

Annex 4

Issues related to the MEDITS reference list of species

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Background

The MEDITS survey programme started in 1994 and adopted the basic protocols by the four first partners, just before the first survey. These protocols included the design of the survey, the sampling gear, the information collected, and the management of the data as far as the production of common standardized analyses of the data (Bertrand et al., 2002). The last updating of protocols has been done in 2007 (MEDITS, 2007). According to it, for each species the total weight and number of individuals is recorded. For a reference list of 38 species of fish, crustaceans and cephalopods, the length frequency by sex must be reported, as well as the maturity stage of the gonads.

However, two different things should be taken into account. On one hand, for most works performed using MEDITS data (including assessments), the length frequency distributions are used, without taking into account the sex. On the other hand, the period of the surveys is not always coincident with the spawning season for all the species in the MEDITS reference list. This document attempts to be a practical exercise in relation to these topics, using both surveys and commercial data, and gives some proposals to the reference list of species.

Data used

Two sources of information have been used: (i) the Spanish MEDITS surveys, from 1994 to 2010 for GSA1 (Northern Alboran Sea) and GSA6 (Northern Spain) and from 2007 to 2010 for GSA5 (Balearic Islands); and (ii) commercial data obtained from Spanish logbooks (2008). Although information from logbooks is not as precise as daily sale bills, this was the only available information covering all the ports from all these areas. In the first case, data was related to species abundance and maturity. In the second one, landings by species were used.

Maturity

The percentage of mature individuals has been estimated for each species and year (1995-2010 for GSAs 1 and 6 and 2007-2010 for GSA 5) and the average values were computed (Table 1). Only individuals from stage 1 were considered as immature.

According to these results, only half (19) of the reference species showed percentages of mature individuals higher than 50%, two (*Mullus barbatus* and *M. surmuletus*) with values higher than 90% and the rest of them (17: *Boops boops*, *Pagellus acarne*, *P. erythrinus*, *Solea vulgaris*, *Spicara flexuosa*, *S. smaris*, *Trigla lucerna*, *Aristeus antennatus*, *Aristaeomorpha foliacea*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone cirrhosa*, *Illex coindetti*, *Loligo vulgaris*, *Octopus vulgaris* and *Sepia officinalis*) with values between 50 and 80%. A total of 20 species showed values under 50% of mature individuals during the survey, 9 of them between 30 and 50% (*Aspitrigla cuculus*, *Citharus linguatula*, *Lophius budegassa*, *L. piscatorius*, *Scylliorhinus canicula*, *Trachurus mediterraneus*, *Trigloporus lastoviza*, *Zeus faber* and *Eledone moschata*) and up to 11 lower than 30% (*Eutrigla gurnardus*, *Galeus melastomus*, *Helicolenus dactylopterus*, *Lepidorhombus boscii*, *Merluccius merluccius*, *Micromesistius poutassou*, *Pagellus bogaraveo*, *Phycis blennoides*, *Raja clavata*, *T. trachurus* and *Trisopterus minutus capelanus*).

If we consider the percentage of mature individuals by year, important fluctuations are shown for most species, not only fishes (Fig. 1) but also crustaceans and cephalopods (Fig. 2). Many reasons

could explain these fluctuations, including the low number of individuals caught (and sampled) by year, short-time differences in the period of the survey (see Table 2), changes in the spawning season and recruitment period or even differences in the sampling team. Whatever the reasons may be, it implies that the use of this data (e.g. time series analysis, assessment trends) should be cautious and results taken carefully.

Based on available bibliography (Fischer *et al.*, 1987; Guerra, 1992; Froese and Pauly, 2011) and own data, the spawning period for each reference species have been summarized in Table 3. The spawning period of approximately half of these species (21) coincides with the season in which the survey is carried out (spring). Nine of the reference species show their spawning period during autumn.

The Workshop on Sexual Maturity Sampling (WKMAT) (ICES, 2007), carried out under the umbrella of Data Collection Regulation to standardize the methodology and maturity stages of biological sampling, provided a summary of guidelines for obtaining maturity data (page 31), and the first of them was: *Only surveys conducted in the right time compared to the spawning time and with an adequate coverage should be used for a maturity index for the spawning stock.* In these sense, the MEDITS List of Reference species should be revised and updated following this recommendation.

