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MEDITERRANEAN MARINE DEMERSAL RESOURCES: THE MEDITS INTERNATIONAL TRAWL SURVEY (1994-1999).
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The general specifications of the MEDITS surveys*

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SUMMARY: An international bottom trawl survey was designed from a European Commission's initiative to produce biological data on the demersal resources in the Mediterranean Sea. Nine Mediterranean countries are associated in the programme, which covers all the trawlable areas along their coasts from 10 to 800 m depth. From 1994 to 2000, one survey was carried out each year, applying common standardized protocols. Seven yearly surveys have therefore been done, with a total of 7,500 stations prospected. This paper presents the methods adopted to carry out the surveys.

Key words: trawl survey, Mediterranean Sea, trawl gear

INTRODUCTION

The Mediterranean Sea is a complex biogeographic system including a large variety of specific areas. Due to the small extension of the continental shelf in most of the areas, benthic and demersal resources are mainly exploited close to the shore. As most of the benthic and demersal fish stocks are defined and exploited at a national level, and as exploitation is strongly distributed in a wide number of units (type of vessels, fishing techniques, landing ports, species caught, etc.), very little global information was, at the start of the programme, available on the status of these fisheries resources.

In some Mediterranean areas, national programmes of bottom trawl surveys were carried out routinely since the early eighties (Liorzou *et al.*, 1989; Relini, 2000). All these programmes were designed with protocols defined at local level.

The MEDITS survey programme intended to produce basic information on benthic and demersal species in terms of population distribution as well as demographic structure, on the continental shelves and along the upper slopes at a global scale in the Mediterranean. The programme began with only four partner countries (Spain, France, Italy and Greece). Nevertheless, the intention was to organize the protocols in such a way as to easily permit the enlargement of the programme to other Mediterranean countries.

So, when the partners decided to organize the MEDITS survey, one of the main challenges of the project was the adoption of common standardized sampling protocols. The basic protocols have been adopted by the four first partners early in 1994, just before the first survey. These protocols included

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TABLE 1. – The MEDITS Steering Committee.

Area (clockwise)	**Name** (and period)
CC, general co-ordinator	Jacques A. BERTRAND, IFREMER France (1994-1999) Arnauld SOUPLET, IFREMER France (2000) Giulio RELINI, SIBM/Dip.Te.Ris Italy (2001<)
CC, Spanish and Morrocan area	Luis GIL DE SOLA, IEO Spain (1994 <)
CC, French area	Arnauld SOUPLET, IFREMER France (1994 <)
CC, Italian, Albanian, Croatian, Slovenian and Maltese areas	Giulio RELINI, SIBM/Dip.Te.Ris Italy (1994 <)
CC, Greek area	Costas PAPACONSTANTINOU, NCMR Greece (1994 <)
South Alboran Sea	Ali Srairi, INRH Morroco (1999 <)
Ligurian Sea, North and Central Tyrrhenian Sea (M1)	Gianni ARDIZZONE, DBAU Italy (1994 <)
Sardinia (M2)	Angelo CAU, DBAE Italy (1994 <)
South Tyrrhenian Sea and Sicilian Channel (M3)	Dino LEVI, IRMA-CNR Italy (1994 <)
Sicilian Channel (Maltese area)	Matthew CAMILLIERI, MAF-DFA-NAC Malta (2000 <)
West Ionian Sea South Adriatic Sea (M4)	Giovanni MARANO, LBMB Italy (1994 <)
North and Central Adriatic Sea (M5)	Corrado PICCINETTI, LBMP Italy (1994 <)
North-East Adriatic Sea (Slovenian area)	Stanko CERVEK, NIB Slovenia (1996-1998) Bojan MARCETA, NIB Slovenia (1998 <)
Central-East Adriatic Sea (Croatian area)	Stjepan JUKIC-PELADIC, IOR Croatia (1996 <)
South-East Adriatic Sea (Albanian area)	Alexander FLLOKO, MAF Albania (1996-1998) Kastriot OSMANI, IKP-FSA Albania (1998 <)
Argosaronic Gulf and East Ionian Sea (G2)	Chrissi-Yianna POLITOU, NCMR Greece (1995 <)
North Aegean Sea (G1)	Argyris KALLIANOTIS, IFR Greece (1996 <)
South Aegean Sea (G3)	Argyris KALLIANOTIS, IMBC Greece (1994-1996) Georgios TSERPES, IMBC Greece (1996 <)
Trawl technology	Pierre-Yves DREMIÈRE, IFREMER France (1994 <) Loris FIORENTINI, IRPEM-CNR Italy (1994-1998) Giulio COSIMI, IRPEM-CNR Italy (1999 <)

