Diagnostic of the fishery stocks and possible future scenarios: Demersals

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High Level Seminar on the status of the stocks in the Mediterranean Sea

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0. Outline

1. **Some fisheries indicators**
2. **Assessments**
3. **Stock status**
4. **Difficulties**
5. **Suggested actions**

1. Some fisheries indicators

The Mediterranean and Black Seas are semi-enclosed seas with a surface of about 3.3 million km^2, which represents 0.8 % of the total world marine surface.

Mediterranean fisheries are dominated by small-scale vessels dispersed across a large number of landing places in most countries and using a great variety of fishing gears.

Four main types of fisheries can be identified:

1- fishery for large pelagic fish (bluefin tuna and swordfish)
2- fishery for small pelagic fish (anchovy and sardines)
3- multispecies demersal fishery (mainly hake and red mullet)
4- fishery for deepsea crustaceans (red shrimp and deep-water rose shrimp)

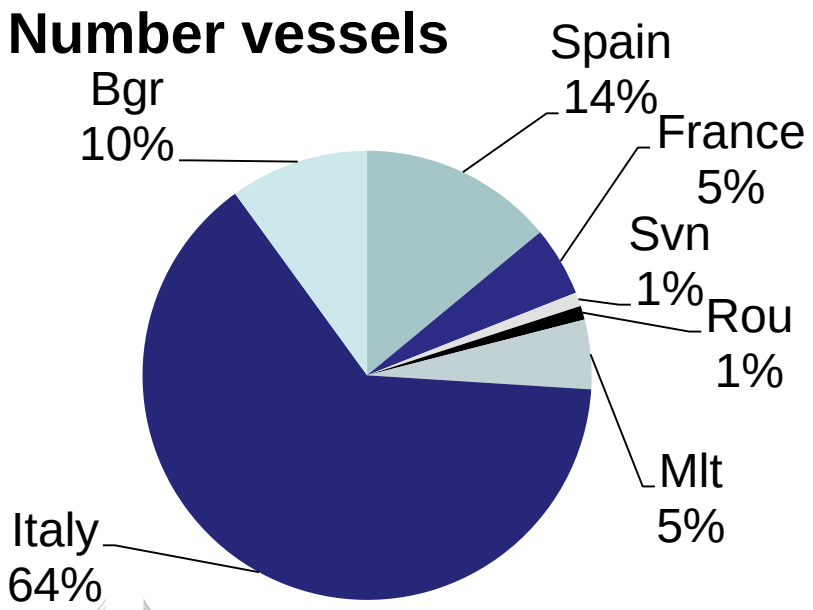
Demersal species represent about 30 percent of total reported catches in the Mediterranean and Black Sea. More than 100 demersal species are caught in Mediterranean fisheries being the most economically important among them: hake (*Merluccius merluccius***), red mullets (***Mullus*** spp.), blue whiting (***Micromesistius poutassou***), whiting (***Merlangius merlangus***), anglerfishes (***Lophius*** spp.), pandoras (***Pagellus*** spp.), bogue (***Boops boops***), picarels (***Spicara*** spp.), octopus (***Octopus*** spp.), cuttlefish (***Sepia officinalis***), red shrimps (***Aristeus antennatus*** and ***Aristaeomorpha foliacea***), Norway lobster (***Nephrops norvegicus***) and deep-water rose shrimp (***Parapenaeus longirostris***).**