Species occurrence

The mean number of individuals caught by year and by area was computed (Table 4). Even taking into account that the mean number of hauls performed by area and year is different, the results showed that, for some species, clear differences can be detected even at a medium geographical scale (inside the same country). For instance, some species are much more abundant in GSA1 (e.g. *Galeus melastomus*, *Helicolenus dactylopterus*, *Pagellus acarne*, *P. bogaraveo* and *Parapenaeus longirostris*), others in GSA5 (e.g. *Mullus surmuletus*, *Raja clavata*, *Scyliorhinus canicula*, *Spicara smaris*, *Trachurus mediterraneus* and *Trigloporus lastoviza*) and others in GSA6 (e.g. *Boops boops*, *Citharus linguatula*, *Eutrigla gurnardus*, *T. trachurus*, *Trisopterus minutus capelanus*, *Nephrops norvegicus*, *Eledone cirrhosa* and *Illex coindetti*).

Also for some sympatric species, their relative abundance differs among areas. In the case of *Mullus*, *M. barbatus* is more abundant than *M. surmuletus* in GSA1 and GSA6 than in GSA5. Similarly for *Lophius*, *L. budegassa* is much more abundant than *L. piscatorius* in GSA1 and GSA6 than in GSA5, in which the proportion of both species is quite similar.

Commercial landings

When compared to the commercial landings from the bottom trawl fleet at national level, many of the most important species in terms of biomass (22 of 30) are included in the MEDITS reference list (Table 5). However, if we consider landings by GSA for the MEDITS reference list of species (Table 6), more than half of the species showed a contribution lower than 1% in the three GSAs analysed. Aside of this, although the absolute values are not comparable between areas (due to the important differences in fishing effort, see Table 6), the contribution differs among areas for some of the species such as *Merluccius merluccius*, *Spicara smaris*, *Trachurus* spp., *Zeus faber*, *Aristeus antennatus*, *Parapenaeus longirostris* or *Octopus vulgaris*.

The Data Collection Framework (DCF) rules are a flexible framework to standardize the collection of fisheries data in the European countries. The rules allow focus the sampling effort in the main fisheries and species of each country and area. In the DCF Regulation (Commission Decision 93/2010), the biological variables related to the stock (reproductive biology and age) are collected for the main species of each country (more of 200 t of catches and/or more than 10% of the regional catches). For Spain, 15 species have been selected following these rules, being 13 of them demersals (*Lophius budegassa*, *Merluccius merluccius*, *Micromesistius poutassou*, *Mullus barbatus*, *M. surmuletus*, *Scomber* spp., *Trachurus mediterraneus*, *T. trachurus*, *Aristeus antennatus*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Loligo vulgaris* and *Octopus vulgaris*). Although they represent in number less than half of the number of the MEDITS reference list of species, when consider total landings, their contribution only differs by 10% (Figure 3). For these reason, a similar way to select the MEDITS reference species could be applied.

Other DCF surveys

A comparison with ICES International Bottom Trawl Surveys (IBTS) has been performed, taking into account the IBTS western and southern areas, whose coordination started in 1997 and in which significant level of standardisation has been achieved within the sampling protocols (IBTS, 2002). For these surveys, length distributions are recorded for all fish and commercial species (crustaceans and cephalopods) caught. Biological parameters (length, weight, sex and maturity stage, among others) and hard structures (otoliths and ilicia) are collected for those species of commercial interest in each area. For instance the IBTS carried out by Spain perform the biological sampling of between 8 and 16 species (Table 7). In all cases, less than half of the MEDITS reference list of species.

Conclusions

- Only half of the MEDITS reference species showed mean percentages of matures higher than 50%, which agrees with the fact that the spawning period of only half of the species coincides with the season of the survey. This fact, together with the important inter-annuals fluctuations found in the percentage of mature individuals for most of the species, implies that the maturity data from MEDITS surveys should be used carefully.
- For some of the MEDITS reference list species, important differences have been found in their abundance at the small geographical scale analysed (GSA inside the same country), both with survey and commercial data, which suggest that they could be even higher at regional level (Mediterranean). This implies that many maturity data for low abundant species are collected but not used, as the scarcity of the information obtained prevents for being used for any analytical assessment.
- When comparing with other DCF standardised surveys, the number of species for biological sampling (BS: individual weight, sex and maturity stage) in MEDITS surveys are more than double. On the contrary, according to the MEDITS protocol, it is no compulsory to obtain length frequency distributions (LFD) for many species. BS is more time consuming and subjective (closely related to the sampler) than LFD, but their use for analytical assessment is more limited. In this sense, focussing the sampling effort in LFD for more species instead of BS for non abundant species should be prioritised, as LFD could be used for analytical assessment both at stock and at community level.