CC: Co-ordination Committee; <: outstanding

the design of the survey, the sampling gear (feature and handling), the information collected, and the management of the data as far as the production of common standardized analyses of the data. Before the first survey, all the common protocols were brought together in a "Manual of protocols" agreed by the Steering Committee of the programme (Table 1), distributed to the participants before the first survey (1994), and published later (Anon., 1998) to ensure its distribution. This manual has been established from different experiences, and particularly from that of the IBTS Group (ICES, 1992). The protocols have been amended when necessary for the following surveys, and particularly in 1995 to take into account the experience gained during the first survey.

A first publication describing the MEDITS surveys was done a few years ago (Bertrand *et al.*, 2000a). This paper intends to outline the main specifications of the programme and to present its evolution since 1998.

Study area

The MEDITS programme aims to conduct co-ordinated surveys from bottom trawling in the Mediterranean Sea. So far, the surveys cover all the trawlable areas over the shelves and the upper slopes from 10 to 800 m depth in the sampled area.

The working zone is defined as the totality of the trawlable areas off the coasts of the partner countries (Fig. 1) from 10 to 800 m depth. These limits have been adopted to cover at best the distribution areas of the main exploited - or potentially exploitable - species, considering the administrative and technical constraints of the project. The first two surveys (1994 and 1995) have been conducted only along the coasts of Spain, France, Italy and Greece. In 1996 the area was enlarged to cover almost all the Adriatic Sea (including Slovenian, Croatian and Albanian waters). The south of the Alborán Sea has been included in the survey programme since 1999 (the Moroccan contribution), and the waters around Malta were surveyed in 2000.

The stations have been distributed applying a stratified sampling scheme with random drawing inside each stratum. The stratification parameter adopted was the depth, with the following bathymetric limits: 10, 50, 100, 200, 500 and 800 m (Fig. 1). Each position has been selected randomly in small sub-areas defined to get a compromise between the constraints of statistics based on random sampling and those of geostatistics (Green, 1979; Hilborn and Walters, 1992).

The foreseen average sampling rate was one station per 60 square nautical miles in all the areas except in the Adriatic where it was laid down to one

