

# Status of Mediterranean and Black Sea resources in European Waters in 2013

Results for stocks in GSA 1-29 (Mediterranean and Black Sea)

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# Status of Mediterranean and Black Sea resources in European Waters in 2013



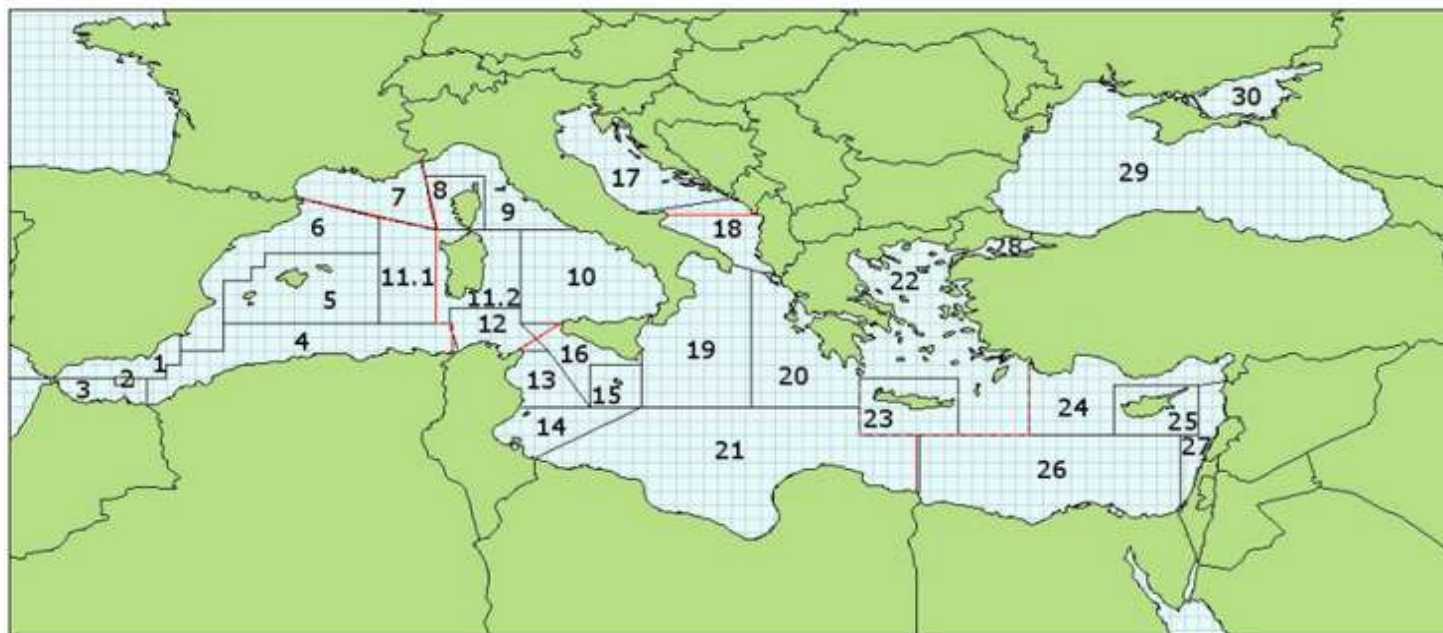
## Guidelines for the evaluation of stock status

### Terminology

- **Spawning stock biomass (SSB)** is the biomass of the adult or reproducing fish
- **Fishing mortality (F)** is the proportion of fish in the stock that are taken by the fisheries
- $F_{MSY}$  is the F associated to high long term yields and the long-term sustainable exploitation of the stock
- $F/F_{MSY}$  indicates how far each stock is from the MSY target

# Mediterranean and Black Sea stock assessment unit

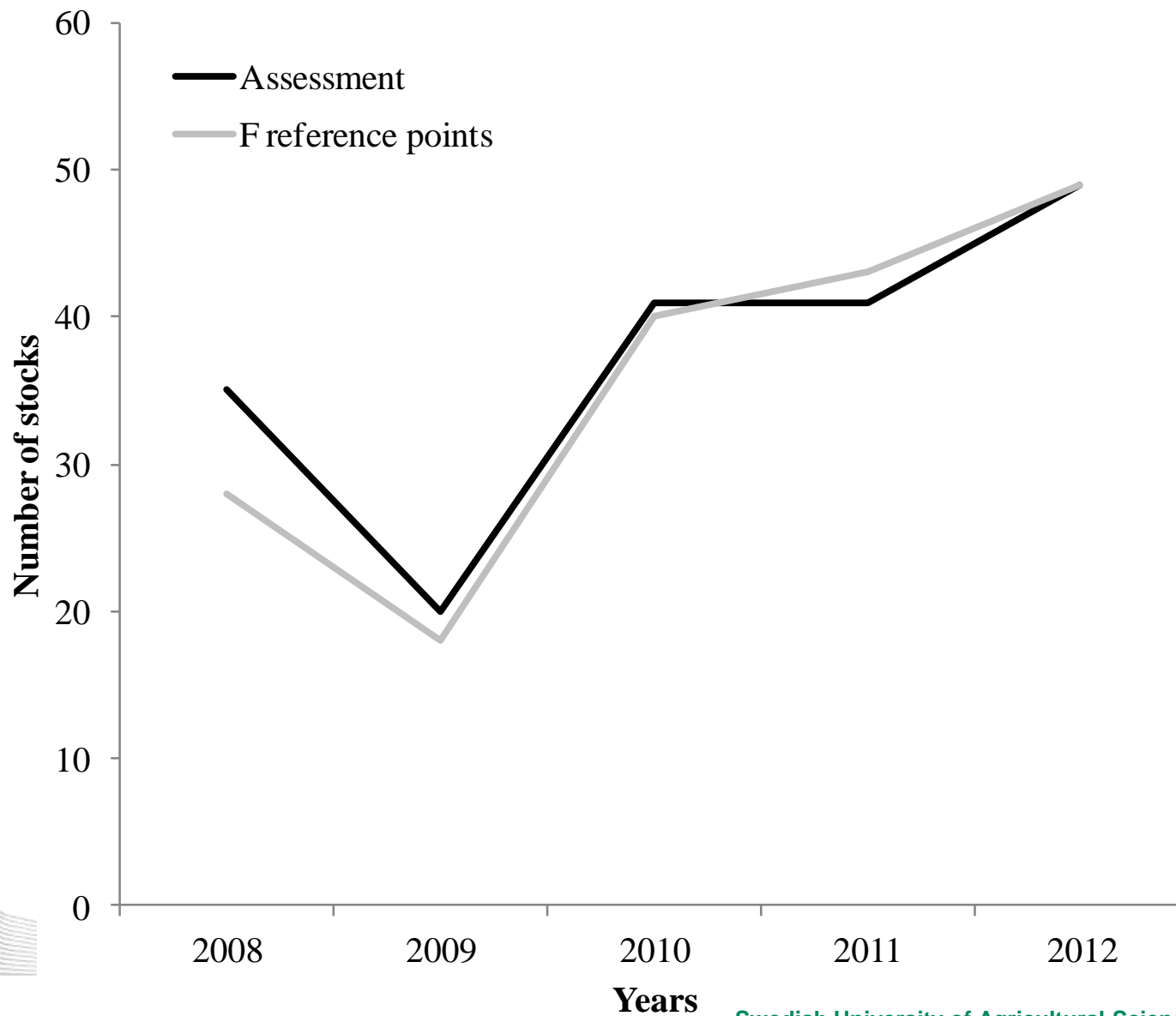
## FAO GFCM sub-areas (GSA's)



