- Other commercial species
- Discard of commercial species
- Discard of non commercial species

# Data from own field surveys

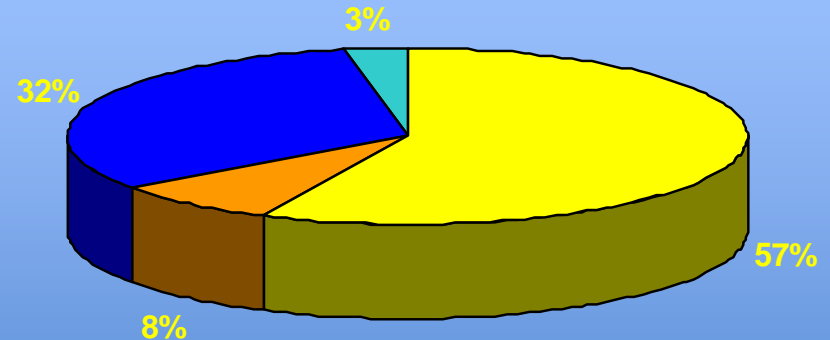
## Trammel net fishery for cuttlefish (*Sepia officinalis*)

**Ligurian and north Tyrrhenian Sea**



- Target species (*Sepia officinalis*)
- Other commercial species
- Discard of commercial species
- Discard of non commercial species

**Adriatic Sea**



- Target species (*Sepia officinalis*)
- Other commercial species
- Discard of commercial species
- Discard of non commercial species

# Data from own field surveys

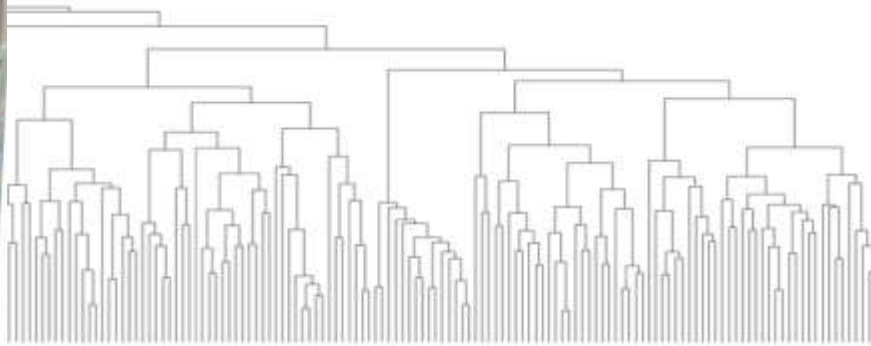


analysis of detailed fish sale databases at temporal scales < 1 year to understand the short-term dynamics of the production of UWC and discarding.