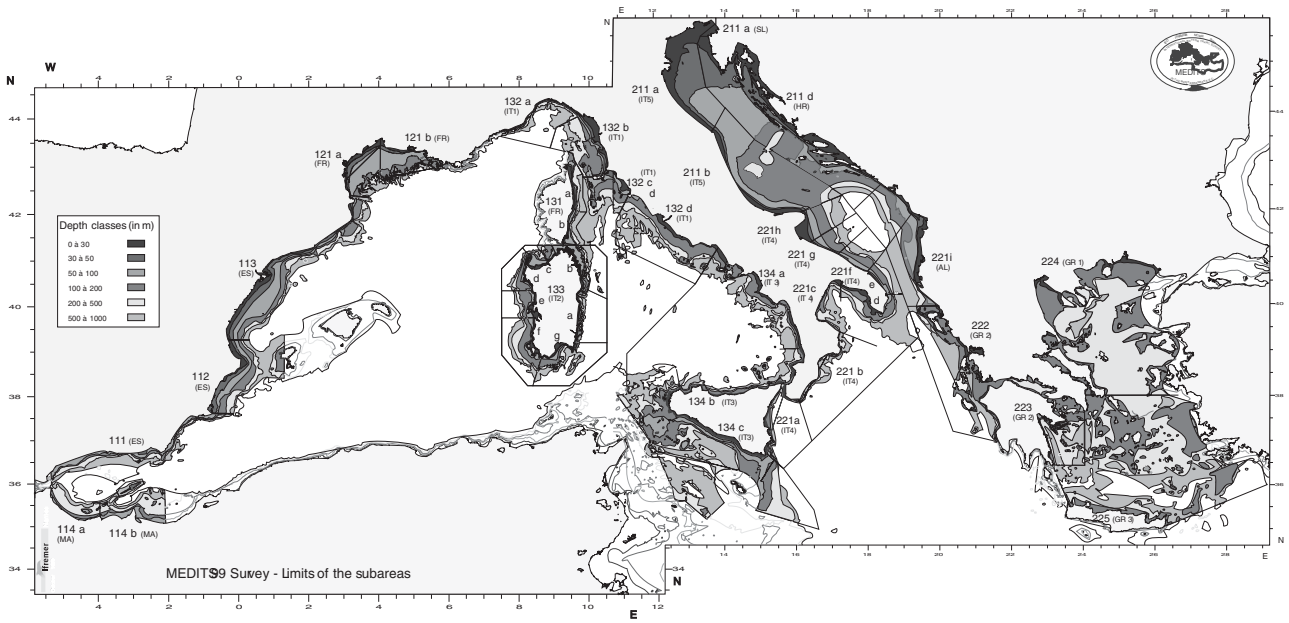

Fig. 1.- Study area of the MEDITS trawl surveys. Limits of the sampling strata (MEDITS 1999).

station per 200 square nautical miles because of the relative monotony of the depth. The same positions were visited each year. A total of about one thousand hauls was carried out during each annual survey (Table 2). Taking into account the total trawlable surface of the area (504,000 km^2 in 1999) and the surface swept during each haul, the average ratio of surface sampled by survey is about 0.026% (Table 3).

Sampling gear

At the beginning of the project, it was decided that the same sampling gear should be used throughout the study by all teams. The standard device is a bottom trawl, including all the material and its rigging from the doors to the codend of the net. The chosen gear (GOC 73) is a bottom trawl (Fiorentini *et al.*, 1999) designed for experimental fishing with scientific purpose. It achieves a compromise between different constraints. In particular, the characteristics of this gear make it usable over the depth range and in the various conditions encountered in the whole survey area. To increase the catch of demersal species, it has a vertical opening slightly superior to the most common professional gears used in the area. Its codend mesh size is 20 mm (stretched mesh).

TABLE 2. – Number of hauls carried out by area during the MEDITS 1994 to 2000 surveys.

Area (clockwise)	1994	1995	1996	1997	1998	1999	2000
Morroco (MA)						62	55
Spain (ES)	83	111	107	102	94	117	114
France (FR) - F1	70	68	65	76	71	66	68
France (FR) - F2	22	22	24	13	24	25	24
Italy (IT) - M1	153	153	153	153	153	153	153
Italy (IT) - M2	123	108	125	126	123	124	123
Italy (IT) - M3	140	142	141	141	141	141	141
Malte (ML)							5
Italy (IT) - M4	146	146	146	146	146	146	146
Italy (IT) - M5	86	86	85	86	86	84	85
Slovenia (SL)		2	2	2	2	2	2
Croatia (HR)			50	51	50		48
Albania (AL)			40	40	40	40	40
Greece (GR) - G2	23	31	41	40	53	53	31
Greece (GR) - G1	44	43	64	64	64	64	65
Greece (GR) - G3	43	46	52	60	61	61	55
Total	933	958	1095	1100	1108	1138	1155

TABLE 3. – MEDITS 1999: Sampling scheme on the different strata, with indication (within each area and depth stratum) of the trawlable surface area (km^2), number of hauls and sampling rate (percentage of the trawlable area sampled). Location of areas is shown in Fig. 1.