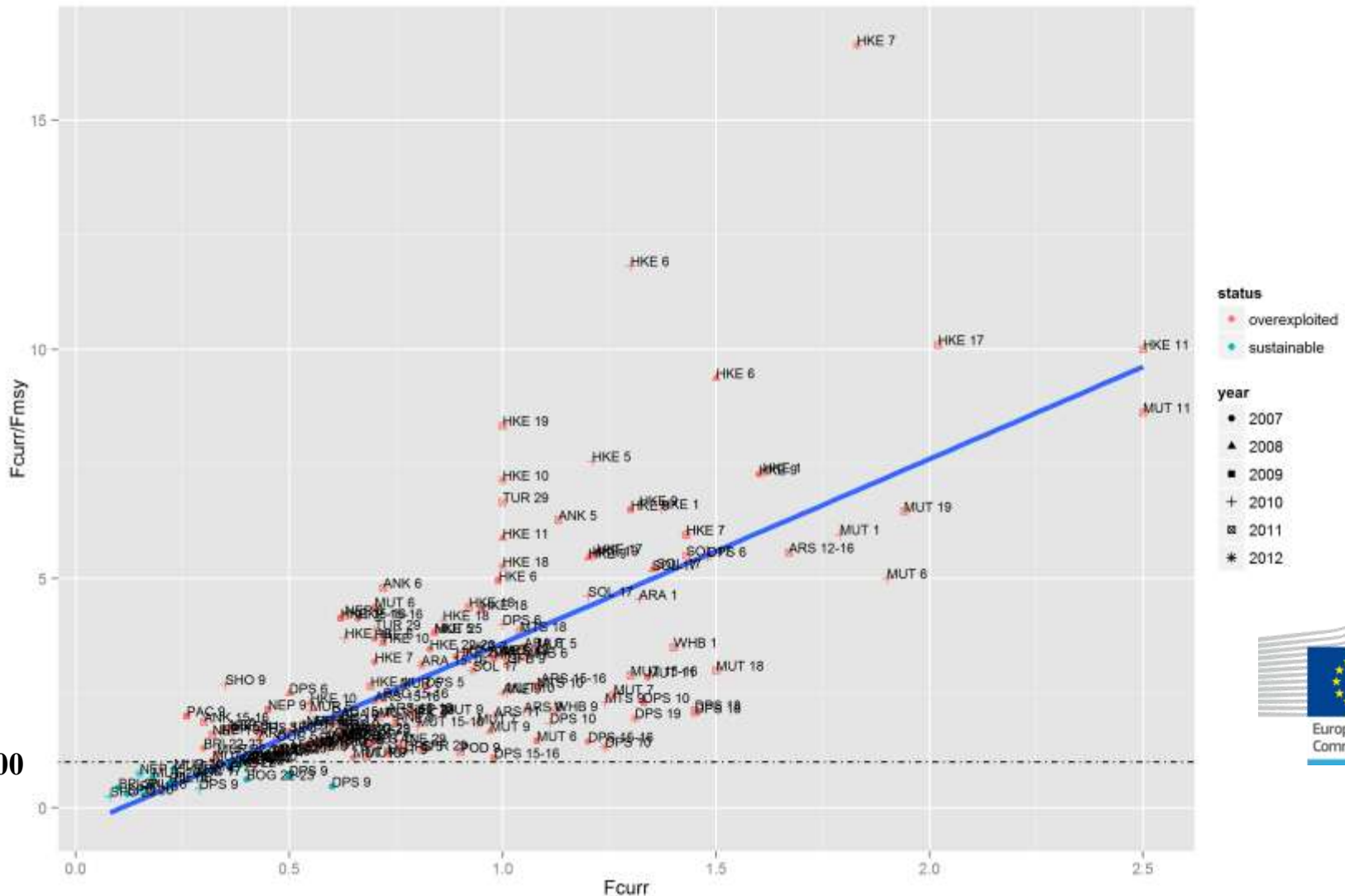
— FAO Statistical Divisions (red) — GFCM Geographical Sub-Areas (black)

01 - Northern Alboran Sea	07 - Gulf of Lions	13 - Gulf of Hammamet	19 - Western Ionian Sea	25 - Cyprus Island
02 - Alboran Island	08 - Corsica Island	14 - Gulf of Gabes	20 - Eastern Ionian Sea	26 - South Levant
03 - Southern Alboran Sea	09 - Ligurian and North Tyrrhenian Sea	15 - Malta Island	21 - Southern Ionian Sea	27 - Levant
04 - Algeria	10 - South and Central Tyrrhenian Sea	16 - South of Sicily	22 - Aegean Sea	28 - Marmara Sea
05 - Balearic Island	11.1 - Sardinia (west) 11.2 - Sardinia (east)	17 - Northern Adriatic	23 - Crete Island	29 - Black Sea
06 - Northern Spain	12 - Northern Tunisia	18 - Southern Adriatic Sea	24 - North Levant	30 - Azov Sea

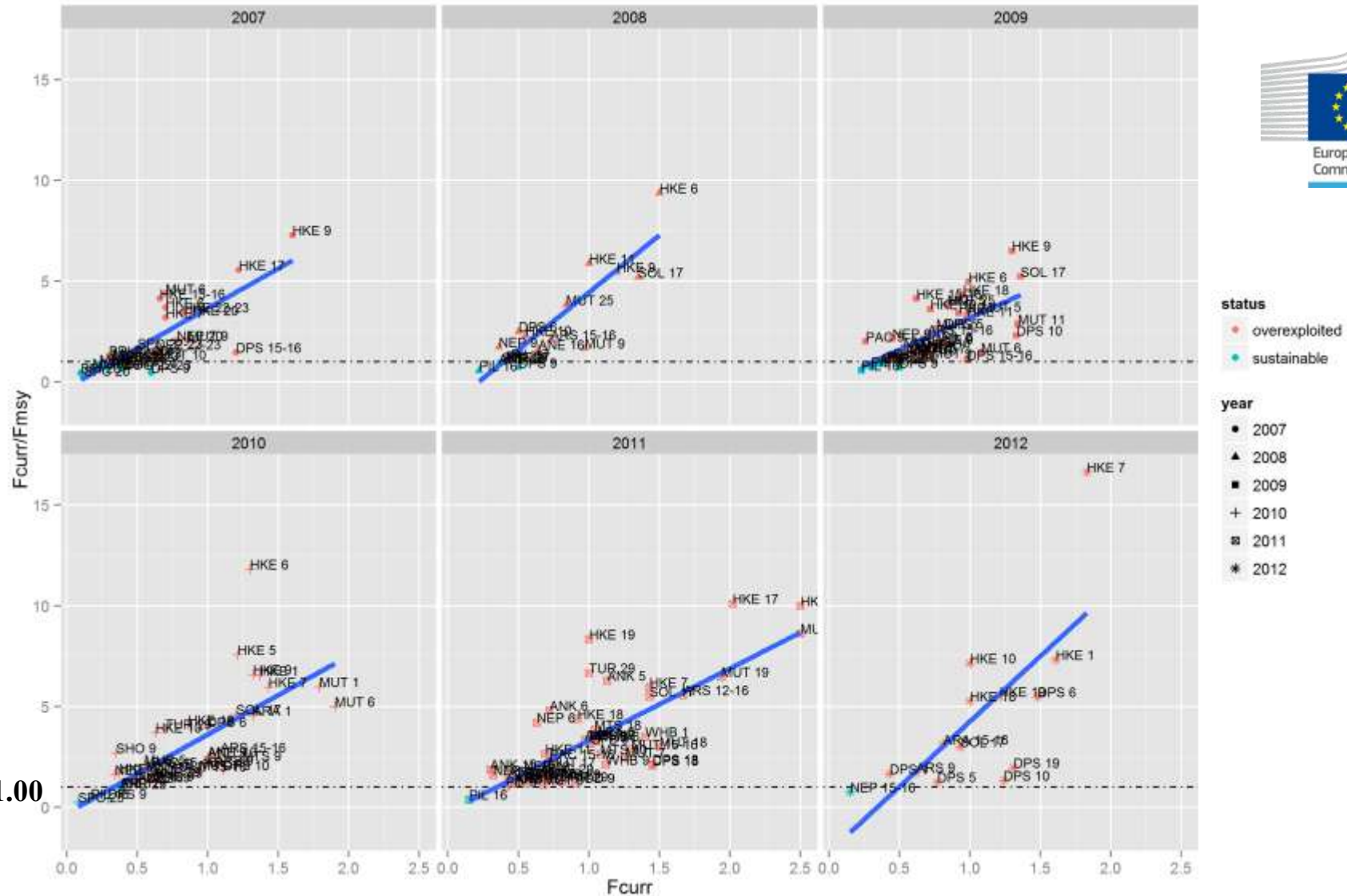
# Historical trend of the assessed stocks