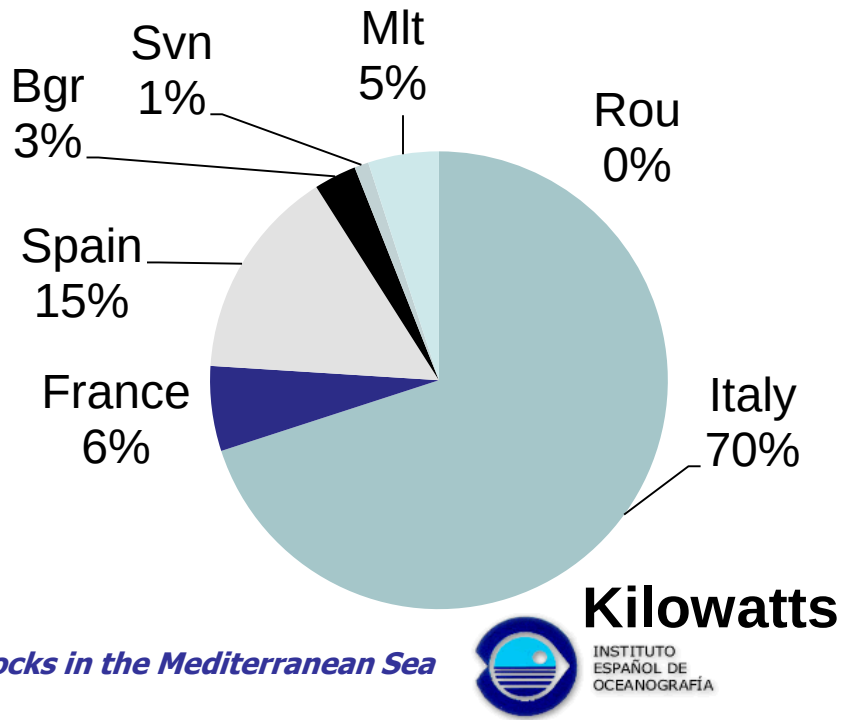
1. Some fisheries indicators

Fishing Capacity:

The EU fleet fishing in the Mediterranean and Black Sea consists of around **22.800 vessels**, with a total gross tonnage of **279.000 GT** and total engine power of **1.75 million kilowatts** (2011 data, excluding Greece).

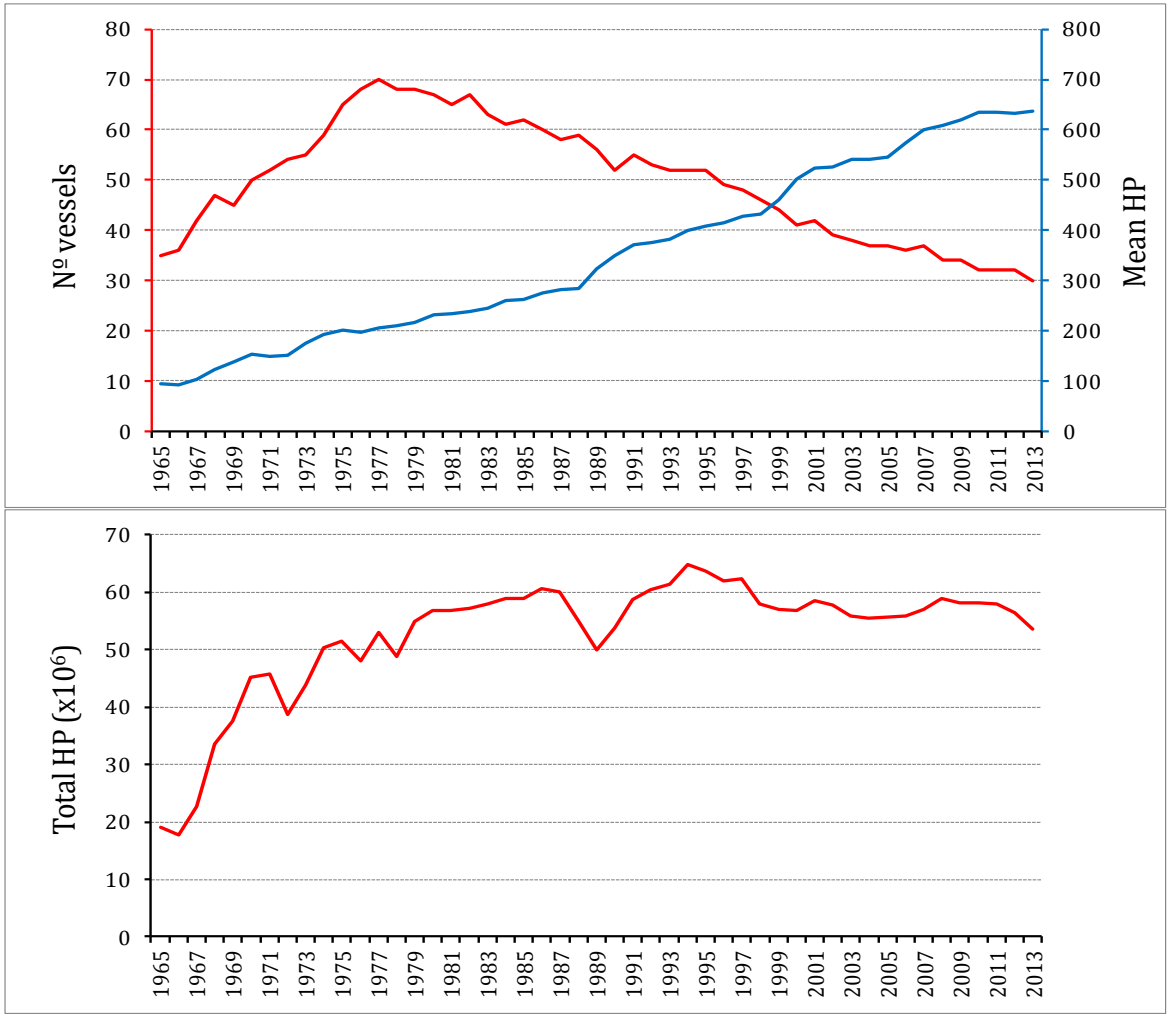
The Italian fleet accounts for 64% of the total number of vessels, followed at a very long distance by the Spanish (14%) and the Bulgarian (10%) fleets.





