Report of the MEDITS Coordination Meeting (Mediterranean International Trawl Survey)

Coordination Committee Report

Ljubljana, Slovenia – 6th-8th March 2012

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1 Introduction

The annual meeting of the MEDITS (Mediterranean International Trawl Survey) survey partners was held in Ljubljana (Slovenia) between the 6th and 8th March, 2012.
The MEDITS Coordination meeting is held on an annual basis in order to give an account of the activities carried under the frame of the MEDITS survey during the intersession period (the last MEDITS meeting was held in Nantes, France, between the 15th and 17th March 2011), to take into account proposals and suggestions made at other meetings as well as to coordinate activities to be carried out during the next intersession period.

- Representatives from Albania (GSA 18), Croatia (GSA 17), France (GSAs 7, 8), Greece (GSAs 21, 22, 23), Italy (GSAs 9, 10, 11, 16, 17, 18, 19), Malta (GSA 15), Montenegro (GSA 18), Romania (GSA 29), Slovenia (GSA 17) and Spain (GSAs 1, 2, 5, 6) were present during the meeting (Annex 2 - List of participants). The Cypriote MEDITS focal point informed the meeting that she could not attend but gave input through correspondence when necessary. The meeting was chaired by Dr. Maria Teresa Spedicato.

After the welcoming notes from both the chair and the host of the meeting, the agenda was approved (Annex 1 – 2012 MEDITS Coordination meeting agenda) and the conclusions of the last Coordination meeting held in Nantes were highlighted. In particular, during the meeting last year:

- changes to the MEDITS protocol were proposed, agreeing to produce a revision;
- the development of a specific protocol for otolith, individual weight and maturity sampling was decided;
- RoME was presented and it was adopted as a standard tool for MEDITS data checking;
- a permanent group to work on the FM list was set up;
- the DCF indicators 1-4 were reviewed and some work for testing was started, especially for the indicator 1, while for the indicator 4 an analysis of the methodological approach to be applied was carried out.

2 The MEDITS survey within the Data Collection Framework

Maria Teresa Spedicato

Maria Teresa Spedicato presented the terms of reference proposed by the Regional Coordination Meeting of the Mediterranean and Black Sea (RCMMed&BS), highlighting the actions taken so far and the progress forward. A special focus was given to those issues regarding the changes in the MEDITS protocol, i.e.

1. finalization and adoption of the new lists of species (MEDITS G1 and MEDITS G2);
2. finalization of a harmonised protocol for the collection of biological parameters (i.e. collection of otoliths, individual weight measurements and maturity stage);
3. finalization of the MEDITS manual.

With regards to the first point, the list discussed and agreed during the MEDITS meeting in Nantes was reviewed during the present meeting, taking into account possible new elements for consideration (see section 7 of this report: Finalization and adoption of the new lists (MEDITS

G1 and MEDITS G2) list of species). For the second point, a draft was circulated before the meeting to the Working Group identified during the MEDITS meeting last year. During the present meeting the document was further discussed for final decision and endorsed as part of the revised MEDITS manual (see section 9 of this report: Harmonised protocol for collection of biological parameters (i.e. collection of otoliths, maturity stages and individual weight measurements)).

In addition, the RCMMed&BS asked the MEDITS group to:

4. develop a specific protocol to estimate the indicator n. 4 of the DCF (App. XIII EU Decision 93/2010), i.e. genetic effect of fishing from age survey data.

For this issue a deep analysis has been prepared by the group COISPA (cfr. section 13 of this report: Harmonisation of methodology for estimating Ecosystem Indicators from fisheries independent research surveys (App. XIII EU Decision 93/2010)) and presented to the current meeting for consideration. Following the request by the Planning Group for the Mediterranean (PGMed), the analysis was also extended to the other 3 ecosystem indicators foreseen in the DCF (App. XIII EU Decision 93/2010). In their January 2012 meeting, the PGMed recognised that at Regional level there is no clear position on how to approach and estimate most of the Ecosystem Indicators and there is no standard methodology to calculate them. Thus, the PGMed concluded that the first four ecosystem indicators, to be estimated from fisheries independent research surveys, could be addressed by the coming MEDITS and MEDIAS WG that were requested to:

- harmonize the methodologies and the different requirements as much as possible;
- propose a common approach.