# Stock status compared to MSY target

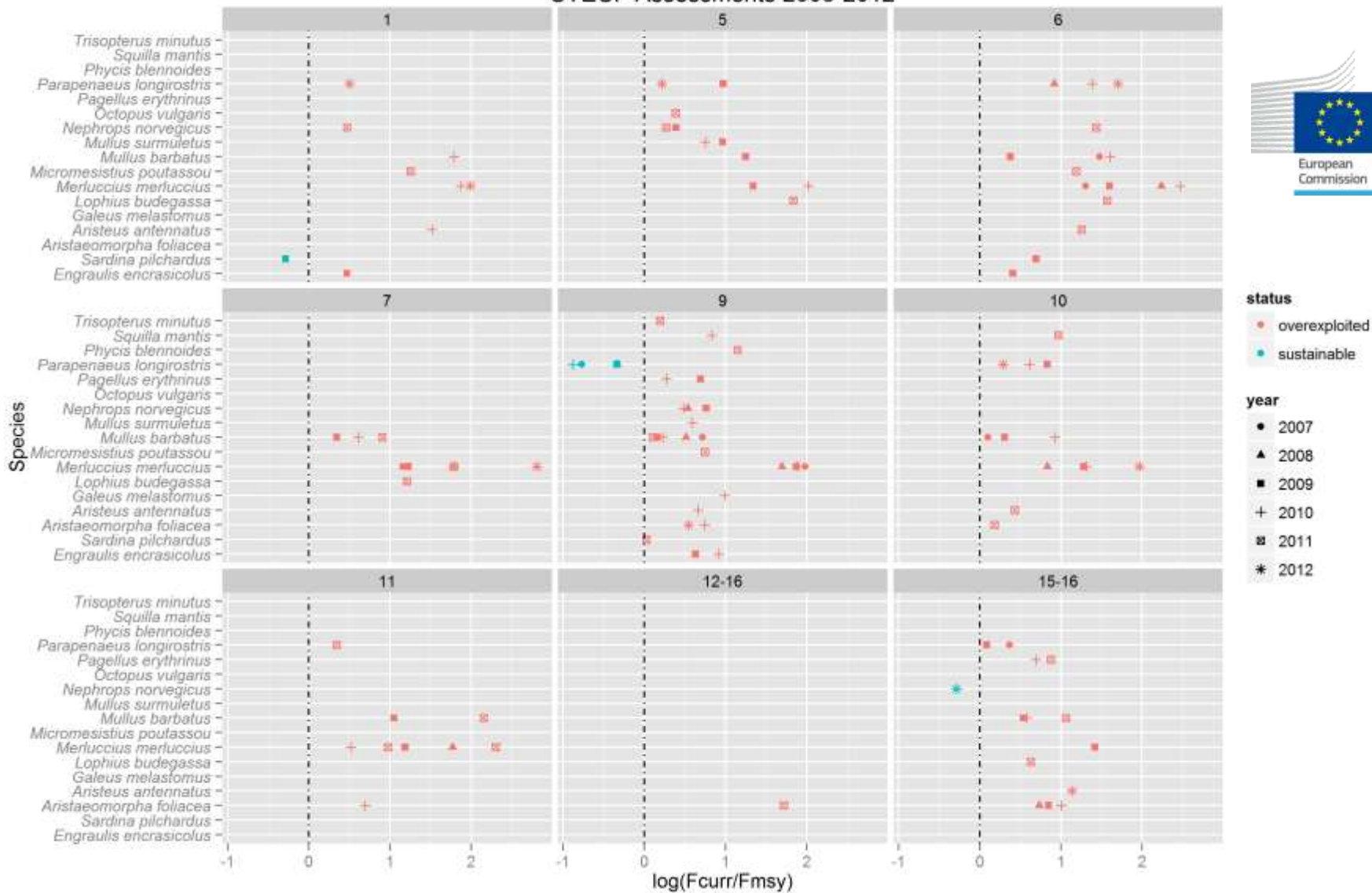


# Stock status compared to MSY target by year



# Stock status compared to MSY target by GSA

STECF Assessments 2008-2012



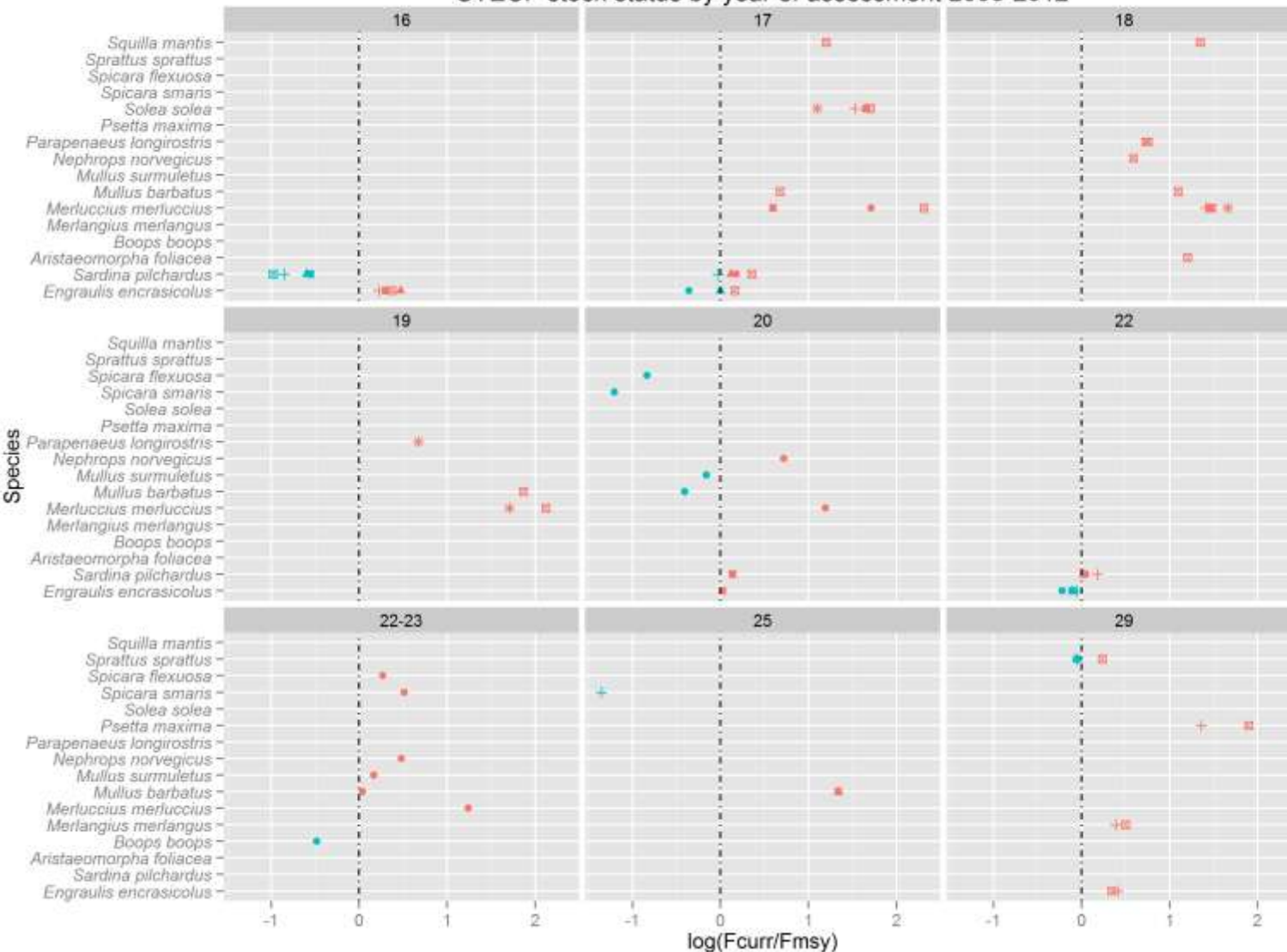
# Stock status compared to MSY target by GSA

STECF stock status by year of assessment 2008-2012



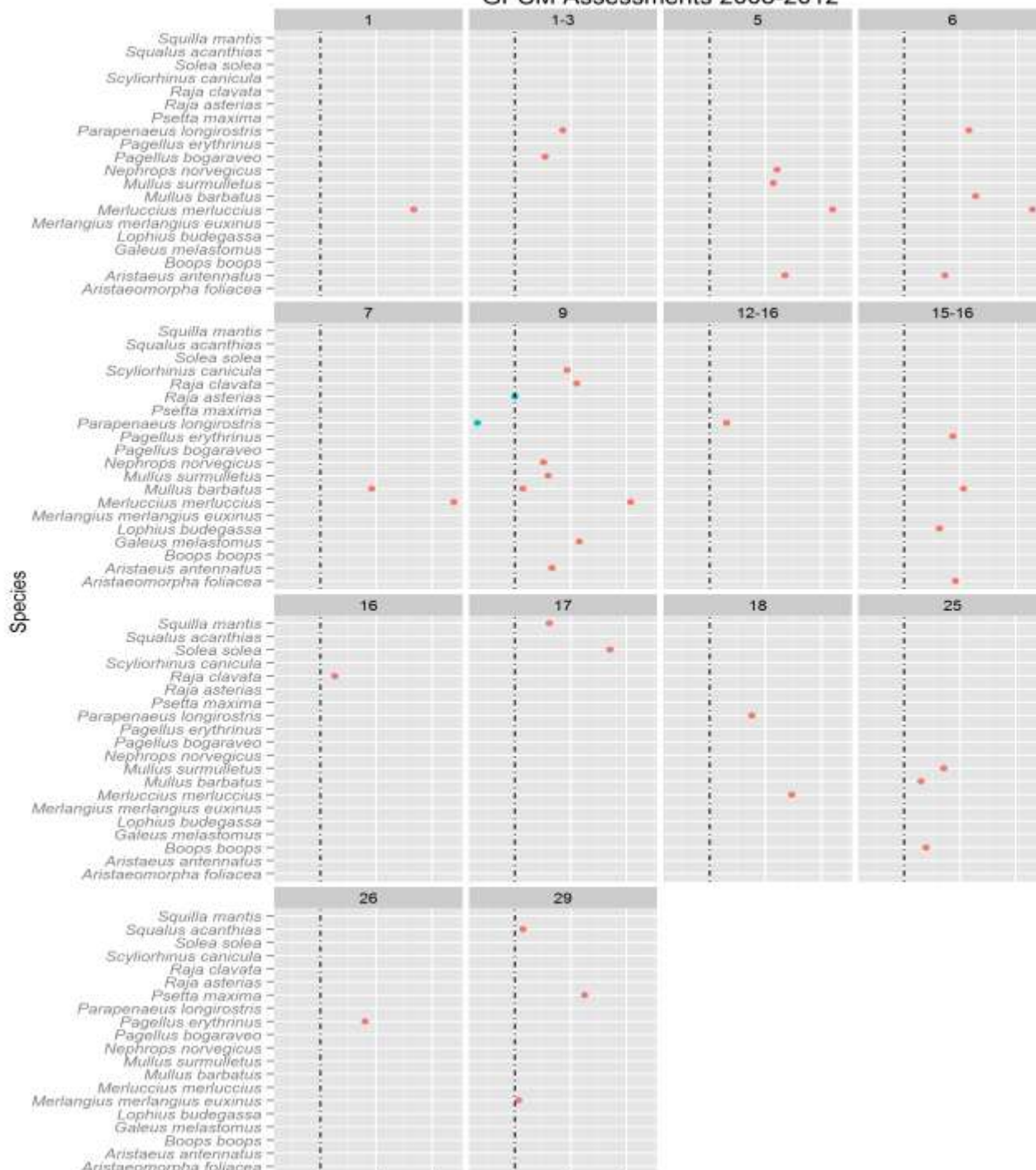
**status**  
 • overexploited  
 • sustainable