	Area	N°strata	10-50 m		50-100 m		100-200 m		200-500 m		500-800 m		TOTAL	
ES	1.1.1a	01-05	510	2	2081	5	1218	3	3682	11	5262	13	12753	34
				0.0171		*0.011*		*0.0138*		*0.0277*		*0.0219*		
	1.1.2a	01-05	1130	3	4095	10	3302	6	4242	6	3159	5	15928	30
				0.0109		*0.0105*		*0.0076*		*0.0111*		*0.0114*		
	1.1.3a	01-05	1896	4	7219	17	3587	9	2477	7	1399	6	16578	43
				0.0075		*0.0089*		*0.0092*		*0.0182*		*0.0273*		
FR	1.2.1a	01-05	1482	8	3911	22	819	2	709	4	660	4	7581	40
				0.0251		*0.0271*		*0.0135*		*0.0632*		*0.0542*		
	1.2.1b	06-10	696	4	2610	10	1734	8	653	2	586	1	6279	25
				0.0266		*0.0161*		*0.0239*		*0.0293*		*0.0147*		
	1.3.1a	01-05	166		521	3	234	2	920	5	867	3	2708	13
				0.0000		*0.0271*		*0.0217*		*0.0603*		*0.0433*		
	1.3.1b	06-10	0		524	3	153	3	383	3	960	2	2020	11
				0.0000		*0.0287*		*0.0737*		*0.0911*		*0.0211*		
IT1	1.3.2a	01-05	657	2	729	3	658	3	1737	7	2093	9	5874	24
				0.0146		*0.0177*		*0.0229*		*0.0381*		*0.0425*		
	1.3.2b	06-10	2053	8	1598	6	3186	13	2449	10	879	4	10165	41
				0.0183		*0.0194*		*0.0200*		*0.0349*		*0.0460*		
	1.3.2c	11-15	945	4	1506	6	2732	10	2828	11	3071	11	11082	42
				0.0232		*0.0215*		*0.0184*		*0.0381*		*0.0336*		
	1.3.2d	16-20	2107	6	2159	6	4302	13	3573	12	3148	9	15289	46
				0.0124		*0.0131*		*0.0154*		*0.0343*		*0.0286*		
IT2	1.3.3a	01-05	822	3	382	2	351	2	589	3	502	3	2646	13
				0.0153		*0.0236*		*0.0233*		*0.0428*		*0.0528*		
	1.3.3b	06-10	910	4	1592	6	839	2	765	3	855	4	4961	19
				0.0170		*0.0156*		*0.0111*		*0.0397*		*0.0418*		
	1.3.3c	11-15	627	3	796	3	512	3	500	2	242	1	2677	12
				0.0200		*0.0166*		*0.0286*		*0.0356*		*0.0278*		
	1.3.3d	16-20	431	2	541	3	896	4	471	2	335	3	2674	14
				0.0190		*0.0188*		*0.0172*		*0.0231*		*0.0804*		
	1.3.3e	21-25	1096	4	446	2	927	5	412	2	260	3	3141	16
				0.0133		*0.0178*		*0.0194*		*0.0434*		*0.1075*		
	1.3.3f	26-30	783	2	987	4	2335	11	1620	8	1041	7	6766	32
				0.0102		*0.0158*		*0.0209*		*0.0465*		*0.0589*		
	1.3.3g	31-35	705	3	350	2	768	4	1060	4	1227	6	4110	19
				0.0120		*0.0250*		*0.0202*		*0.0346*		*0.0410*		
IT3	1.3.4a	01-05	1194	4	1224	6	2095	11	3238	15	5248	21	12999	57
				0.0144		*0.0219*		*0.0255*		*0.0460*		*0.0387*		
	1.3.4b	06-10	622	4	1003	4	1224	6	1966	7	2441	7	7256	28
				0.0275		*0.0178*		*0.0237*		*0.0360*		*0.0284*		
	1.3.4c	11-15	3145	4	6610	8	9866	10	13424	15	15653	19	48698	56
				0.0055		*0.0056*		*0.0049*		*0.0111*		*0.0117*		
IT4	2.2.1a	01-05	259	3	224	2	584	3	1098	3	1273	2	3438	13
				0.0529		*0.0434*		*0.0255*		*0.0242*		*0.0142*		
	2.2.1b	06-10	306	2	278	2	258	2	886	3	989	15	2717	24
				0.0300		*0.0330*		*0.0335*		*0.0301*		*0.1393*		
	2.2.1c	11-15	455	3	305	3	357	2	972	4	1032	3	3121	15
				0.0317		*0.0475*		*0.0272*		*0.0396*		*0.0281*		
	2.2.1d	16-20	677	1	524	1	1009	3	874	5	1160	12	4244	22
				0.0070		*0.0101*		*0.0147*		*0.0560*		*0.0923*		
	2.2.1e	21-25	261		509	3	1348	8	332	5	860	4	3310	20
				0.0000		*0.0269*		*0.0289*		*0.1413*		*0.0453*		
	2.2.1f	26-30	329	3	599	3	1809	5	472	1	350	1	3559	13
				0.0442		*0.0237*		*0.0139*		*0.0190*		*0.0258*		
	2.2.1g	31-35	290	2	689	3	1214	3	260		336	1	2789	9
				0.0325		*0.0222*		*0.0120*		*0.0000*		*0.0300*		
	2.2.1h	36-40	1702	9	1307	6	1407	7	707	4	492	4	5615	30
				0.0234		*0.0215*		*0.0236*		*0.0437*		*0.0750*		
AL	2.2.1i	41-45	568	3	2231	10	2186	10	1840	8	1910	9	8735	40
				0.0241		*0.0209*		*0.0227*		*0.0405*		*0.0422*		
IT5	2.1.1a	01-05	17300	25	8200	12							25500	37
				0.0063		*0.0071*								
	2.1.1b	06-10	4700	8	10350	14	14950	19	3900	5	950	2	34850	48
				0.0075		*0.0062*		*0.0063*		*0.0112*		*0.0197*		
SL	2.1.1c	11-	184	2									184	2
				0.0462										
HR	2.1.1d	16-19	7308	12	14785	18	7225	17	2409	3			31727	50
				0.0068		*0.0052*		*0.0106*		*0.0128*				
GR1	2.2.4	06-10	8645	7	8489	13	15823	14	19774	21	15426	9	68157	64
				0.0033		*0.0057*		*0.0039*		*0.0090*		*0.0050*		
GR2	2.2.2	16-20	2916	2	4365	8	2536	4	3158	4	3848	4	16823	22
				0.0026		*0.0074*		*0.0051*		*0.0122*		*0.0091*		
	2.2.3a	01-05	4918	2	4090	8	13269	14	18100	20	22224	8	62601	52
				0.0016		*0.0073*		*0.0041*		*0.0083*		*0.0027*		
	2.2.3b	16-20	2467	2	587	4	7143	7	6074	4	8645	2	24916	19
				0.0026		*0.0217*		*0.0037*		*0.0031*		*0.0017*		
													504471	1095