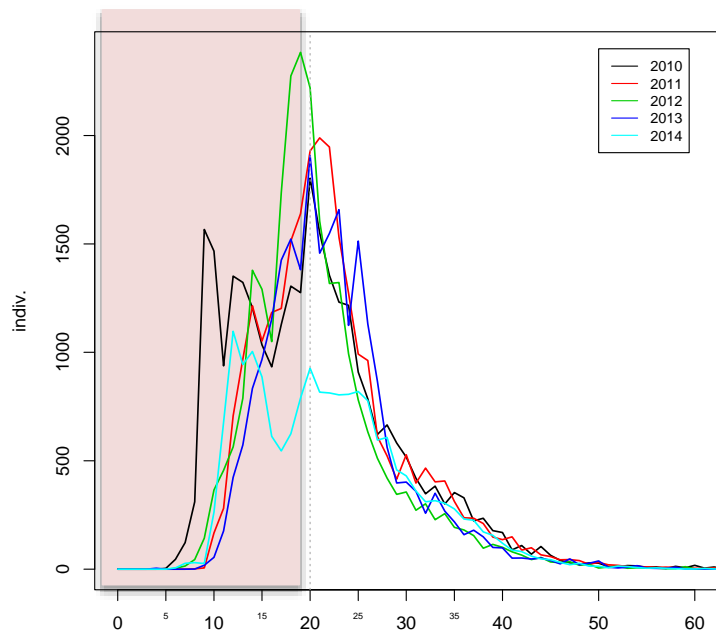
Gear/METIER	Depth (m)	Fishing time (h)	Mesh size (mm)/hook size (n°)	Discard (more significative species)
<b>Trammel net</b>				
<i>Palinurus elephas</i> (Fabricius, 1787)	30-80	24-72	90-120	<i>Conger conger</i> , <i>Muraena helena</i> , Damaged specimens
<i>Melicertus kerathurus</i> (Forsskål, 1775)	5-15	6-10	44-50	<i>Brachirans</i> <i>Diplodus annularis</i> , <i>Engraulis encrasicolus</i>
<i>Sparus aurata</i> Linnaeus, 1758	5-50	8-12	80-100	Damaged or undersized specimens, <i>D. annularis</i> , <i>Trachurus</i> spp.
<i>Sepia officinalis</i> Linnaeus, 1758	5-20	10-12	70-80	Damaged specimens, <i>D. annularis</i> , <i>Trachurus</i> spp., <i>Labridae</i> indet.
<i>Mullus</i> spp.	5-30	3-6	44-52	<i>D. annularis</i> , <i>Trachurus</i> spp., <i>Labridae</i> indet.
<b>Pots</b>				
<i>Octopus vulgaris</i> Cuvier, 1797	3-40	36-72		<i>D. annularis</i> , <i>Brachirans</i> , <i>Labridae</i> indet.
<i>Spondyllosoma cantharus</i> (Linnaeus, 1758)	30-70	12		<i>Trachurus</i> spp., <i>Spicara</i> spp.
<b>Gillnet</b>				
<i>Merluccius merluccius</i> (Linnaeus, 1758)	100-300	4-10	80-120	Small <i>T. trachurus</i>
<i>Sparidae</i> indet.	5-90	8-12	70-120	<i>Trachurus</i> spp., Damaged specimens
<i>Solea solea</i> (Linnaeus, 1758)	5-80	10-12	70-90	<i>Brachirans</i> , Damaged or undersized specimens, <i>Trachurus</i> spp.
<b>Longline</b>				
<i>Xiphias gladius</i> Linnaeus, 1758	50-100	8-12	1-3	Damaged specimens, <i>Dasyatidae</i> indet.
<b>Boat seine</b>				
<i>Aphia minuta</i> (Risso, 1810)	5-20	0.3	9	<i>Labridae</i> indet., <i>D. annularis</i>

Gear/métier	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Trammel net</b>												
<i>Palinurus elephas</i> (Fabricius, 1787)												
<i>Melicertus kerathurus</i> (Forsskål, 1775)												
<i>Sparus aurata</i> Linnaeus, 1758												
<i>Sepia officinalis</i> Linnaeus, 1758												
<i>Mullus</i> spp.												
<b>Pots</b>												
<i>Octopus vulgaris</i> Cuvier, 1797												
<i>Spondyllosoma cantharus</i> (Linnaeus, 1758)												
<b>Gillnet</b>												
<i>Merluccius merluccius</i> (Linnaeus, 1758)												
<i>Solea solea</i> (Linnaeus, 1758)												
<b>Longline</b>												
<i>Xiphias gladius</i> Linnaeus, 1758												
<b>Boat seine</b>												
<i>Aphia minuta</i> (Risso, 1810)												

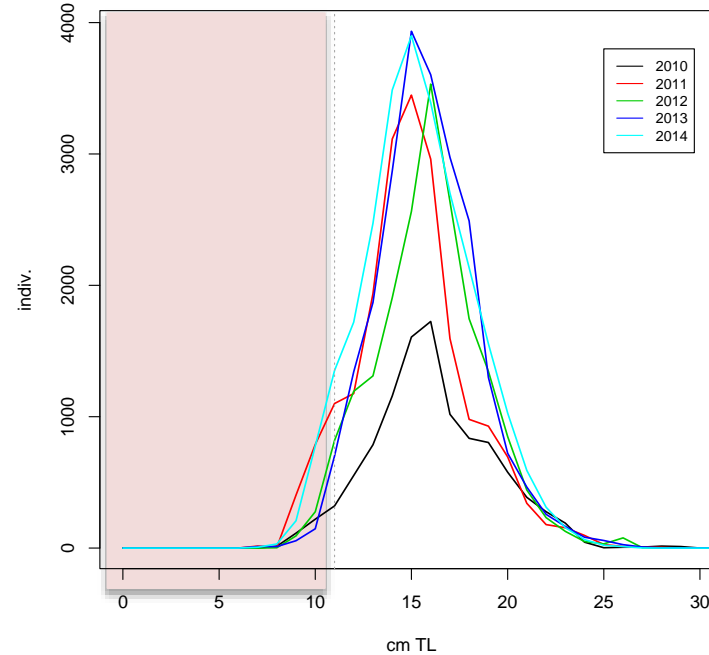
Periods when métier may have high UWC of regulated species