**year**  
 • 2007  
 ▲ 2008  
 ■ 2009  
 + 2010  
 ■ 2011  
 \* 2012





# Stock status compared to MSY target by GSA



status  
 ● overexploited  
 ● sustainable

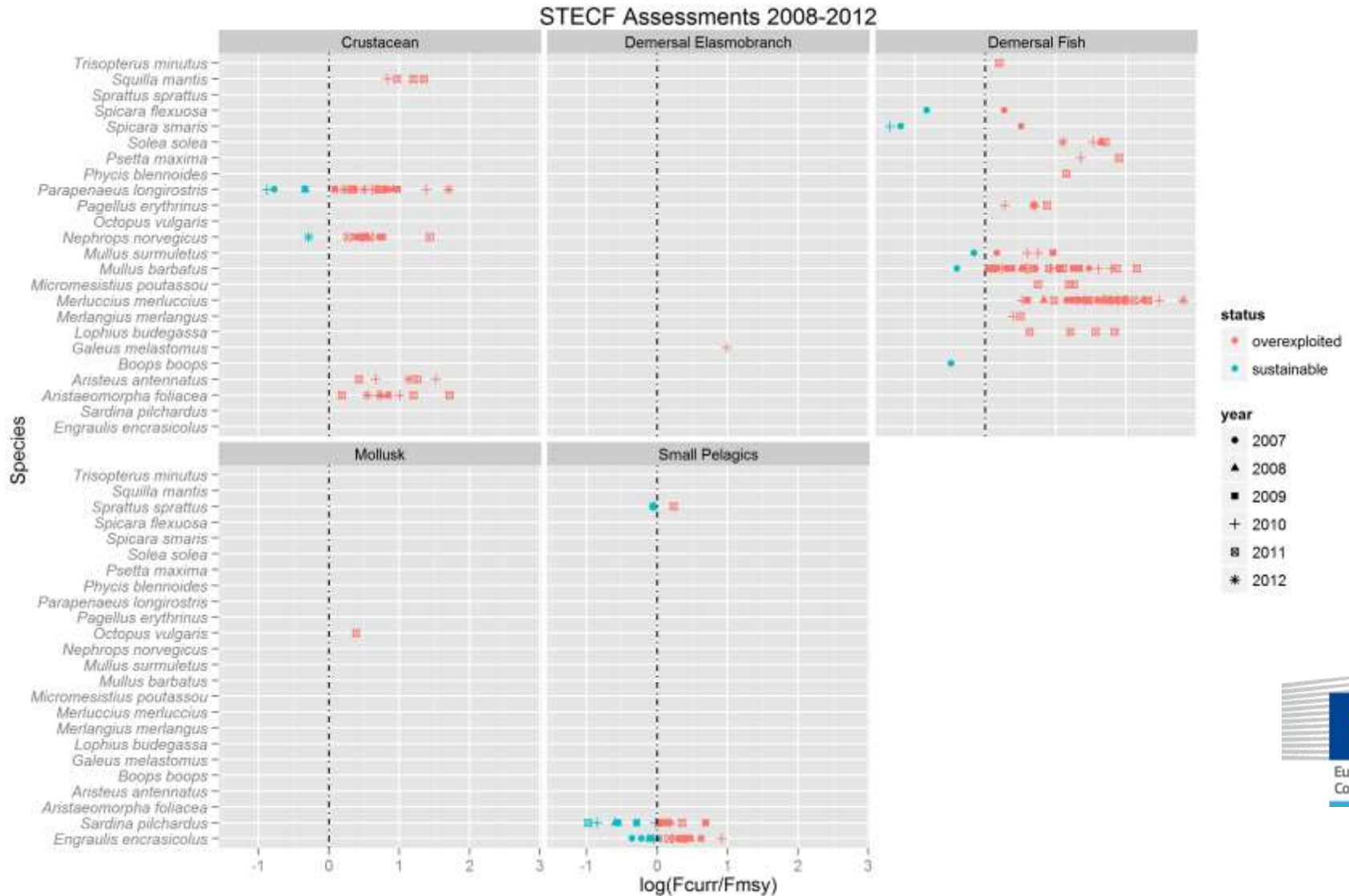


European Commission

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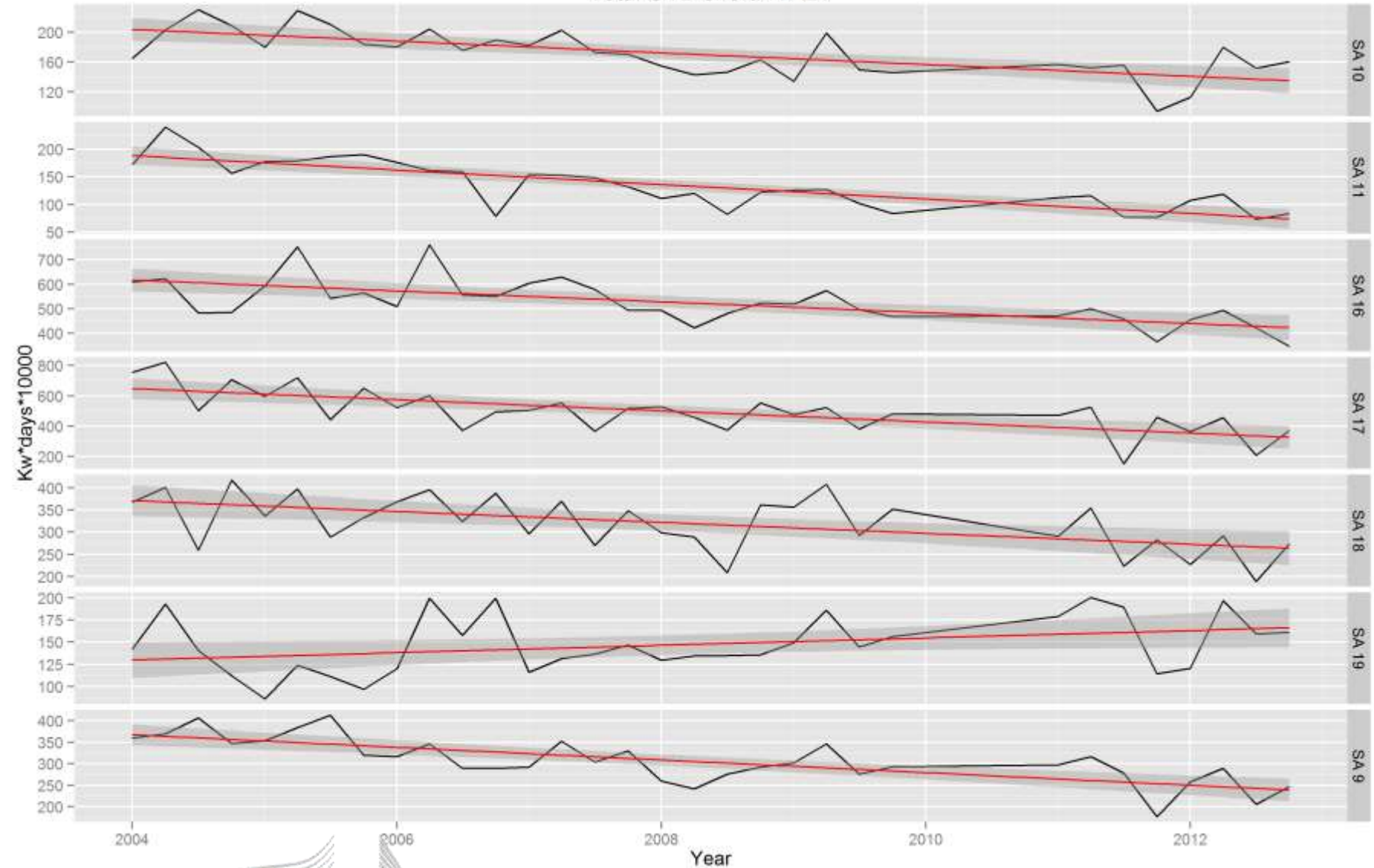