Recommendations

- In relation to the first conclusion, the MEDITS protocol should follow the ICES Workshop on Sexual Maturity Sampling (WKMAT; 2007) recommendation “*Only surveys conducted in the right time compared to the spawning time and with an adequate coverage should be used for a maturity index for the spawning stock*”, and update the reference list of species.
- In relation to the second conclusion, the selection of species of the MEDITS reference list should be more flexible and related to fishery importance at national level, in a similar way that DCF rules work. In this sense, each country should be allowed to select at least part of their own reference list, following new MEDITS agreed rules.
- In relation to the third conclusion, we consider that focussing the sampling effort in LFD for more species, instead of BS for non abundant species, should be prioritised, as LFD could be used for analytical assessment, both at stock and at community level. In this sense, we agree with the recommendation of PGMed (PGMed, 2011) related to the creation of two different lists for sampling during surveys:
 - o A list of target species for which all parameters should be collected (sex, maturity, weight and age; stock-related variables in the DCF).
 - o A second list of species for which only length should be collected (metier-related variables in the DCF).

References

- Bertrand, J.A., L. Gil de Sola, C. Papaconstantinou, G. Relini and A. Souplet, 2002. The general specifications of the MEDITS surveys. *Scientia Marina* 66 (Suppl. 2): 9-17.
- Commission Decision 93/2010 of 18 December 2009 adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013.
- Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in fisheries sector and support for scientific advice regarding the Common Fisheries Policy.
- Fischer, W., M.-L. Bauchot and M. Schneider (eds.), 1987. Fiches FAO d'identification des espèces pour les besoins de la pêche. (Révision 1). Méditerranée et mer Noire. Zone de Pêche 37. FAO, Rome. 1529 p.
- Froese, R. and D. Pauly. Editors, 2011. FishBase. World Wide Web electronic publication. www.fishbase.org; version (02/2011).
- Guerra, A., 1992. Mollusca, Cephalopoda. In: Fauna Ibérica, vol. 1. Ramos, M.A. et al (eds). Museo Nacional de Ciencias Naturales. CSIC. Madrid. 327 p.
- IBTS, 2002. Manual for the International Bottom Trawl Surveys in the Western and Southern Areas. Revision II. Agreed during the meeting of the International Bottom Trawl Survey Working Group. 8-12 April 2002, Dublin. http://www.ices.dk/datacentre/datras/SWAreas_Manual.pdf
- ICES. 2007. Report of the Workshop on Sexual Maturity Sampling (WKMAT), 15–19 January 2007, Lisbon, Portugal. ICES CM 2007/ACFM:03. 85 pp.
- MEDITS, 2007. International bottom trawl survey in the Mediterranean (MEDITS). Instruction manual Version 5.
- PGMed, 2011. Report of the 5th Meeting of the Mediterranean Planning Group for Methodological Development. Vienna (Austria), 7-11 February 2011.

Table 1.- Average percentage of matures (only individuals from stage 1 were considered) by species, estimated from the Spanish MEDITS surveys: from 1994 to 2010 for GSA1 (Northern Alboran Sea) and GSA6 (Northern Spain), and from 2007 to 2010 for GSA5 (Balearic Islands).

Species	Matures (%)
<i>Aspitrigla cuculus</i>	42.6
<i>Boops boops</i>	65.5
<i>Citharus linguatula</i>	47.5
<i>Eutrigla gurnardus</i>	21.9
<i>Galeus melastomus</i>	20.2
<i>Helicolenus dactylopterus</i>	15.5
<i>Lepidorhombus boschii</i>	22.0
<i>Lophius budegassa</i>	44.2
<i>Lophius piscatorius</i>	30.0
<i>Merluccius merluccius</i>	2.8
<i>Micromesistius poutassou</i>	21.9
<i>Mullus barbatus</i>	98.2
<i>Mullus surmuletus</i>	96.8
<i>Pagellus acarne</i>	65.8
<i>Pagellus bogaraveo</i>	10.3
<i>Pagellus erythrinus</i>	69.4
<i>Phycis blenoides</i>	11.5
<i>Raja clavata</i>	15.7
<i>Scyliorhinus canicula</i>	43.3
<i>Solea vulgaris</i>	73.0
<i>Spicara flexuosa</i>	69.1
<i>Spicara smaris</i>	77.3
<i>Trachurus mediterraneus</i>	44.5
<i>Trachurus trachurus</i>	16.7
<i>Trigla lucerna</i>	76.8
<i>Trigloporus lastoviza</i>	44.2
<i>Trisopterus minutus capelanus</i>	16.7
<i>Zeus faber</i>	36.7