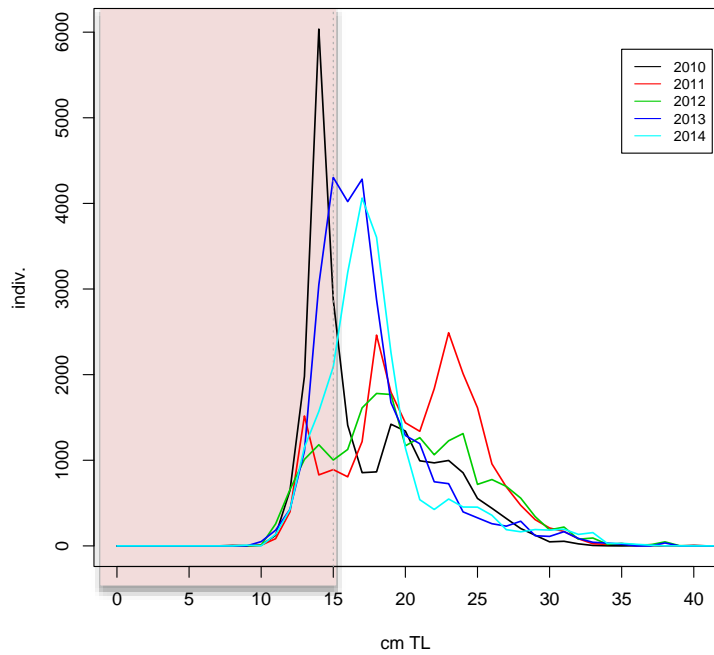
Hake Landings - GSA06 2010-2014



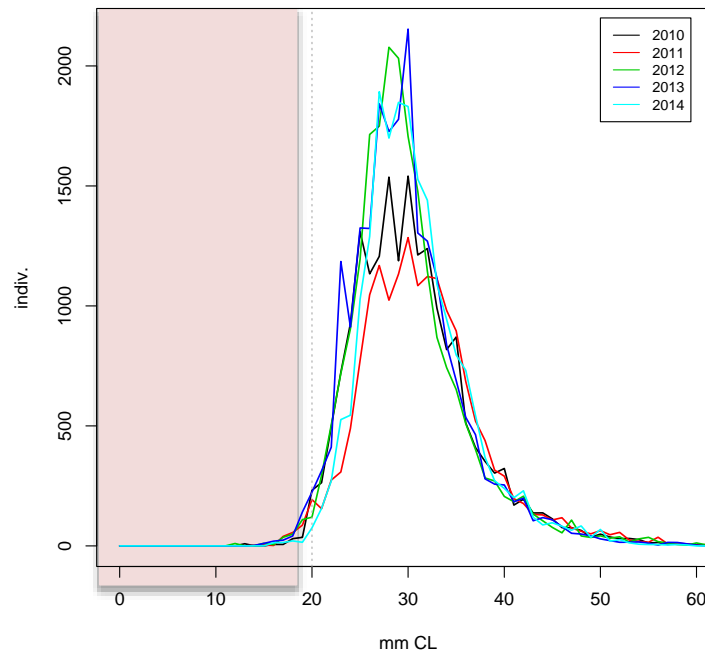
Red mullet Landings - GSA06 2010-2014



Horse mackerels Landings - GSA06 2010-2014



Nephrops Landings - GSA06 2010-2014



Analysis so far shows that:

- a) some specific deployments at specific times of the year ("métiers") can be problematic in terms of UWC of regulated species
- b) Since 2010 significantly reduced problem for certain species (red mullet; valuable crustaceans) in OTB, but still some species in mixed cont. shelf fisheries remain; part.
  - a) hake
  - b) horse mack.
  - c) bogue
  - d) blue whiting
  - e) etc.





# Hot Spot Analysis (Getis-Ord Gi\*)

This analysis identifies statistically significant spatial clusters of high values (hot spots) and low values (cold spots). *each year*