# Stock status compared to MSY target by groups



# Effort trends by GSA and country

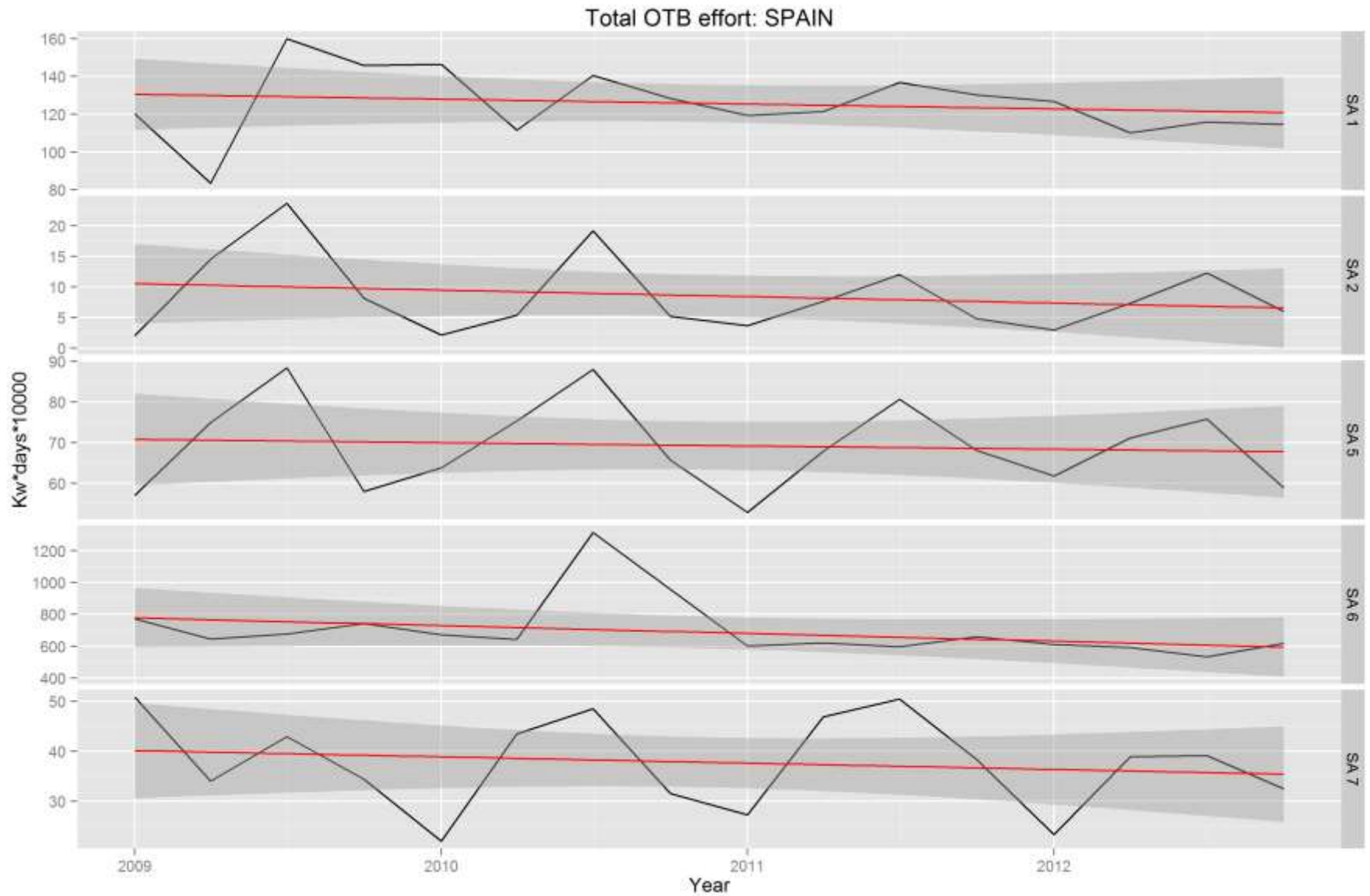
Total OTB effort: ITALY



Unstandardized data from 2013 DCF datacall  
Swedish University of Agricultural Sciences  
[www.slu.se](http://www.slu.se)



# Effort trends by GSA and country



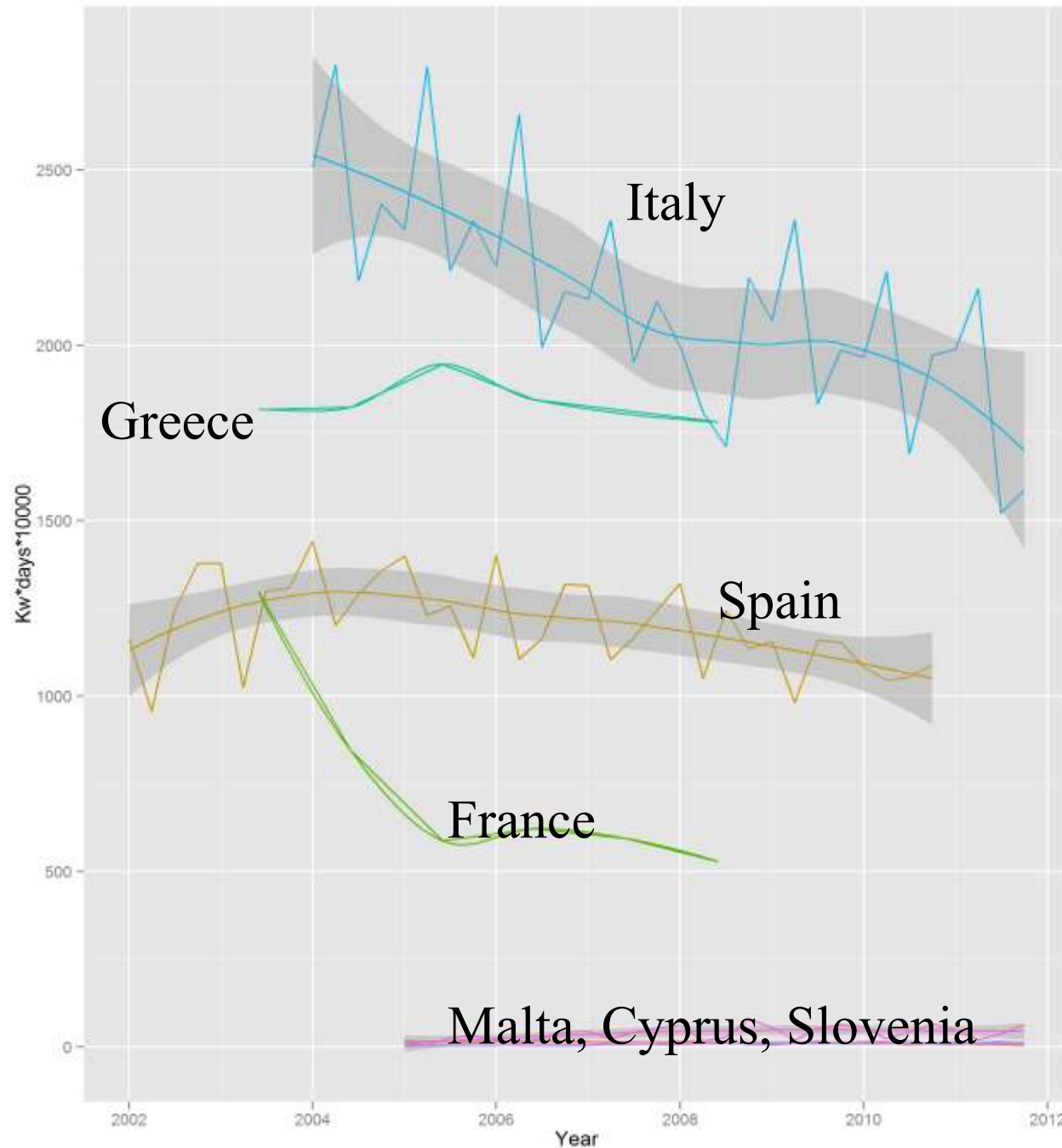
Unstandardized data from 2013 DCF datacall



Swedish University of Agricultural Sciences  
[www.slu.se](http://www.slu.se)