Species	Matures (%)
<i>Aristeus antennatus</i>	52.8
<i>Aristaeomorpha foliacea</i>	75.0
<i>Nephrops norvegicus</i>	77.3
<i>Parapenaeus longirostris</i>	74.2

Species	Matures (%)
<i>Eledone cirrhosa</i>	59.1
<i>Eledone moschata</i>	31.4
<i>Illex coindetti</i>	62.0
<i>Loligo vulgaris</i>	62.6
<i>Octopus vulgaris</i>	64.9
<i>Sepia officinalis</i>	78.9

Table 2.- Dates of the Spanish MEDITS surveys, which covered GSA1 (Northern Alboran Sea) and GSA6 (Northern Spain) during 1994-2006, and GSA1, GSA5 (Balearic Islands) and GSA6 during 2007-2010.

Year	Date of the survey	Year	Date of the survey	Year	Date of the survey
1994	28 th May - 19 th June	2000	22 nd May - 23 rd June	2006	5 th May - 13 th June
1995	22 th April - 21 st May	2001	12 th May - 14 th June	2007	19 th May - 27 th June
1996	2 nd - 27 th May	2002	11 th May - 13 rd June	2008	6 th May - 8 th June
1997	9 th May - 3 rd June	2004	6 th May - 3 rd June	2009	8 th April - 21 st May
1998	3 rd - 30 th May	2003	26 th April - 26 th May	2010	16 th May - 5 th June
1999	4 th May - 3 rd June	2005	5 th May - 6 th June		

Table 3.- Spawning seasons (in grey) for the MEDITS reference species, based on available bibliography (Fischer et al., 1987; Guerra, 1992; Froese and Pauly, 2011) and own data.

Species	Spring	Summer	Autumn	Winter
<i>Aspitrigla cuculus</i>				
<i>Boops boops</i>				
<i>Citharus linguatula</i>				
<i>Eutrigla gurnardus</i>				
<i>Galeus melastomus</i>				
<i>Helicolenus dactylopterus</i>				

<i>Lepidorhombus boscii</i>				
<i>Lophius budegassa</i>				
<i>L. piscatorius</i>				
<i>Merluccius merluccius</i>				
<i>Micromesistius poutassou</i>				
<i>Mullus barbatus</i>				
<i>M. surmuletus</i>				
<i>Pagellus acarne</i>				
<i>P. bogaraveo</i>				
<i>P. erythrinus</i>				
<i>Phycis blennoides</i>				
<i>Raja clavata</i>				
<i>Scyliorhinus canicula</i>				
<i>Solea vulgaris</i>				
<i>Spicara flexuosa</i>				
<i>S. smaris</i>				
<i>Trachurus mediterraneus</i>				
<i>T. trachurus</i>				
<i>Trigla lucerna</i>				
<i>Trigloporus lastoviza</i>				
<i>Trisopterus minutus capelanus</i>				
<i>Zeus faber</i>				
<i>Aristaeomorpha foliacea</i>				
<i>Aristeus antennatus</i>				
<i>Nephrops norvegicus</i>				
<i>Parapenaeus longirostris</i>				
<i>Eledone cirrhosa</i>				
<i>Eledone moschata</i>				
<i>Illex coindetii</i>				
<i>Loligo vulgaris</i>				
<i>Octopus vulgaris</i>				
<i>Sepia officinalis</i>				

Table 4.- Mean annual number of individuals caught during the Spanish MEDITS surveys, by GSA for the period 1994-2010 (GSA1: Northern Alboran Sea; GSA6: Northern Spain) and 2007-2010 (GSA5: Balearic Islands). Mean annual number of hauls by GSA is also included.