1. Some fisheries indicators

GSA05: fishing effort



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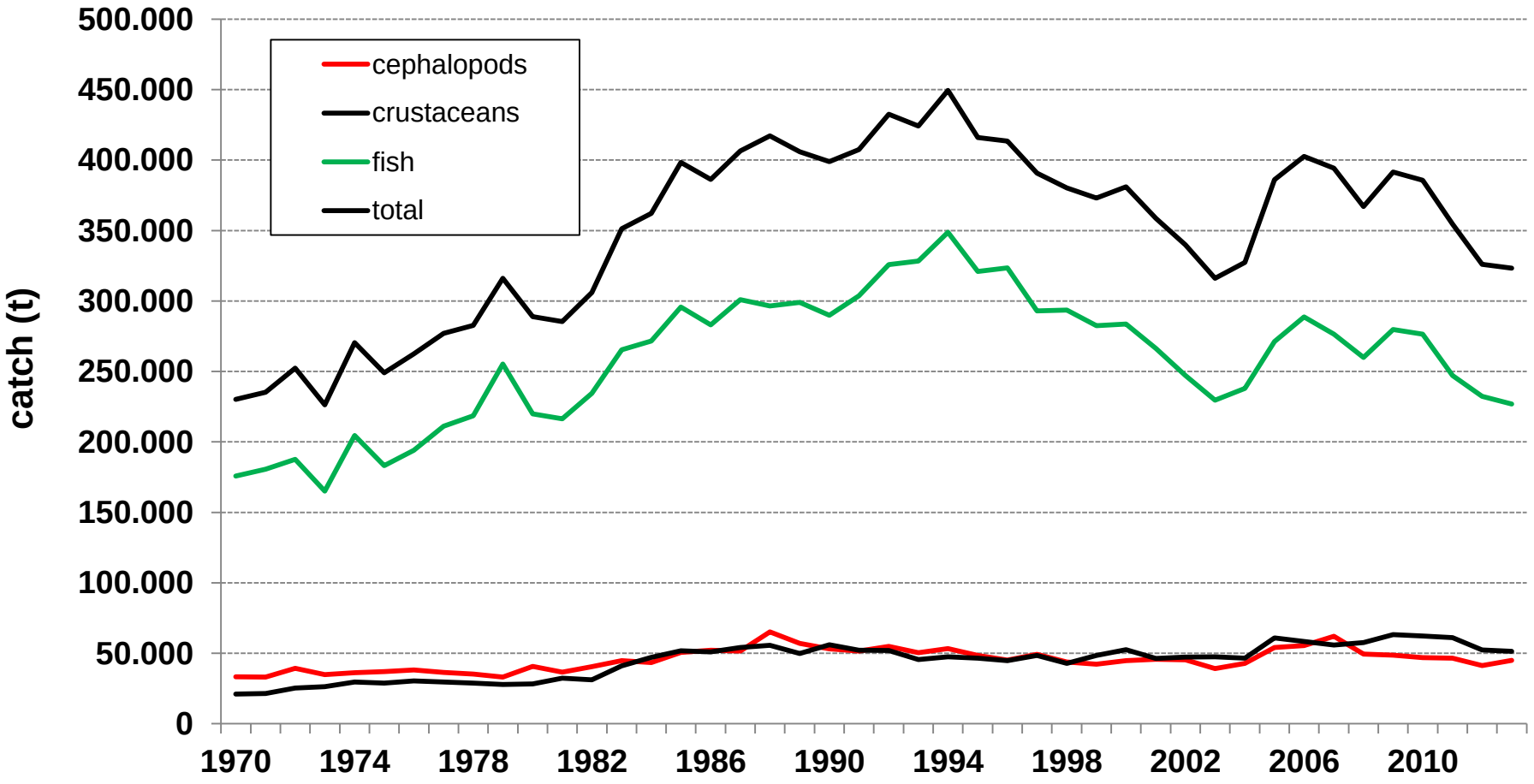