The design of the gear has been drawn up by fishery technologists (P.Y. Dremière, IFREMER-Sète) from specifications defined by the biologists. The gear has been tested from a model in a flume tank then in real conditions at sea, before its production for the first survey. Then, specific studies have been conducted to complete the knowledge about the efficiency of the gear (Dremière *et al.*, 1999; Fiorentini *et al.*, 1996; Fiorentini and Dremière, 1996; Fiorentini *et al.*, 1999). When necessary the sampling gear and its handling have been slightly modified to improve its performances, especially to better stabilize it when contacting the bottom. The modifications have been decided as much as possible to limit their effects on the series consistency, but improving their quality. The main improvements were applied just before the 1995 survey (Fiorentini *et al.*, 1999). At that time, the results of the first survey had shown that the contact of the gear with the bottom was not fully satisfactory, especially along the slopes (depths of over 200 m). To improve this contact, buoyancy at the headline was reduced, links between the net and footrope were shortened, the sweeps were reduced, and rules for hauling were modified. As a secondary consequence, the vertical opening of the gear has been reduced (from an average of 3 to 2.5 m), and the average wide opening enlarged consequently. Further, the tickler chain was removed in 1995 over the slopes, and everywhere in 1996.

A device to follow the geometry of the gear was systematically used only aboard some of the sampling vessels since the beginning of the survey series. Aboard the other vessels, only preliminary tests were conducted with this kind of device at the beginning of the first surveys. Since the 1998 survey, an autonomous recorder was systematically added

TABLE 4. – Codes and usual names of the species included in the MEDITS reference list.