Area	GSA1	GSA5	GSA6	Area	GSA1	GSA5	GSA6
Number of hauls	38	50	74	Number of hauls	38	50	74
<i>A. cuculus</i>	19	1850	111	<i>S. vulgaris</i>	2	2	8
<i>B. boops</i>	1599	1739	2586	<i>S. flexuosa</i>	373	0	1804
<i>C. linguatula</i>	13	148	181	<i>S. smaris</i>	423	31675	905
<i>E. gurnardus</i>	0	3	87	<i>T. mediterraneus</i>	304	6799	1298
<i>G. melastomus</i>	3772	2402	467	<i>T. trachurus</i>	3132	16047	9401
<i>H. dactylopterus</i>	1401	565	811	<i>T. lucerna</i>	2	1	13
<i>L. boscii</i>	1	293	111	<i>T. lastoviza</i>	78	446	113
<i>L. budegassa</i>	45	29	118	<i>T. minutus capelanus</i>	5	1214	4875
<i>L. piscatorius</i>	2	34	28	<i>Z. faber</i>	11	97	42
<i>M. merluccius</i>	682	1835	8964	<i>A. antennatus</i>	435	670	529
<i>M. poutassou</i>	7222	6256	49565	<i>A. foliacea</i>	0	2	2
<i>M. barbatus</i>	482	824	1140	<i>N. norvegicus</i>	147	463	939
<i>M. surmuletus</i>	96	4879	140	<i>P. longirostris</i>	493	167	165
<i>P. acarne</i>	3230	446	546	<i>E. cirrhosa</i>	76	159	305
<i>P. bogaraveo</i>	624	10	132	<i>E. moschata</i>	14	18	14
<i>P. erythrinus</i>	96	222	319	<i>I. coindetii</i>	122	509	534

<i>P. blennoides</i>	953	406	1137	<i>L. vulgaris</i>	13	205	21
<i>R. clavata</i>	1	205	2	<i>O. vulgaris</i>	112	345	86
<i>S. canicula</i>	343	2826	898	<i>S. officinalis</i>	11	16	14

Table 5.- Spanish landings (in tonnes; from logbooks during 2008) of the most important species in terms of biomass (accumulated contribution of 90%), with their specific and accumulated contributions (as percentage).

Species	Landings (t)	%	Accumulated %	MEDITS reference list
<i>Trachurus</i> spp.	3349.75	15.76	15.76	X
<i>M. merluccius</i>	3292.92	15.5	31.26	X
<i>M. poutassou</i>	2694.56	12.68	43.94	X
<i>O. vulgaris</i>	1441.75	6.78	50.72	X
<i>Mullus</i> spp.	1355.23	6.38	57.1	X
<i>Lophius</i> spp.	982.39	4.62	61.72	X
<i>A. antennatus</i>	880.35	4.14	65.86	X
<i>Scomber scombrus</i>	656.29	3.09	68.95	
<i>N. norvegicus</i>	425.23	2.00	70.95	X
<i>S. officinalis</i>	386.98	1.82	72.77	X
<i>P. erythrinus</i>	286.34	1.35	74.12	X
<i>S. smaris</i>	275.10	1.29	75.42	X
<i>Brachyura</i>	267.76	1.26	76.68	
<i>Sparus aurata</i>	264.73	1.25	77.92	
<i>P. blennoides</i>	260.07	1.22	79.15	X
<i>L. vulgaris</i>	237.89	1.12	80.27	X
<i>Sardina pilchardus</i>	194.68	0.92	81.18	
<i>P. bogaraveo</i>	161.59	0.76	81.94	X
<i>P. longirostris</i>	157.08	0.74	82.68	X
<i>Todarodes sagittatus</i>	155.42	0.73	83.41	X
<i>Raja</i> spp.	137.75	0.65	84.06	X
<i>Engraulis encrasicolus</i>	120.21	0.57	84.63	
<i>S. canicula</i>	118.84	0.56	85.19	X
<i>C. linguatula</i>	107.71	0.55	85.73	X
<i>T. minutus capelanus</i>	102.84	0.55	86.28	X
<i>Eledone</i> spp.	92.81	0.53	86.81	X
<i>Cepola rubescens</i>	90.25	0.52	87.33	
Pandalidae	87.32	0.51	87.84	
<i>P. acarne</i>	84.25	0.51	88.35	X
Triglidae	83.73	0.51	88.86	X
Trachinidae	81.7	0.50	89.36	
<i>Murex</i> spp.	78.9	0.42	89.78	
<i>B. boops</i>	76.77	0.40	90.18	X

Table 6.- Spanish landings (in tonnes; from logbooks during 2008) by species and GSA (Northern Alboran Sea: GSA1; Balearic Islands: GSA5; Northern Spain: GSA6), and contribution (as percentage) to the total biomass landed by GSA. Fishing effort, as number of trawlers, is also included.