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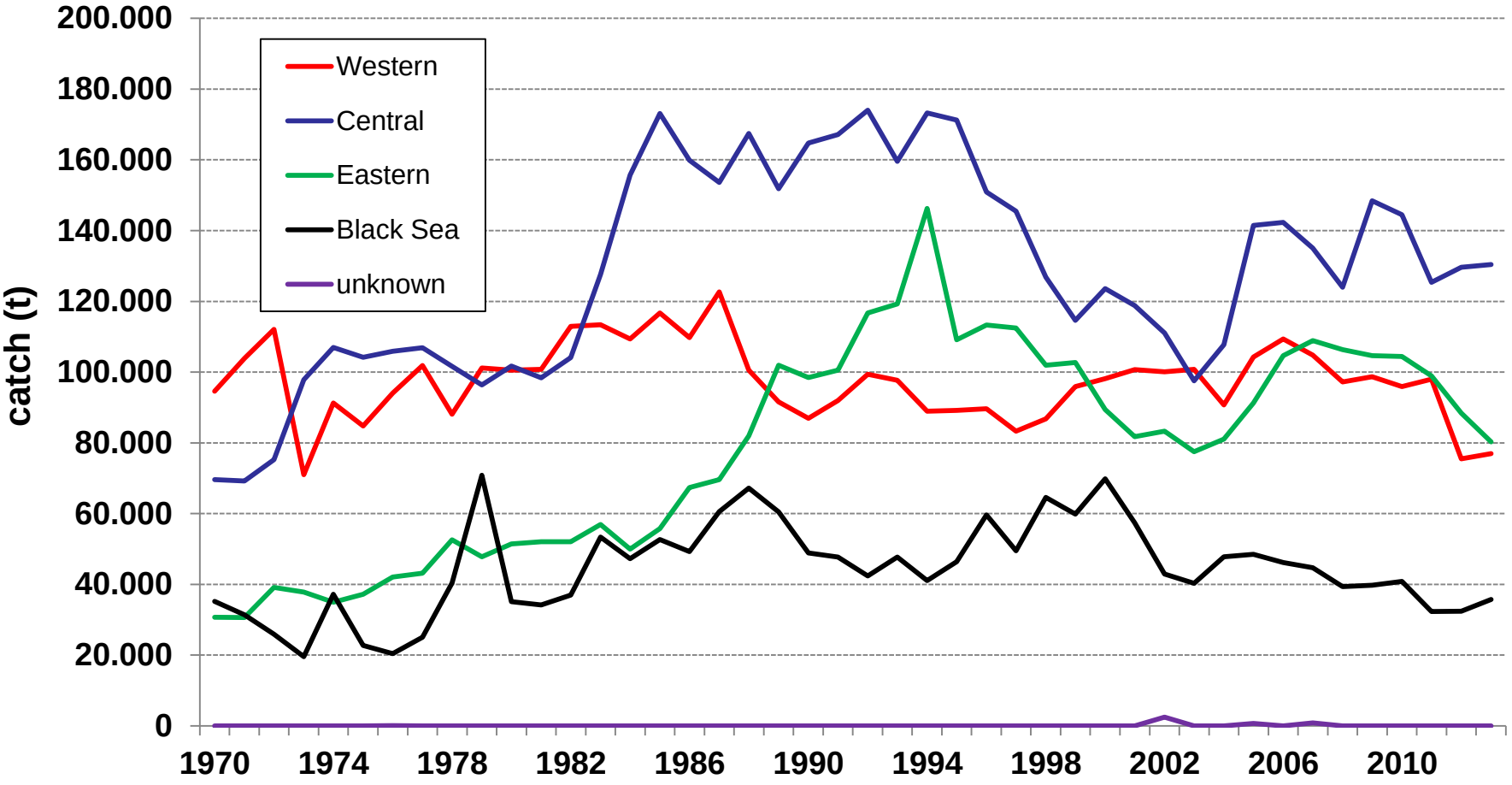