Species	Year[1]	MEDITS Code	Usual name
Aspitrigla cuculus (Linnaeus, 1758)	1998<	ASPI CUC	Red gurnard
Citharus linguatula (Linnaeus, 1758)	1994<	CITH MAC	Spotted flounder
Eutrigla gurnardus (Linnaeus, 1758)	1994<	EUTR GUR	Grey gurnard
Galeus melastomus Rafinesque, 1809	1998<	GALU MEL	Blackmouth catshark
Helicolenus dactylopterus (Delaroche, 1809)	1994<	HELI DAC	Rockfish
Lepidorhombus boscii (Risso, 1810)	1994<	LEPM BOS	Four-spotted megrim
Lophius budegassa Spinola, 1807	1994<	LOPH BUD	Black-bellied angler
Lophius piscatorius Linnaeus, 1758	1994<	LOPH PIS	Angler
Merluccius merluccius (Linnaeus, 1758)	1994<	MERL MER	European hake
Micromesistius poutassou (Risso, 1826)	1994<	MICM POU	Blue whiting
Mullus barbatus Linnaeus, 1758	1994<	MULL BAR	Red mullet
Mullus surmuletus Linnaeus, 1758	1994<	MULL SUR	Striped red mullet
Pagellus acarne (Risso, 1826)	1994<	PAGE ACA	Axillary seabream
Pagellus bogaraveo (Brünnich, 1768)	1994<	PAGE BOG	Blackspot seabream
Pagellus erythrinus (Linnaeus, 1758)	1994<	PAGE ERY	Common pandora
Pagrus pagrus pagrus (Linnaeus, 1758)	>1996	SPAR PAG	Common seabream
Phycis blennoides (Brünnich, 1768)	1994<	PHYI BLE	Greater forkbeard
Raja clavata Linnaeus, 1758	1994<	RAJA CLA	Thornback ray
Scyliorhinus canicula (Linnaeus, 1758)	1998<	SCYO CAN	Smallspotted catshark
Solea vulgaris Quensel, 1806	1994<	SOLE VUL	Common sole
Spicara flexuosa Rafinesque, 1810	1994<	SPIC FLE	Picarel
Spicara smaris (Linnaeus, 1758)	1998<	SPIC SMA	Picarel
Trachurus mediterraneus (Steindachner, 1863)	1994<	TRAC MED	Mediterranean horse mackerel
Trachurus trachurus (Linnaeus, 1758)	1994<	TRAC TRA	Atlantic horse mackerel
Trigloporus lastoviza (Bonnaterre, 1788)	1998<	TRIP LAS	Streaked gurnard
Trisopterus minutus capelanus (Lacepède, 1800)	1994<	TRIS CAP	Poor-cod
Zeus faber Linnaeus, 1758	1994<	ZEUS FAB	John dory
Aristaeomorpha foliacea (Risso, 1827)	1994<	ARIS FOL	Giant red shrimp
Aristeus antennatus (Risso, 1816)	1994<	ARIT ANT	Blue and red shrimp
Nephrops norvegicus (Linnaeus, 1758)	1994<	NEPR NOR	Norway lobster
Parapenaeus longirostris (Lucas, 1846)	1994<	PAPE LON	Deep-water pink shrimp
Eledone cirrhosa (Lamarck, 1798)	1994<	ELED CIR	Horned octopus
Eledone moschata (Lamarck, 1799)	1997<	ELED MOS	Musky octopus
Illex coindetii (Verany, 1839)	1994<	ILLE COI	Broadtail squid
Loligo vulgaris Lamarck, 1798	1994<	LOLI VUL	European squid
Octopus vulgaris Cuvier, 1797	1994<	OCTO VUL	Common octopus
Sepia officinalis Linnaeus, 1758	1994<	SEPI OFF	Common cuttlefish

[1] Year at which the species was introduced (<) or eliminated (>).
Ref. Usual names for fish : Fischer W., M.L. Bauchot, M. Schneider (rédacteurs), 1987. Fiches FAO d'identification des espèces pour les besoins de la pêche (Révision 1). Méditerranée et Mer Noire Zone de pêche 37. Rome, FAO, vol 1 et 2, 1530 p.

along the headline aboard all the vessels to record water temperature at the beginning and end of hauls. The device used (Vemco Minilog) also recorded depth all during the hauls. A first analysis of the gear trajectory described from these recordings (Bertrand *et al.*, 2002) has shown that some progress is yet to be done to better standardize the distance really swept by the gear at the deepest locations.

Target species and data collected

A list of common target species (including fish, molluscs and crustaceans) was established with reference to their commercial production, their accessibility to a bottom trawl and their potential interest as biological indicators in the different areas. The reference list of species defined at the beginning of the programme included thirty species. It was enlarged to thirty-six species during the following years (Table 4), taking into account the removal of one species (*Sparus pagrus*) from the list in 1996 due to its very rare occurrence in the samples. Observations on these species are the total number of individuals, total weight, length frequency distribution, and sex (including sexual maturity stage). The characteristics of each kind of observation are specified in the manual of protocols (Anon., 1998). For all the other species of commercial interest (fish, crustaceans and molluscs), the total number and total weight are reported for each haul. During each annual survey, a total of approximately 150 species were identified aboard each vessel.