# Effort trends of otter trawlers



Unstandardized data from 2012 DCF datacall



# Stock status in the last assessment year compared to MSY target

STECF

GSA	Common name	Species	2010-2012 % decrease in F			GSA	Common name	Species	2010-2012 % decrease in F		
			Fcurr	Fmsy					Fcurr	Fmsy	
1	Blue and red shrimp	<i>Aristeus antentus</i>	1.32	0.29	0.78	7	White anglerfish	<i>Lophius budegassa</i>	0.97	0.29	0.70
1	Hake	<i>Merluccius merluccius</i>	1.61	0.22	0.86	7	Hake	<i>Merluccius merluccius</i>	1.83	0.11	0.94
1	Red mullet	<i>Mullus barbatus</i>	1.79	0.30	0.83	7	Red mullet	<i>Mullus barbatus</i>	1.26	0.51	0.60
1	Blue whiting	<i>Micromesistius poutassou</i>	1.4	0.40	0.71	9	Anchovy	<i>Engraulis encrasicolus</i>	1.00	0.40	0.60
1	Norway lobster	<i>Nephrops norvegicus</i>	0.32	0.20	0.38	9	Blackmouth catshark	<i>Galeus melastomus</i>	0.35	0.13	0.63
1	Pink shrimp	<i>Parapenaeus longirostris</i>	0.43	0.26	0.40	9	Blue and red shrimp	<i>Aristeus antentus</i>	0.62	0.32	0.48
5	Angler fish	<i>Lophius budegassa</i>	1.13	0.18	0.84	9	Blue whiting	<i>Micromesistius poutassou</i>	1.12	0.53	0.53
5	Pink shrimp	<i>Parapenaeus longirostris</i>	0.77	0.62	0.19	9	Common Pandora	<i>Pagellus erythrinus</i>	0.63	0.48	0.24
5	Hake	<i>Merluccius merluccius</i>	1.21	0.16	0.87	9	Giant red shrimp	<i>Aristaeomorpha foliacea</i>	0.62	0.36	0.42
5	Norway lobster	<i>Nephrops norvegicus</i>	0.55	0.42	0.24	9	Hake	<i>Merluccius merluccius</i>	1.32	0.20	0.85
5	Octopus	<i>Octopus vulgaris</i>	0.47	0.32	0.32	9	Norway lobster	<i>Nephrops norvegicus</i>	0.34	0.21	0.38
5	Striped red mullet	<i>Mullus surmuletus</i>	0.55	0.26	0.53	9	Pink shrimp	<i>Parapeeus longirostris</i>	0.29	0.70	-1.41
6	Norway lobster	<i>Nephrops norvegicus</i>	0.63	0.15	0.76	9	Poor cod	<i>Trisopterus minutus</i>	0.90	0.74	0.18
6	Pink shrimp	<i>Parapenaeus longirostris</i>	1.48	0.27	0.82	9	Red mullet	<i>Mullus barbatus</i>	0.68	0.61	0.10
6	Angler fish	<i>Lophius budegassa</i>	0.72	0.15	0.79	9	Sardine	<i>Sardina pilchardus</i>	0.41	0.40	0.02
6	Blue and red shrimp	<i>Aristeus antentus</i>	1.05	0.30	0.71	9	Greater forkbeard	<i>Phycis blennoides</i>	1.01	0.32	0.68
6	Blue whiting	<i>Micromesistius poutassou</i>	1.05	0.32	0.70	9	Spottail mantis shrimp	<i>Squilla mantis</i>	1.24	0.54	0.56
6	Hake	<i>Merluccius merluccius</i>	1.30	0.11	0.92	9	Striped red mullet	<i>Mullus surmuletus</i>	0.56	0.31	0.45
6	Pink shrimp	<i>Parapeeus longirostris</i>	1.00	0.25	0.75	10	Hake	<i>Merluccius merluccius</i>	1.00	0.14	0.86
6	Red mullet	<i>Mullus barbatus</i>	1.90	0.38	0.80	10	Blue and red shrimp	<i>Aristeus antennatus</i>	0.43	0.28	0.35

# Stock status in the last assessment year compared to MSY target

## STECF

GSA	Common name	Species	2010-2012 % decrease in F			GSA	Common name	Species	2010-2012 % decrease in F		
			Fcurr	Fmsy					Fcurr	Fmsy	
11	Giant red shrimp	<i>Aristaeomorpha foliacea</i>	0.98	0.49	0.50	18	Spottail mantis shrimp	<i>Squilla mantis</i>	1.04	0.27	0.74
11	Hake	<i>Merluccius merluccius</i>	2.50	0.25	0.90	19	Hake	<i>Merluccius merluccius</i>	1.21	0.22	0.82
11	Red mullet	<i>Mullus barbatus</i>	2.5	0.29	0.88	19	Red mullet	<i>Mullus barbatus</i>	1.94	0.30	0.85
11	Pink shrimp	<i>Parapeeus longirostris</i>	0.69	0.49	0.29	19	Pink shrimp	<i>Parapenaeus longirostris</i>	1.31	0.67	0.49
16	Anchovy	<i>Engraulis encrasicolus</i>	0.50	0.40	0.20	22	Anchovy	<i>Engraulis encrasicolus</i>	0.38	0.40	-0.05
16	Sardine	<i>Sardina pilchardus</i>	0.17	0.40	-1.35	22	Sardine	<i>Sardina pilchardus</i>	0.48	0.40	0.17
17	Common sole	<i>Solea solea</i>	0.93	0.31	0.67	25	Picarel	<i>Spicara smaris</i>	0.08	0.31	-2.88
17	Red mullet	<i>Mullus barbatus</i>	0.71	0.36	0.49	29	Anchovy	<i>Engraulis encrasicolus</i>	0.76	0.54	0.29
17	Sardine	<i>Sardi pilchardus</i>	0.57	0.40	0.30	29	Sprat	<i>Sprattus sprattus</i>	0.81	0.64	0.21
17	Anchovy	<i>Engraulis encrasicolus</i>	0.47	0.40	0.15	29	Turbot	<i>Psetta maxima</i>	1.00	0.15	0.85
17	Hake	<i>Merluccius merluccius</i>	2.02	0.20	0.90	29	Whiting	<i>Merlangius merlangus</i>	0.66	0.40	0.39
17	Spottail mantis shrimp	<i>Squilla mantis</i>	1.00	0.30	0.70	15-16	Common Pandora	<i>Pagellus erythrinus</i>	0.72	0.30	0.58
18	Giant red shrimp	<i>Aristaeomorpha foliacea</i>	1.00	0.30	0.70	15-16	Giant red shrimp	<i>Aristaeomorpha foliacea</i>	1.09	0.40	0.63
18	Hake	<i>Merluccius merluccius</i>	1.00	0.19	0.81	15-16	Norway lobster	<i>Nephrops norvegicus</i>	0.15	0.20	-0.33
18	Norway lobster	<i>Nephrops norvegicus</i>	0.54	0.30	0.44	15-16	Blue and red shrimp	<i>Aristeus antennatus</i>	0.81	0.26	0.68
18	Pink shrimp	<i>Parapeeus longirostris</i>	1.45	0.68	0.53	15-16	Red mullet	<i>Mullus barbatus</i>	1.30	0.45	0.65
18	Red mullet	<i>Mullus barbatus</i>	1.50	0.50	0.67	15-16	Black bellied anglerfish	<i>Lophius budegassa</i>	0.30	0.16	0.47

Around 94% of the analysed Mediterranean and Black Sea stocks are estimated to be exploited unsustainably in 2010-2012

# Stock status in the last assessment year compared to MSY target

GFCM

GSA	Species	Year period	F <sub>MSY</sub>	F <sub>curr</sub>	F <sub>MSY</sub> /F <sub>curr</sub>	Status	% reduction in F
1	<i>Merluccius merluccius</i>	2002-2011	0.28	1.50	5.36	Overexploited	81
5	<i>Merluccius merluccius</i>	2000-2011	0.17	1.57	9.08	Overexploited	89
5	<i>Mullus surmulletus</i>	2000-2011	0.23	0.71	3.10	Overexploited	68
5	<i>Aristaeus antennatus</i>	1992-2011	0.33	1.28	3.88	Overexploited	74
5	<i>Nephrops norvegicus</i>	2001-2011	0.13	0.45	3.36	Overexploited	70
6	<i>Mullus barbatus</i>	1995-2010	0.20	0.72	3.60	Overexploited	72
6	<i>Aristaeus antennatus</i>	1996-2011	0.56	1.16	2.07	Overexploited	52
6	<i>Parapenaeus longirostris</i>	2001-2011	0.34	1.08	3.18	Overexploited	69
7	<i>Merluccius merluccius</i>	1998-2011	0.15	1.65	11.00	Overexploited	91
7	<i>Mullus barbatus</i>	2004-2011	0.50	1.26	2.52	Overexploited	60
9	<i>Merluccius merluccius</i>	2005-2010	0.22	1.75	7.95	Overexploited	87
9	<i>Mullus barbatus</i>	1994-2010	0.47	0.54	1.15	Overexploited	13
9	<i>Mullus surmulletus</i>	2009-2010	0.35	0.64	1.81	Overexploited	45
9	<i>Galeus melastomus</i>	2009-2010	0.11	0.35	3.18	Overexploited	69
9	<i>Aristaeus antennatus</i>	2009-2010	0.32	0.62	1.94	Overexploited	48
9	<i>Nephrops norvegicus</i>	2006-2010	0.21	0.35	1.67	Overexploited	40
9	<i>Parapenaeus longirostris</i>	2006-2010	0.78	0.40	0.51	Sustainable	-95
9	<i>Raja asterias</i>	1994-2010	0.49	0.49	1.00	Sustainable	0
9	<i>Raja clavata</i>	1994-2010	0.08	0.23	3.03	Overexploited	67
9	<i>Scyliorhinus canicula</i>	1994-2010	0.13	0.33	2.54	Overexploited	61