2. Assessments

- **Currently two main technical bodies conducting regular assessments on Mediterranean stocks:**

1- The General Fisheries Commission for the Mediterranean (GFCM)
(24 countries + European Union)

- Scientific Advisory Committee (SAC)
  - Subcommittee on Stock Assessment (SCSA)
    - Working Group on Stock Assessment of Demersal Species (WGSAD)

2- The Scientific, Technical and Economic Committee for Fisheries (STECF)

- Expert Working Group on the Mediterranean (STECF EWG MED)

VARIETY OF ASSESSMENT METHODOLOGIES USED

2. Assessments

1 Northern Alboran Sea	6 Northern Spain	11Sardinia	16 South of Sicily	21 Southern Ionian Sea	26 South Levant
2 Alboran Island	7 Gulf of Lion	12 Northern Tunisia	17 Northern Adriatic	22 Aegean Sea	27 Levant
3 Southern Alboran Sea	8 Corsica Island	13 Gulf of Hammamet	18 Southern Adriatic Sea	23 Crete Island	28 Marmara Sea
4 Algeria	9 Ligurian and North Tyrrhenian Sea	14 Gulf of Gabes	19 Western Ionian Sea	24 North Levant	29 Black Sea
5 Balearic Island	10 South Tyrrhenian Sea	15 Malta Island	20 Eastern Ionian Sea	25 Cyprus Island	30 Azov Sea

2. Assessments

Species	N	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30
O. vulgaris	1					1																									
A. foliacea	11									2	1	1	1			4			1	1											
A. antennatus	9	2				1	2			2	1					1															
N. norvegicus	15	1				2	2			6		1							1		1		1								
P. longirostris	22	1		1		2	3			3	4	1		4					2	1											
S. mantis	5									1	1							2	1												
G. melastomus	2									2																					
R. asterias	1									1																					
R. clavata	2									1							1														
S. canicula	1									1																					
S. acanthias	3																													3	
B. boops	2																						1			1					
L. budegassa	6					1	1	2								2															
M. merlangus	1																													1	
M. merluccius	49		4			2	6	6		6	5	4		2				5	5	2	1		1								
M. poutassou	5	1					2			2																					
M. barbatus	46	1		2		2	7	5		5	4	3				4		3	1	1	1		1		1	3				2	
M. surmuletus	11					4				2						1					1		1			1	1				
P. bogaraveo	1		1																												
P. erythrinus	5									2						2											1				
Ph. blennoides	1									1																					
Ps. maxima	4																													4	
S. undosquamis	1																										1				
S. solea	6																	6													
S. flexuosa	2																				1		1								
S. smaris	3																				1		1			1					
T. minutus	1									1																					
TOTAL		**6**	**1**	**6**	**1**	**15**	**23**	**13**	**0**	**38**	**16**	**10**	**1**	**6**	**0**	**14**	**1**	**16**	**11**	**5**	**6**	**0**	**7**	**0**	**1**	**6**	**3**	**0**	**0**	**10**	**0**
		130												**59**									**17**						**10**		