The data are put in computer files by the teams in charge of the survey. Four standard exchange formats (in ASCII) including normalized coding are defined (Table 5). A specific software was written (Souplet, 1996a,b) for an automatic checking of the data. This checking is done by each of the partners for their own data before their regrouping. After a second validation in the regrouping phase (at IFREMER-Sète), copies of the total set of data files are deposited on CD-ROM at the co-ordinator's and EC-DG Fish offices. The process is managed such as to make the data bank available a few months after the end of each survey (usually in October).

Work at sea

Since 1994, one survey has been carried out every year, during the spring and the beginning of

Table 5. – Parameters included in the exchange files.

Haul characteristics (file A)	**Catch per haul (file B)**	**Biological parameters (file C)**
Country	Country	Country
Vessel	Vessel	Vessel
Gear	Year	Year
Rigging	Haul number	Haul number
Doors	Codend closing device	Codend closing device
Year	Part of the codend	Part of the codend
Month	Faunistic category	Faunistic category
Day	Species code (Rubbin type)	Species code (Rubbin type)
Haul number	Total weigth in the haul	Length class code
Codend closing device	Total number in the haul	Fraction weight
Shooting time	Females Number	Subsample weight
Shooting quadrant	Males number	Sex
Shooting latitude	Unsexed number	Number of measured individuals
Shooting longitude		Length class
Shooting depth		Maturity
Hauling time		Nb of individuals in that class
Hauling quadrant		
Hauling latitude		
Hauling longitude		**Temperature recording (file D)**
Hauling depth		
Haul duration		Country
Validity code		Vessel
Course (rectilinear or not)		Year
Species reporting code		Haul number
Distance		Bottom temperature (start of haul)
Vertical opening		Bottom temperature (end of haul)
Wing opening		Recording system
Briddles length		
Warp length		
Warp diameter		
Hydrological station number		
Observations		

TABLE 6. – Calendar of the MEDITS surveys from 1994 to 2000.

Area	1994		1995		1996		1997		1998		1999		2000	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
Morroco											2-June	2-July	20-May	31-May
Spain	28-May	20-June	22-avr	21-May	2-May	27-May	9-May	3-June	3-May	30-May	4-May	3-June	22-May	23-June
France	16-May	16-June	24-June	23-July	28-May	24-June	26-May	28-June	17-May	19-June	6-May	7-June	31-May	2-July
Italy - M1	21-May	1-July	1-June	14-July	1-June	22-July	4-June	28-July	21-May	28-July	7-May	7-July	26-May	22-July
Italy - M2	9-June	4-Aug	21-May	27-July	17-June	2-Aug	23-June	5-Aug	25-May	3-July	17-May	2-July	29-May	21-July
Italy - M3	2-June	15-July	3-June	10-July	31-May	5-July	3-June	6-July	22-May	27-June	6-May	9-June	26-May	1-July
Italy - M4	3-June	13-July	2-June	11-July	4-June	15-July	4-June	21-July	8-May	22-June	11-May	31-Aug	2-May	21-June
Italy - M5	21-May	3-June	6-June	30-June	3-June	24-June	2-June	22-June	10-June	4-July	4-Aug	14-Oct	8-June	2-Aug
Slovenia					16-June	16-June	13-June	13-June	22-June	22-June	27-Aug	27-Aug	7-July	7-July
Croatia					15-June	25-June	14-June	22-June	22-June	1-July			26-June	2-July
Albania					18-July	25-July	24-July	8-Aug	24-June	11-July	17-Aug	29-Aug	22-June	8-July
Malta													7-June	8-June
Greece - G2	11-Aug	22-Aug	12-July	28-July	16-July	3-Aug	16-June	14-Aug	12-June	10-July	8-June	7-July	12-June	8-July
Greece - G1	15-June	7-Aug	17-May	7-June	20-June	29-July	9-June	15-July	17-June	20-July	18-June	27-July	21-June	28-July
Greece - G3	4-June	12-July	12-June	6-July	3-June	4-July	14-June	4-Aug	16-June	27-July	9-June	21-July	2-June	13-July

summer (Table 6). To reduce the duration of each survey, several boats (8 to 11 vessels according to the year) work at the same time. Each of these vessels works at sea during about one month per year. Research vessels and chartered fishing vessels are used, depending on local possibilities. As much as possible, the same vessel was used every year in each area.