The other terms of reference suggested by the RCMMed&BS were to:

5. continue the implementation of extended checks on the MEDITS data and testing of the RoME routine;
6. progress on the Regional MEDITS Database for the management of the MEDITS data;
7. progress in common research activity;
8. harmonize (field guide, methodology….) the protocol for data collection of Elasmobranches under the surveys with ICCAT requirements and collection of biological samplings under DCF;
9. explore the possibility of sharing the age reading of otoliths among MS participating in the survey: both for species that are not routinely aged (e.g. *Pagellus erythrinus*) and for common species (*Mullus spp.* and *Merluccius merluccius*).

A new release of RoME is available and during this meeting a working group met for training and data checking purposes (point 5) (cfr. section 1 of this report). The need to progress soon with regards to point 6 above was highlighted as the issue has been in the agenda for a long time and the request of MEDITS data from end users is increasing. This was tackled during the current meeting through a proposal for a common data base presented by Pino Lembo (see section 6.2 of this report: State and progress of the database (Regional MEDITS database)). Common research activity (point 7) was dedicated a whole session during this meeting allowing time for presentations about the progress of ongoing projects and new proposals, of which there were two this year (from Antoni Quetglas and Francesco Colloca) (see section 15 of this report: Progress in common research activity). Moreover, some ideas regarding the MEDITS special publication project were introduced by Giulio Relini (see section 16 of this report: MEDITS publication).
The issue regarding the harmonization (field guide, methodology….) of the protocol for data collection of Elasmobranches under the surveys with ICCAT requirements and collection of

biological samplings under DCF (point 8 above) was tackled during the meeting through a presentation by Fabrizio Serena (see section 15.8 of this report: Harmonization of the data on Elasmobranches collected during the surveys).
Concerning point 9, interested groups were encouraged to explore possible forms of collaboration with other colleagues/Institutes in order to establish bilateral agreements (see section 17 of this report: Task sharing of the age reading of otolith among MS participating in the survey).

3 Outcomes of the EWG-STECF regarding some issues related to the MEDITS survey

Maria Teresa Spedicato

MEDITS data is routinely part of the assessment process as it is used to parameterise models based on fishery independent data, for the tuning of VPA and for simplified approaches in data poor situations. Furthermore, for some species, the MEDITS data is sometimes the only source of information. Thus, amongst the ToRs of the EWG-STECF there are some issues related to MEDITS in order to fully exploit the information there. These include the formulation and testing of R-scripts to evaluate MEDITS results in terms of 1) trends in stock specific abundance and biomass, 2) length and age based analysis 3) testing of empirical biological indicators and methodologies for their calculation as recommended by STECF SGMED 10-01. While the latter was not tackled as yet, a new statistical slicing method that assumes the distribution of numbers at length as composed of a mixture of length frequency distributions, was implemented. The fitting is performed using the R mixdist package.
The R script developed to extract, explore, plot, map and perform statistics on the MEDITS data provides the essential data manipulation routines necessary to fit statistical models (like GLM, GAM, GLMM or spatial statistics) in an open source platform with unlimited extensibility (as in FLR), with the additional advantages of producing maps of various types, being completely free and an international standard. The only drawback is that good programming skills and advanced statistical skills are required to use or modify routines and to fit certain types of models, respectively. The main difference between the R scripts and routinely used software such as ATRIS is that the latter is a database structure with useful routines relying on non open access software (MS ACCESS and ARCView/ARCGis) while the R script has no database functions, other than performing queries, but is a powerful platform in which several analysis can be performed. Thus, in the conclusion EWG_STECF 11-12 stated that if ATRIS is commonly used in many fisheries contexts, it could be very useful to link it with R routines.

Amongst other issues of the EWG_STECF 11-12 there was the evaluation of the influence of sea-bottom temperature on trawl swept-area estimates, followed by the evaluation of the performance of the gear, net horizontal opening and trawled area per GSA and vessel. This evaluation concluded that at the moment all the Operative Units of the MEDITS programme are using old gear monitoring systems without temperature compensation. The effects of temperature on speed sound, gear openings and swept-area have been investigated.

A list of recommendations regarding gear monitoring systems and catch standardization was also reported. Finally the establishment of a new group of gear technologists to investigate regularly the full standardization of the MEDITS trawl survey (gear parameters, use of the gear and processing of data) in accordance with the protocol was suggested. The concept is that this new group of gear technologists should report regularly to the MEDITS coordination group the findings of the investigations. The group is best placed under the umbrella of MEDITS group.