3. Stock status (CGPM)

Species	GSA	Year	F/Fmsy	Effort modulation
Black-bellied anglerfish	7	2011	3.3	0.70
Black-bellied anglerfish	15-16	2011	1.9	0.47
Blackspot seabream	1-3	2011	1.7	0.42
Blue and red shrimp	1	2013	2.0	0.50
Blue and red shrimp	5	2012	4.3	0.77
Blue and red shrimp	6	2013	2.0	0.50
Brushtooth lizardfish	26	2013	2.3	0.57
Common pandora	15-16	2011	2.4	0.58
Deepwater pink shrimp	5	2012	1.2	0.17
Deepwater pink shrimp	6	2012	5.5	0.82
Deepwater pink shrimp	10	2013	1.7	0.41
Deepwater pink shrimp	18	2013	2.2	0.55
Deepwater pink shrimp	19	2012	2.4	0.58
Deepwater pink shrimp	1-3-4	2011	2.4	0.58
Deepwater pink shrimp	12-13-14-15-16	2013	1.3	0.21
Deepwater pink shrimp	12-16	2012	1.8	0.44
Giant red shrimp	19	2013	2.3	0.57
Hake	1	2012	7.4	0.86
Hake	3	2013	0.6	
Hake	5	2013	7.7	0.87
Hake	6	2013	7.8	0.87
Hake	7	2013	9.8	0.90
Hake	10	2013	4.6	0.78
Hake	17	2013	2.0	0.50

3. Stock status (CGPM)

Species	GSA	Year	F/Fmsy	Effort modulation
Hake	18	2013	**4.0**	0.75
Hake	1-2-3-4	2011	**2.4**	0.58
Hake	12-13-14-15-16	2013	**4.5**	0.78
Hake	12-16	2012	**5.8**	0.83
Norway lobster	5	2011	**3.2**	0.69
Norway lobster	15-16	2012	**0.7**	
Picarel	25	2012	**0.6**	
Red mullet	3	2013	**2.3**	0.57
Red mullet	5	2012	**6.6**	0.85
Red mullet	6	2013	**1.3**	0.23
Red mullet	7	2013	**3.2**	0.69
Red mullet	10	2013	**1.0**	0.00

Species	GSA	Year	F/Fmsy	Effort modulation
Red mullet	17	2012	**5.3**	0.81
Red mullet	19	2012	**3.1**	0.68
Red mullet	25	2013	**1.5**	0.33
Red mullet	15-16	2011	**2.9**	0.65
Sole	17	2013	**1.5**	0.33
Spottail mantis shrimp	17	2011	**1.9**	0.48
Spurdog	29	2011	**1.2**	0.13
Striped red mullet	5	2013	**3.0**	0.67
Striped red mullet	26	2013	**2.5**	0.60
Striped red mullet	15-16	2012	**4.1**	0.76
Turbot	29	2012	**2.1**	0.52
Whiting	29	2011	**1.1**	0.07

Around 92% of demersal stocks assessed by the CGPM are estimated to be exploited not in accordance with Fmsy

3. Stock status (STECF)

Species	GSA	Year	F/Fmsy	Effort modulation
Black-bellied anglerfish	5	2011	**6.3**	0.84
Black-bellied anglerfish	6	2011	**4.8**	0.79
Black-bellied anglerfish	7	2011	**3.3**	0.70
Black-bellied anglerfish	15-16	2011	**1.9**	0.47
Blue and red shrimp	6	2011	**3.5**	0.71
Blue and red shrimp	10	2011	**1.5**	0.35
Blue and red shrimp	15-16	2012	**3.1**	0.68
Blue whiting	1	2011	**3.5**	0.71
Blue whiting	6	2013	**9.5**	0.89
Blue whiting	9	2013	**1.2**	0.16
Common pandora	15-16	2011	**2.4**	0.58
Deepwater pink shrimp	1	2012	**1.7**	0.39
Deepwater pink shrimp	5	2012	**1.2**	0.19
Deepwater pink shrimp	6	2012	**5.5**	0.82
Deepwater pink shrimp	10	2012	**1.3**	0.25