Number of trawlers	GSA1		GSA5		GSA6	
	190		40		567	
Reference MEDITS species	Tonnes	%	Tonnes	%	Tonnes	%
<i>B. boops</i>	12.8	0.3	0.1	0.1	63.8	0.4
<i>C. linguatula</i>	5.3	0.1	0.7	0.1	101.7	0.7
<i>G. melastomus</i>	6.5	0.2	11.7	0.7	13.8	0.1
<i>H. dactylopterus</i>	15.1	0.4	2.2	0.1	26.6	0.2
<i>L. boscii</i>	2.9	0.1	10.4	0.6	5.4	0.1
<i>Lophius</i> spp.	197.2	4.9	68.6	4.2	716.6	4.6
<i>M. merluccius</i>	252.6	6.3	83.2	5	2957.1	19
<i>M. poutassou</i>	459.4	11.4	164.7	10	2070.5	13.3

<i>Mullus</i> spp.	235.5	5.8	133.5	8.1	986.3	6.3
<i>P. acarne</i>	52.3	1.3	4.3	0.3	27.6	0.2
<i>P. bogaraveo</i>	73.5	1.8	1.4	0.1	86.7	0.6
<i>P. erythrinus</i>	21.3	0.5	8.9	0.5	256.2	1.6
<i>P. blennoides</i>	21.2	0.5	14	0.8	137.3	0.9
<i>R. clavata</i>	0.1	0.1	0.1	0.1	0.5	0.1
<i>S. canicula</i>	1.7	0.1	22.1	1.3	0.3	0.1
<i>Solea</i> spp.	17.9	0.4	3.4	0.2	18.4	0.1
<i>Spicara</i> spp.	22.2	0.6	238.5	14.5	14.4	0.1
<i>Trachurus</i> spp.	1017.3	25.2	95.2	5.8	2237.3	14.4
Triglidae*	28.6	0.7	4.9	0.3	72.9	0.5
<i>T. minutus capelanus</i>	11.6	0.3	11	0.7	80.2	0.5
<i>Z. faber</i>	8.7	0.2	43.2	2.6	19.3	0.1
<i>A. foliacea</i>	0.1	0.1	0.2	0.1	0.2	0.1
<i>A. antennatus</i>	155.8	3.9	176.4	10.7	548.1	3.5
<i>N. norvegicus</i>	70.7	1.7	42.4	2.6	312.2	2
<i>P. longirostris</i>	120.2	3	4.1	0.3	32.7	0.2
<i>E. cirrhosa</i>	3	0.1	0.1	0.1	45.3	0.3
<i>E. moschata</i>	0.1	0.1	13.5	0.8	2.6	0.1
<i>I. coindetii</i>	0.1	0.1	0.1	0.1	73.4	0.5
<i>L. vulgaris</i>	35.1	0.9	45.6	2.8	157.2	1
<i>O. vulgaris</i>	453.5	11.2	134.2	8.1	804.7	5.2
<i>S. officinalis</i>	78.9	2	7.4	0.4	300.7	1.9

(*) *Aspitrigla cuculus*, *Eutrigla gurnardus*, *Trigla lucerna* and *Trigloporus lastoviza*, together with other non MEDITS reference species.

Table 7.- List of reference species for biological sampling (length, weight, sex, maturity stage and hard structures) in three of the IBTS, from western and southern areas.

IBTS 4° Porcupine Groundfish	<i>Conger conger</i> , <i>Gyptocephalus cynoglossus</i> , <i>Helicolenus dactylopterus</i> , <i>Lepidorhombus boscii</i> , <i>L. whiffiagonis</i> , <i>Lophius budegassa</i> , <i>L. piscatorius</i> , <i>Merlangius merlangius</i> , <i>Merluccius merluccius</i> , <i>Micromesistius poutassou</i> , <i>Molva molva</i> , <i>M. macroptalma</i> and <i>Scomber scombrus</i> .
IBTS 4° VIIIc and IXa North	<i>Conger conger</i> , <i>Engraulis encrasicolus</i> , <i>H. dactylopterus</i> , <i>L. boscii</i> , <i>L. whiffiagonis</i> , <i>L. budegassa</i> , <i>L. piscatorius</i> , <i>M. merluccius</i> , <i>M. poutassou</i> , <i>M. molva</i> , <i>S. scombrus</i> , <i>Scomber colias</i> , <i>Trachurus mediterraneus</i> , <i>T. picturatus</i> , <i>T. Trachurus</i> and <i>Trisopterus minutus capelanus</i> .
IBTS 4° IXa South	<i>M. merluccius</i> , <i>Parapenaeus longirostris</i> , <i>Eledone cirrhosa</i> , <i>E. moschata</i> , <i>Loligo forbesii</i> , <i>L. vulgaris</i> , <i>Octopus vulgaris</i> and <i>Sepia officinalis</i> .