4 Review the implications of GFCM activities and recommendations

Fabio Fiorentino

Fabio Fiorentino, as the Coordinator of the Sub Committee on Stock Assessment (SCSA) of the Scientific Advisory Committee (SAC) of the GFCM, reported the main activities of the SCSA. After having emphasized the importance of MEDITS data in most of the assessments on demersal resources done in the last Working Group held in Chania (Greece) in October 2011, he presented the main conclusions and the recommendations relevant for the MEDITS Group. Amongst them, the SCSA recommended to investigate and propose a biomass based reference point for identifying the status of “overexploited stock”. In this context, the time series of indices of Spawning Stock Biomass and Recruitment, derived from trawl surveys can be a main source of information.

With regards to the adoption of the new Stock Assessment Forms (SAF) on direct methods, including trawl surveys, the SCSA suggested to substitute the existing SAF and those proposed last year for trawl surveys, and not yet implemented, with a more descriptive tool based on an agreed template in Word with the data inserted as tables and graphs. The template used by the SGMED could be a good example.

No further progress on the adoption of a common scientific survey protocol in the GFCM area was registered in the last year. However, an important experience on inter-calibration of trawl surveys catch rate, targeted to deep water rose shrimp and hake was carried out in July 2011 in the Strait of Sicily. This experience involved the vessels and gears used by CNR (Italy) and FCD-MRRA (Malta); the Sant’Anna (fishing vessel), and that used by INSTM (Tunisia); the Hannibal (research vessel). The inter-calibration coefficients will allow the production of time series indices and spatial patterns of abundances for the whole area where the stocks are shared.

Considering that at the moment the MEDITS data include a long enough time series, the Group was informed that, within the activities of the SCSA in 2012, a new meeting of the Permanent Working Group on Stock Assessment Methodology (PWGAM) on Time Series Analysis will be held. Place and date have still to be announced.

5 Achievement of the 2011 and plans for the 2012 MEDITS survey in each country/GSA

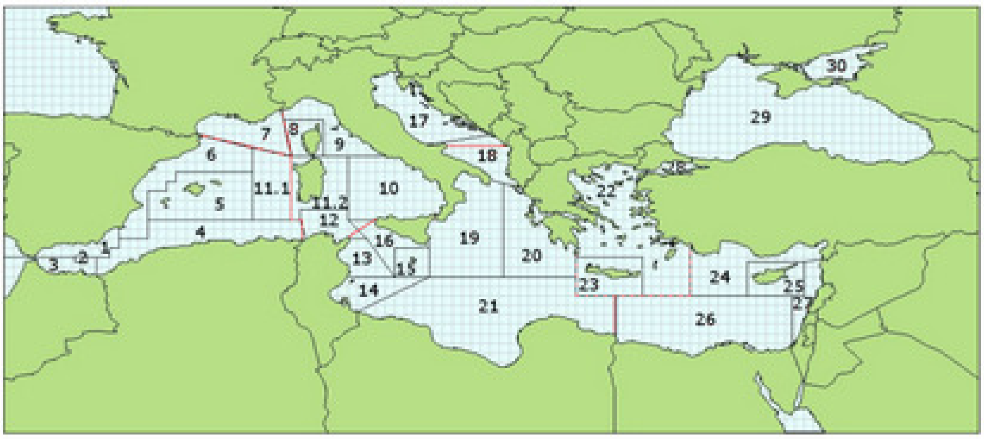


Figure 1. GFCM Geographical Sub-Areas (GSAs) map

During 2011, the Spanish MEDITS took place from the 5th May to the 20th June (46 days) on board the research vessel *Cornide de Saavedra*. Four geographic sub-areas (GSAs) were covered: 01 (northern Alboran), 02 (Alboran Island), 05 (Balearic Islands) and 06 (Northern Spain). A total of 170 hauls were performed by several teams of the Spanish Institute of Oceanography (35 in GSAs 01 and 02, 53 in GSA 05 and 82 in GSA 06), following the MEDITS protocol. A total of 615 species or taxa (214 fishes, 101 crustaceans, 92 mollusca and 208 other invertebrates) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list sampled was 164,614 (see table below), and the number of samples of hard tissues for age estimations in *Merluccius merluccius*, *Mullus barbatus*, *M. surmuletus*, *Lophius budegassa* and *L. piscatorius* was 531 (see table below).