# Stock status in the last assessment year compared to MSY target

GFCM

GSA	Species	Year period	$F_{MSY}$	$F_{curr}$	$F_{MSY}/F_{curr}$	Status	% reduction in F
16	<i>Raja clavata</i>	1994-2010	0.10	0.13	1.30	Overexploited	23
17	<i>Squilla mantis</i>	2007-2011	0.26	1.43	5.50	Overexploited	82
17	<i>Solea solea</i>	2005-2010	0.26	1.43	5.50	Overexploited	82
18	<i>Merluccius merluccius</i>	1994-2010	0.21	0.87	4.14	Overexploited	76
18	<i>Parapenaeus longirostris</i>	2008-2011	0.68	1.45	2.13	Overexploited	53
25	<i>Mullus barbatus</i>	2005-2010	0.33	0.45	1.35	Overexploited	26
25	<i>Mullus surmulletus</i>	2009-2010	0.23	0.46	2.02	Overexploited	51
25	<i>Boops boops</i>	2005-2010	0.25	0.37	1.48	Overexploited	32
26	<i>Pagellus erythrinus</i>	2006-2007	0.29	0.64	2.23	Overexploited	55
29	<i>Merlangius merlangius</i>	2000-2011	0.35	0.37	1.06	Overexploited	5
29	<i>Psetta maxima</i>	1970-2010	0.18	0.62	3.44	Overexploited	71
29	<i>Squalus acanthias</i>	1989-2011	0.22	0.26	1.18	Overexploited	15
12-16	<i>Parapenaeus longirostris</i>	2007-2010	0.95	1.21	1.27	Overexploited	21
15-16	<i>Mullus barbatus</i>	1994-2011	0.45	1.30	2.89	Overexploited	65
15-16	<i>Lophius budegassa</i>	2002-2011	0.16	0.30	1.88	Overexploited	47
15-16	<i>Pagellus erythrinus</i>	1994-2011	0.30	0.72	2.40	Overexploited	58
15-16	<i>Aristaeomorpha foliacea</i>	1994-2010	0.40	1.00	2.50	Overexploited	60

Around 95% of the analysed Mediterranean and Black Sea stocks are estimated to be exploited unsustainably in 2010-2011



# Modelling achievements

STECF

Moving from XSA to statistical catch at age model (e.g. SS3)

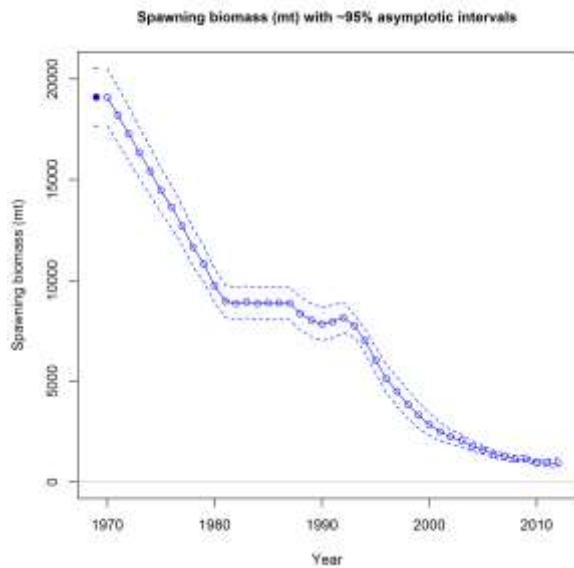
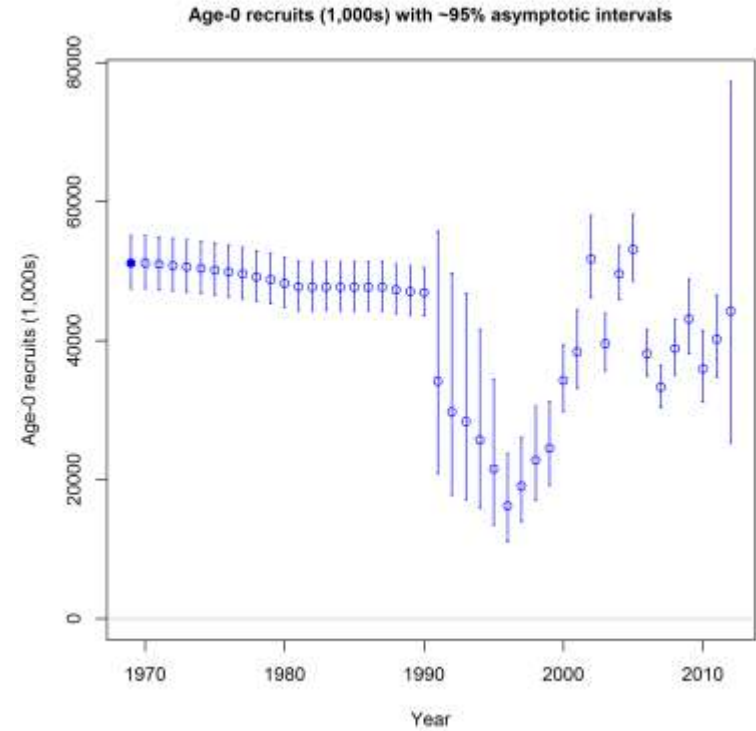
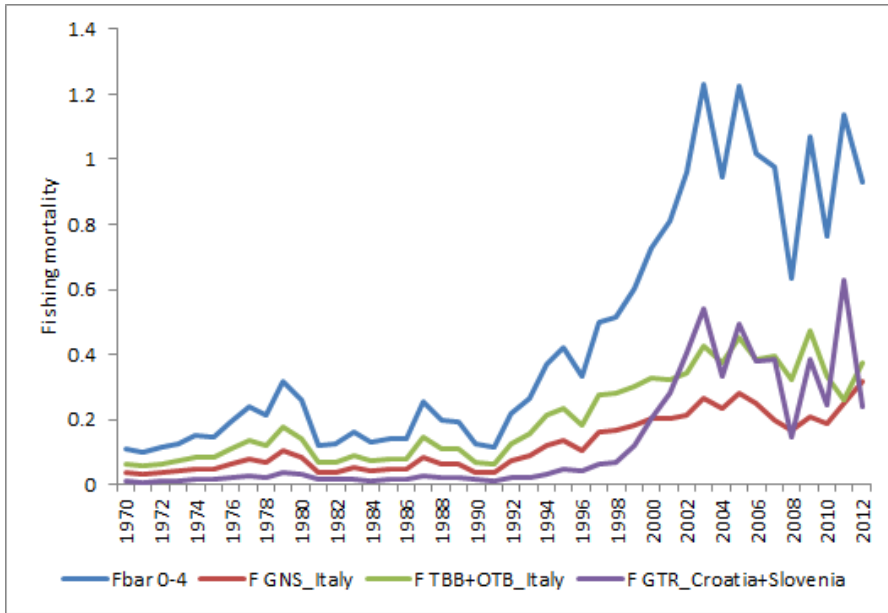
Main advantages over classic VPA and other SCAA models:

- Provide estimates of uncertainty
- Can estimate  $M$
- Can provide different functional response for selectivity
- Can handle multi fleets



# Modelling achievements

STECF



# Productivity and Susceptibility analysis

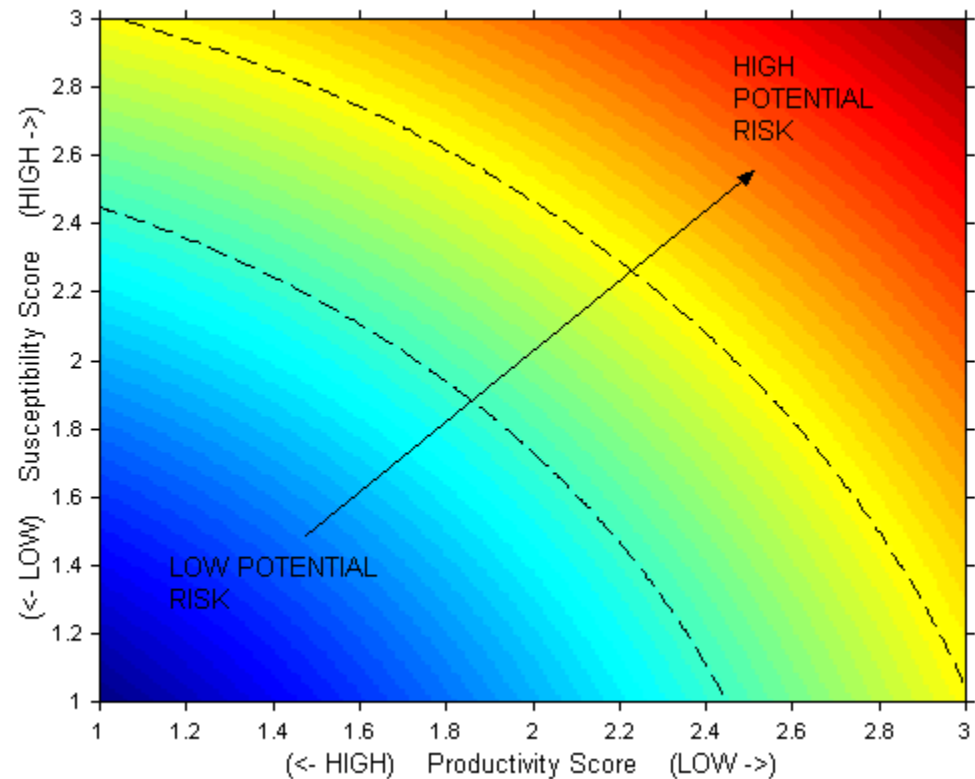
## 151 Mediterranean Demersal and bathydemersal fish stocks

### Productivity Attributes:

- Maximum age ( $t_{max}$ )
- Maximum size ( $L_{max}$ )
- Growth coefficient ( $k$ )
- Natural mortality ( $M$ )
- Fecundity
- Age-at-maturity ( $t_{mat}$ )
- Mean trophic level