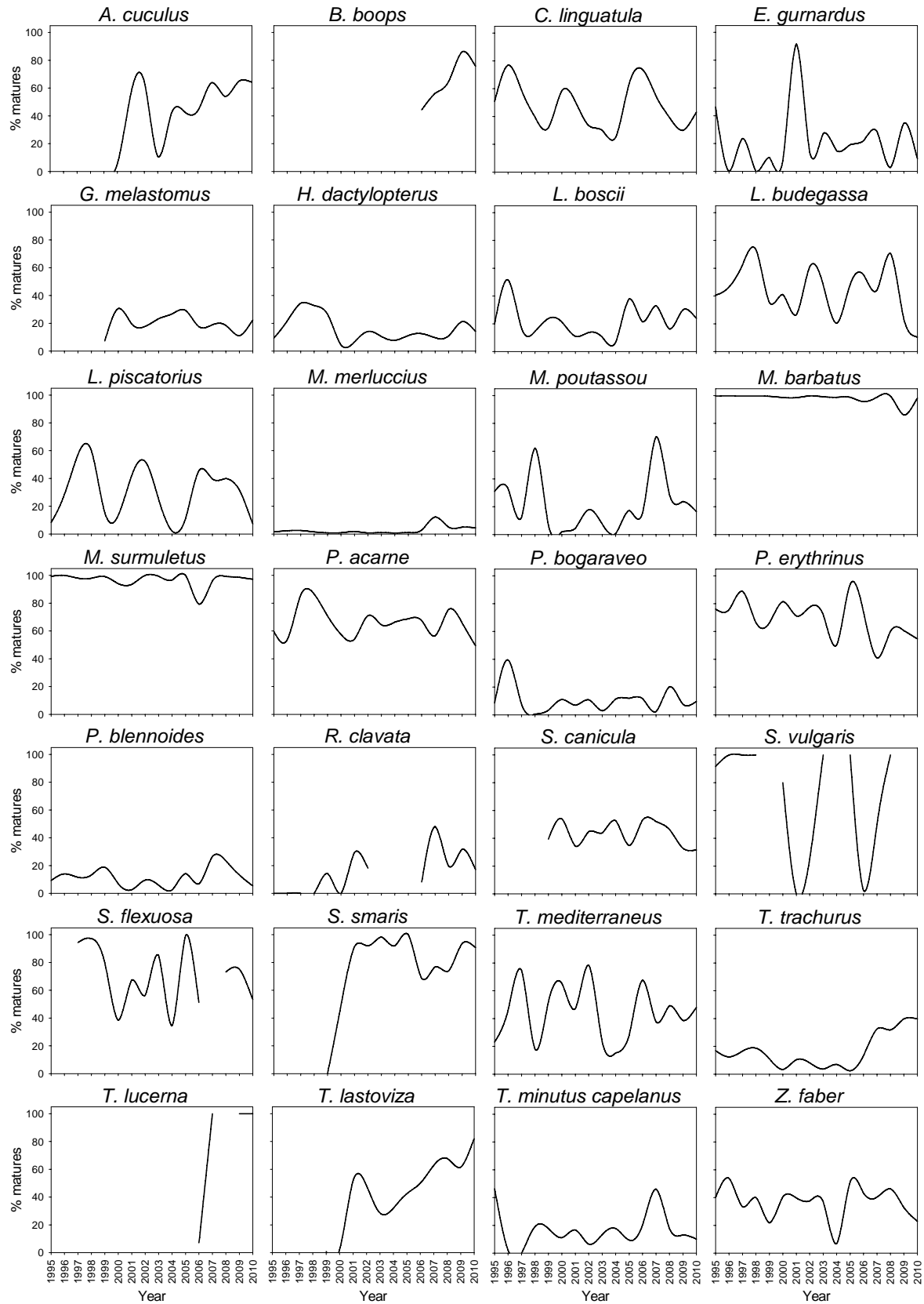


Figure 1.- Annual percentage of mature individuals for the MEDITS reference list fish species for Spain (GSA1: Northern Alboran Sea; GSA5: Balearic Islands; GSA6: Northern Spain).