Species	GSA	Year	F/Fmsy	Effort modulation
Deepwater pink shrimp	11	2011	**1.4**	0.29
Deepwater pink shrimp	18	2011	**2.1**	0.53
Deepwater pink shrimp	19	2012	**2.0**	0.49
Giant red shrimp	9	2012	**1.7**	0.42
Giant red shrimp	10	2011	**1.2**	0.17
Giant red shrimp	18	2011	**3.3**	0.70
Greater forkbeard	9	2011	**3.2**	0.68
Hake	1	2012	**7.3**	0.86
Hake	6	2013	**9.9**	0.90
Hake	7	2013	**9.8**	0.90
Hake	9	2013	**5.9**	0.83
Hake	10	2012	**7.1**	0.86
Hake	11	2011	**10.0**	0.90
Hake	17	2013	**3.6**	0.72
Hake	18	2012	**5.3**	0.81

3. Stock status (STECF)

Species	GSA	Year	F/Fmsy	Effort modulation
Hake	19	2012	5.5	0.82
Norway lobster	1	2011	1.6	0.38
Norway lobster	5	2011	1.3	0.24
Norway lobster	6	2013	3.9	0.75
Norway lobster	9	2013	2.1	0.51
Norway lobster	18	2011	1.8	0.44
Norway lobster	15-16	2012	0.8	
Octopus	5	2011	1.5	0.32
Poor cod	9	2011	1.2	0.18
Red mullet	5	2012	6.6	0.85
Red mullet	6	2013	3.3	0.69
Red mullet	7	2013	3.2	0.69
Red mullet	9	2013	1.2	0.15
Spurdog	29	2013	9.0	0.89

Species	GSA	Year	F/Fmsy	Effort modulation
Striped red mullet	5	2012	3.0	0.66
Striped red mullet	15-16	2012	4.1	0.76
Red mullet	11	2012	9.7	0.9
Red mullet	17	2012	2.6	0.62
Red mullet	18	2011	3.0	0.67
Red mullet	19	2011	6.5	0.85
Red mullet	29	2013	2.5	0.60
Red mullet	15-16	2011	2.9	0.65
Sole	17	2012	3.0	0.67
Spottail mantis shrimp	10	2011	2.6	0.62
Spottail mantis shrimp	17	2011	3.3	0.70
Spottail mantis shrimp	18	2011	3.9	0.74
Turbot	29	2013	5.1	0.80
Whiting	29	2013	2.9	0.65

Around 98% of demersal stocks assessed by the STECF are estimated to be exploited not in accordance with Fmsy

3. Stock status

- **Current state of the stocks according to CGPM and STECF:**
  - A limited number of around 30 species have been recently assessed analytically at CGPM and STECF working groups among which only 6 are being assessed in a routinely basis
  - No major differences have been observed in the status of the stocks between geographical areas
  - Around 92% of analysed Mediterranean demersal stocks by CGPM and 98% by STECF are estimated to be exploited not in accordance with Fmsy. In most cases increasing trends in Fc/Fmsy and decreasing trends in recruitment and SSB have been observed over the last years
  - Demersal finfish are showing the worse stock status compare to cephalopods and crustaceans. **There is a particular concern about the hake situation**
  - Time series of assessments are too short in period of high exploitation to infer the actual situation of the stocks

4. Difficulties

- **Data:**
  - Uneven qualitative and quantitative data availability across GSA's and species
  - Historical time series of data likely existent but unavailable
  - Incomplete geographical and temporal coverage of surveys and lack of coordination in some cases
- **Research:**
  - Lack of knowledge about some basic biological and/or population parameters (e.g. stock identification, discards)
  - Difficulty in relating F with effective effort and nominal effort
- **Assessment:**
  - Two different technical bodies conducting regular stock assessments using different approaches (in house vs WG) and without any apparent direct coordination
  - Diverse and sometimes opportunistic assessment methodologies applied (difficulties for comparisons)
  - Reduced number of stocks/species being assessed routinely (not proportional to landings)

4. Difficulties

- **Scientific and technical advice:**
  - Unclear definition of reference points
  - Different terminologies used in defining the status of the stocks (e.g. fully exploited, overexploited, underexploited, high overfishing, intermediate overfishing, etc.)
  - Unclear and sometimes inaccurate messages in conveying management advice to administrators (e.g. effort reduction)
- **Management:**
  - Lack of clarity in the governance system (CGPM, STECF-CE,... sometimes also ICES and CECAF)
  - Not binding resolutions from CGPM ???
  - Insufficient (or inexistent) participation of stakeholders (including fishermen) in the decision making process