The duration of the hauls is fixed to 30 minutes on depths less than 200 m and 60 minutes on more important depths.

The organisation of the work at sea mainly depends on the facilities aboard the vessels. In some cases, the samples are only taken and preserved on board and all the biological analyses are carried out in the laboratories. On the contrary in other situations, particularly aboard the research vessels, the whole biological analysis of the samples, including the data input into computer files, are conducted on board.

Access to the MEDITS data

A specific chart defines the rules for distribution of the MEDITS data. From this chart, the full access to the raw MEDITS data bank is guaranteed to the European Commission and the laboratories participating in the surveys. This access is managed through the concerned national co-ordinators of the programme. The Co-ordination committee must be informed of projects intending to use raw data from the international data bank. Other users may freely use the aggregated data presented in the reports produced by the MEDITS group.

Data analysis

At the end of each survey, a working group gathering together scientists from the different teams involved in the survey implements standard analyses. The analyses are focused on the reference list species. They are based on the production of biomass and relative abundance indices (in kg/km^2 and in number of individuals /km^2) as well as length frequency distributions by species and strata. These analyses are made using statistical methods approved by the Steering Committee, and included in a specific software (Souplet, 1996a,b). Basic results are presented on standardized media (tables, figures and maps), including visualization of interannual variations. The results obtained by these working groups are distributed in annual survey reports.

Furthermore, specific results obtained from the programme have been presented during an international symposium held in Pisa in 1998 (Bertrand and Relini, 2000). This symposium was mainly devoted to communications related to the properties of the fishing gear and regional approaches on biology and ecology of the species encountered during the surveys, including multispecies approaches. These works gave very useful basic information on the scope of the available data and on ways to enlarge the knowledge of demersal resources in the Mediterranean from these data. They have drawn attention to the very wide variety and variability of situations encountered and the care requested for elaboration of general diagnoses on the present status concerning the demersal resources in the Mediterranean Sea. This scope may include analyses devoted to

critical development stages such as recruitment (Bertrand *et al.*, 2000), or focused on groups of species subject to fishing impact and potentially in danger, such as elasmobranchs (Bertrand *et al.*, 2000b). Furthermore, they may contribute to knowledge on the relationships between demersal species dynamics and their environment, including natural and human constraints. Progress in that direction will often require the combination of data from different sources. We may anticipate that the organization of the MEDITS data bank will favour such work. Different research programmes have already integrated this information. The papers presented in this volume, and the references given in its appendix (Abelló *et al*., 2002), provide a general idea of the domains which have been investigated, to date, with the support of the MEDITS data.

CONCLUSION

The MEDITS data bank has been built thanks to a very intense collaboration between a number of regional teams who had the best knowledge on the biology of demersal species in the different areas. The quality of the data bank is strongly linked to their adherence to the protocols, and the quality of the biological information included. The quantitative data quality is directly linked with precision in handling the sampling gear and reporting information related to its filtering power and motions. The present experience shows that this goal may be obtained only from a strong collaboration between biologists and technologists. More generally, the success of such a long-term survey programme would require implementation of a quality assurance approach to ensure the quality in data collection and the best level of consistency in the series.

The utility of such a survey programme as support for fishery management is strongly related to its ability to produce indices able to characterize the diversity of situations in the whole area and their variations and trends in time. So far, its first goal is the production of relative abundance indices and demographic structure of the main exploited species. Further, the programme offers a fantastic opportunity for complementary observations and studies related to biology and ecology of the demersal species and communities.

Development of easy-to-use instrumentation may facilitate data collection. Nevertheless, in its present configuration, we may consider that the MEDITS data bank is still under-utilized. Furthermore, as explained for other bottom trawl survey series (Heessen *et al.*, 2000; Walsh and McCallum, 1995), more extensive analyses of the data would help to identify certain errors and inconsistencies. In addition, these investigations would be very useful to improve the quality of the data and the overall efficiency of the survey programme.

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