Each cell can be identified like

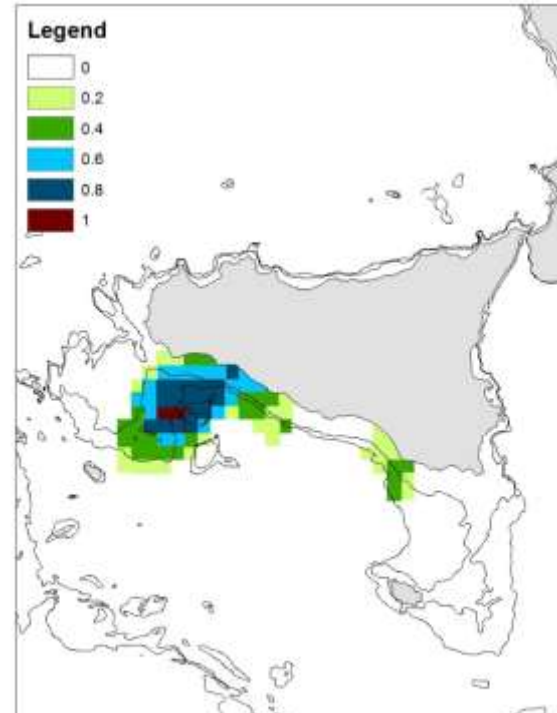
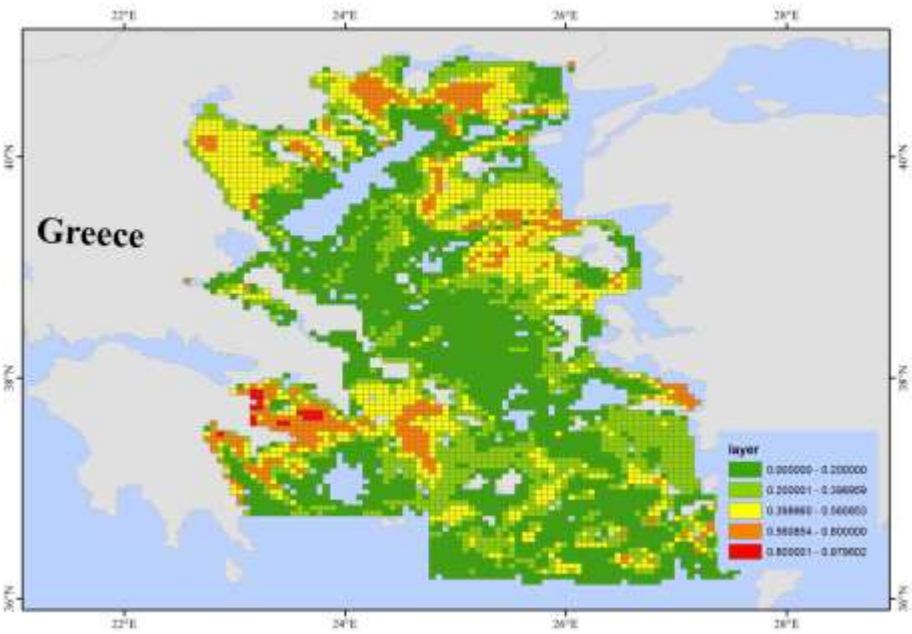
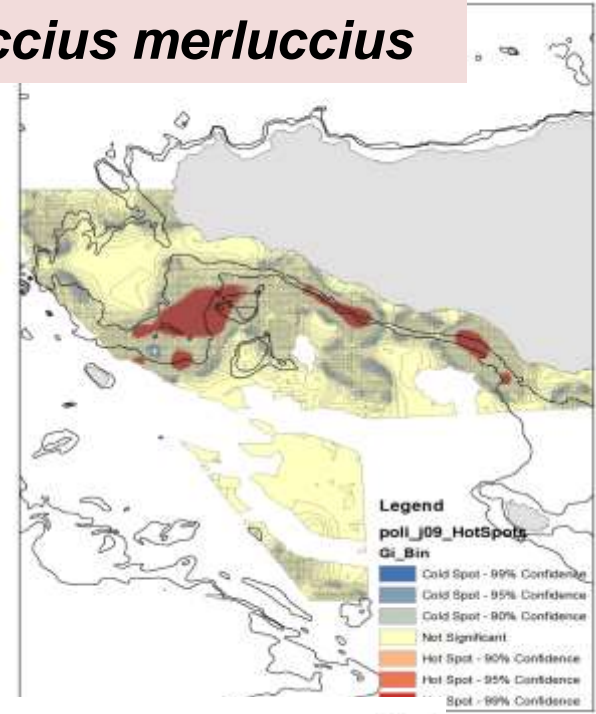
- Hot Spots (with three different levels of confidence)
- Not significant
- Cold Spots (with three different levels of confidence)

**Persistence Index: X% OF THE YEARS A SPECIFIC CELL IS “HOT SPOT”**

This analysis calculates the Index of Persistence ( $I_i$ ) measuring the relative persistence of the hotspot in the cell  $i$

$I_i = 1$  if the cell  $i$  present an hotspot in each years, and  $I_i = 0$  otherwise.

## Merluccius merluccius





# Thank you!

<http://www.minouw-project.eu>



Co-funded by the Horizon 2020  
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RESEARCH & INNOVATION