### Susceptibility attributes:

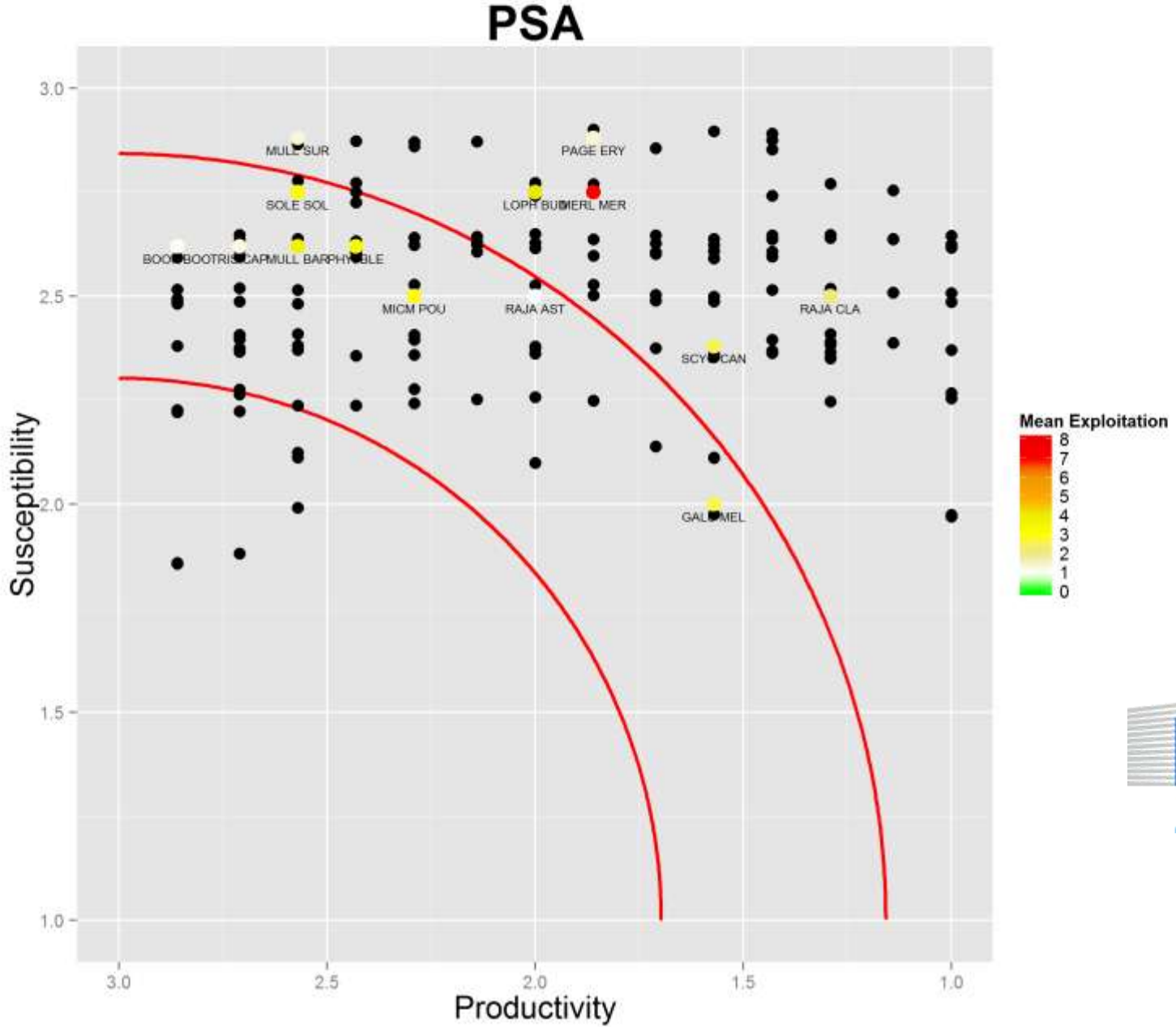
- Areal overlap
- Vertical overlap
- Morphological characteristics affecting capture
- Desirability or value of the fishery
- Management strategy
- Fishing mortality rate (in relation to  $M$ )
- Survival after capture and release.



From Hobday et al. 2007

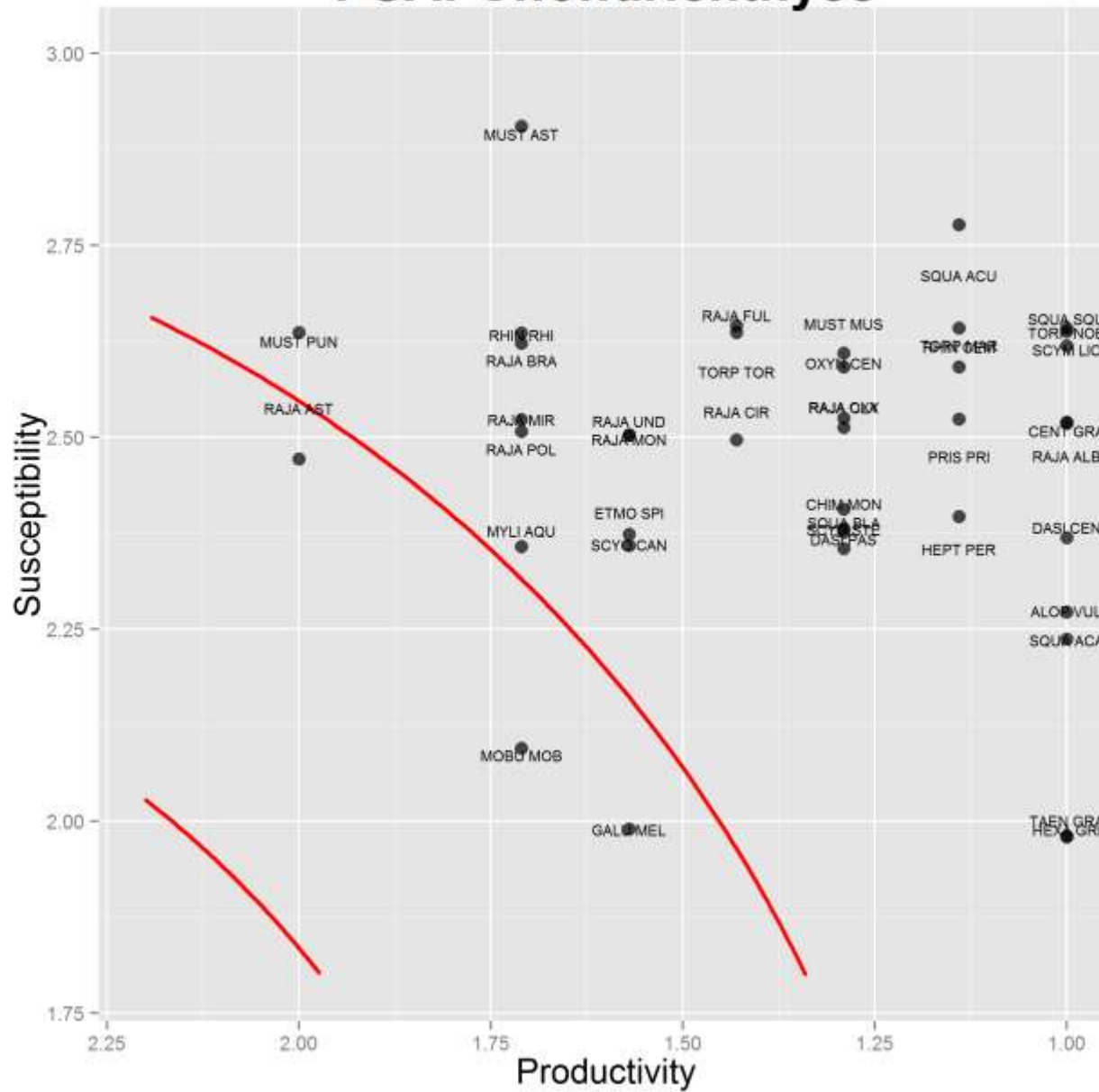


# Species with estimated Mean Exploitation level





# PSA: Chondrichthyes



# Status of Mediterranean and Black Sea marine resources

## State of the art

- State of knowledge on the Mediterranean and Black Sea stocks is improving rapidly
- Between 94% and 95% of the stocks analysed is overexploited compared to  $F_{MSY}$
- An overall reduction between 45% and 51% in  $F$  is necessary to reach MSY
- Reducing  $F$  will not reach MSY without changes in selectivity
- Observed reduction in nominal effort did not result in a decline in  $F$





# Status of Mediterranean and Black Sea marine resources

## Immediate actions

- Reduce  $F$  for all demersal fisheries through reduction in effort or/and catches
- Implement a TAC system for small pelagics
- Modify gear selectivity to move towards MSY
- Several stocks are shared fisheries/stocks with non EU countries and thus a strong coordination and collaboration between GFCM-SAC and SGMED is crucial in the future



# Status of Mediterranean and Black Sea marine resources

## Way forward

- Move to stock integrated models which can estimate  $M$ , handle multifleet data and model selectivity