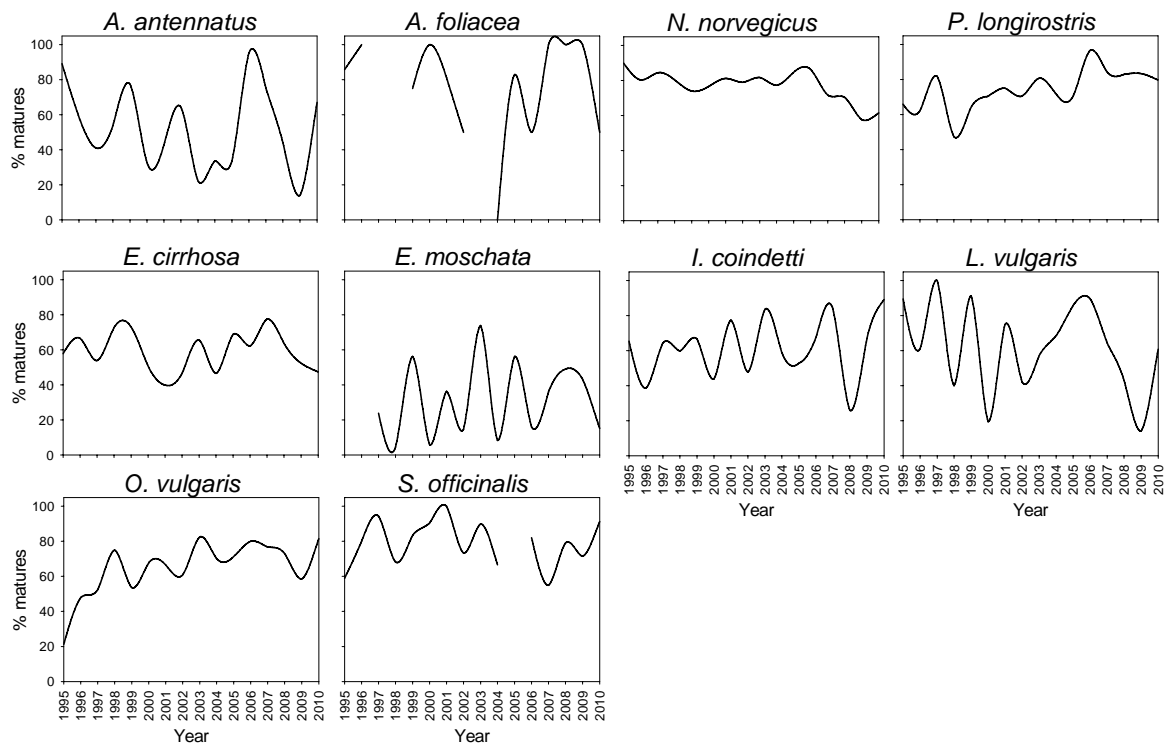


Figure 2.- Annual percentage of mature individuals for the MEDITS reference list crustacean and cephalopod species for Spain (GSA1: Northern Alboran Sea; GSA5: Balearic Islands; GSA6: Northern Spain).

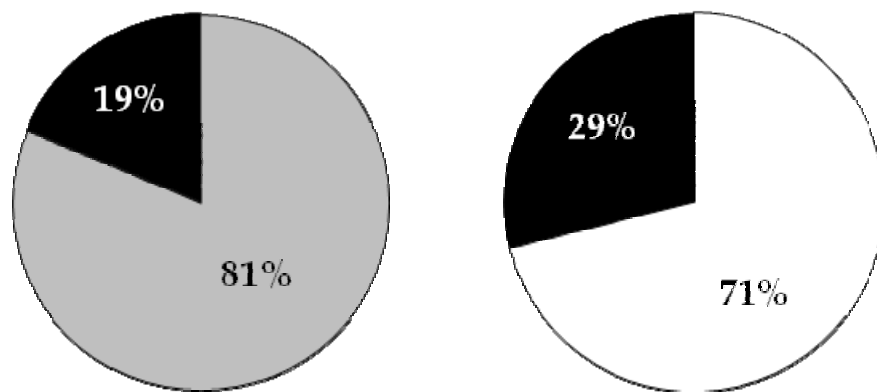


Figure 3.- Landings contribution (from logbooks during 2008) of the MEDITS reference list of species (grey; 38 species) and of the Spanish Data Collection Framework selected species for stock-related sampling (white; 13 species) in relation to total landings of the Spanish bottom trawl fishery.