5. Suggested actions

- **Data:**
  - Implementation of a common data collection program to all countries in the Mediterranean
  - Recovery of existent historical data at a country level and implementation of a common (CGPM/STECF-CE/other) database
  - Establishment of bilateral/multilateral agreements with fishermen for data collection and/or scientific observation
  - Coordination for optimization of regular and regional surveys (e.g. bottom trawl surveys by Morocco and Spain in Alboran and Gulf of Cadiz)
- **Research:**
  - Collaborative (CGPM/STECF/Regional projects) identification of basic research needs (e.g. stock identity, nominal/effective effort)
  - Alignment of research priorities of funding agencies (e.g. EC) with fishery research needs

5. Suggested actions

- **Assessment:**
  - Establishment of joint regular CGPM/STECF assessment working groups (at least for the most important and/or controversial species)
  - Standardization of stock assessment methodologies
  - Use of historical data series in new stock assessments
  - Use of regular and regional survey data
- **Scientific and technical advice:**
  - Definition of clear reference points
  - Adoption of standard terminologies in defining the status of the stocks
  - Adoption of standard procedures for conveying management advice
  - Incorporation of social and economical aspects to the management advice (modulation of biological perspective)
- **Management:**
  - Clarification of the governance system
  - Incorporation of fishermen and other interested stakeholders to the governance system
  - Implementation of long term management plans

5. Immediate suggested action

According to the current state of the stocks and the recommendations made by the CGPM and the STECF an immediate action is needed for all interested parties to globally and significantly reduce fishing mortality in demersal fisheries through the general reduction of effective fishing effort. Particular attention should be paid to all hake stocks as a matter of urgency.

Recovering potential of Mediterranean stocks is still very high!!!

CREDITS:

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GSA05: Estado de explotación de los ecosistemas

TABLE 1. – Number of trawlers and gross tonnage (GT) per potential fishing ground surface (km^2) in three GFCM geographical sub-areas (GSAs) from the western Mediterranean Sea: GSA01 (Northern Alboran Sea); GSA05 (Balearic Islands); and GSA06 (Northern Spain). Data is given for the different sectors and strata established within the framework of the MEDITS program. Source: Massutí and Guijarro (2004).

GSA	MEDITS sector	Trawlers·km^{-2}	GT km^{-2}
01	Alboran	0.015	0.57
05	Mallorca and Menorca	0.004	0.17
06	Levante	0.016	0.77
06	Tramontana	0.032	1.40

TABLE 3. – Information on elasmobranch assemblages in four different depth strata obtained from MEDITS carried out during 2001-2010 in the GFCM geographical sub-areas (GSAs) Balearic Islands (GSA05) and Northern Spain (GSA06). Total number of hauls analyzed (N), total species richness (total S), and mean values (± S.E.) of abundance (ind. km^{-2}), biomass (kg km^{-2}), and species richness (mean S) per haul are shown. Results of the comparison between areas using the Student's t test are also shown (** significant at P<0.001; n.s. not significant).

Stratum	Index	GSA05	GSA06	t-test	d.f.
50-100 m	N	213	296		
	Total S	18	10		
	Abundance	64.2±4.2	3.5±0.9	35.3 **	507
	Biomass	17.3±1.2	0.9±0.2	28.6 **	
	Mean S	3.03±0.1	0.42±0.04	29.9 **	
100-200 m	N	162	173		
	Total S	18	11		
	Abundance	74.0±7.1	19.0±4.4	14.3 **	333
	Biomass	15.1±4.2	2.7±0.4	12.8 **	
	Mean S	3.38±0.1	0.99±0.06	20.4 **	
200-500 m	N	102	137		
	Total S	15	10		
	Abundance	135.7±13.2	43.6±5.7	7.1 **	237
	Biomass	8.8±0.9	4.8±0.7	4.6 **	
	Mean S	3.26±0.15	1.54±0.07	10.6 **	
500-800 m	N	102	91		
	Total S	8	5		
	Abundance	28.6±8.5	24.3±3.6	-0.44 n.s.	191
	Biomass	4.2±0.7	4.6±0.6	0.43 n.s.	
	Mean S	2.09±0.08	2.05±0.09	-0.34 n.s.	