Species	**n**	**Species**	**n**	**Species**	**n**
A. cuculus	2133	*P. acarne*	1839	*T. minutus*	3218
B. boops	4892	*P. bogaraveo*	178	*Z. faber*	164
C. linguatula	172	*P. erythrinus*	1655	*A. antennatus*	1142
E. gurnardus	8	*P. blennoides*	2395	*A. foliacea*	11
G. melastomus	36244	*R. clavata*	211	*N. norvegicus*	1295
H. dactylopterus	1302	*S. canicula*	4808	*P. longirostris*	1154
L. boscii	377	*S. vulgaris*	1	*E. cirrhosa*	826
L. budegassa	522	*S. flexuosa*	4355	*E. moschata*	63
L. piscatorius	126	*S. smaris*	19724	*I. coindetti*	3397
M. merluccius	6838	*T. mediterraneus*	4091	*L. vulgaris*	142
M. poutassou	32681	*T. trachurus*	22447	*O. vulgaris*	1204
M. barbatus	1489	*T. lucerna*	2	*S. officinalis*	56
M. surmuletus	1699	*T. lastoviza*	1753		

Species	Otoliths/Ilicia
Merluccius merluccius	60
Mullus barbatus	47
Mullus surmuletus	55
Lophius budegassa	268
Lophius piscatorius	101

For 2012, the Spanish MEDITS survey is planned from the 26th April to the 11th June, on board the research vessel *Cornide de Saavedra*.

In 2011, the MEDITS survey in France (GSA 7 and 8) took place from the 23rd of May to the 26th of June (36 days) on board of the vessel *L'Europe*. 2 geographic sub-areas (GSA 7 and 8) were covered. A total of 90 hauls were performed by France, following the MEDITS protocol. Scanmar was used in 90 hauls, Minilog was used in 90 hauls. A total of 127 species or taxa (99 fishes, 16 crustaceans, 12 cephalopods) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list (MEDITS Manual, 2007) sampled was 18,982. For 2012, the French MEDITS survey is planned from the 23rd of May to the 26th of June, on board of the vessel *L'Europe*.

In 2011, the MEDITS survey in the Ligurian, north and central Tyrrhenian Sea (GSA 9) took place from the 27th May to the 20th June (25 days) onboard the vessel *Libera* (ITA017828). One geographic sub-area (GSA 9) was covered. A total of 120 hauls were performed, following the MEDITS protocol. Scanmar was not used due technical problems and Minilog was used in 120 hauls. A total of 249 species (140 fishes, 47 crustaceans, 25 cephalopods and 37 other invertebrates) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list (MEDITS Manual, 2007) sampled was 30,760. No samples of hard tissues for age estimations were collected. For 2012, the MEDITS survey is planned from the 15th May to the 15th June, on board the vessel *Libera* (ITA017828).

In 2011, the MEDITS survey in Central Southern Tyrrhenian Sea (GSA 10) took place from the 7th to 19th June (12 days) on board the commercial vessel *Pasquale e Cristina* (UE number 19238), which was also used for sampling in the GSA 18 (South Adriatic Sea). 70 hauls were performed following the MEDITS protocol, Scanmar was used in 50 haul, Minilog was used in all the hauls. A total of 263 species or taxa (124 fishes, 47 crustaceans, 26 cephalopods and 66 other invertebrates) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list sampled was 135,300 of which 21,845 were sampled for length distributions. The number of samples of hard tissues for age estimations collected was as follows: *M. merluccius* - 298 pairs, *M. barbatus* - 121 pairs, *M. surmuletus* - 37 pairs. In addition, samples from other fishes were also taken. In 2011, the morphological parameters for the common MEDITS project 'Analyzing functional traits of target species' were also collected. For 2012, the GSA10 MEDITS survey is planned in June, on board the vessel *Pasquale e Cristina*, as in 2011.

In 2011, the MEDITS survey in Sardinian Seas (GSA 11) took place from the 1st June to the 7th July (27 days) onboard the vessel *Gisella*. A total of 101 hauls were performed in GSA 11, following the MEDITS protocol. The scientific crew was always made up of 3-4 people. During the survey the weather was generally good, however, when the weather was not at its best, at least three out of the four planned hauls per day were managed. Scanmar was used in 83 hauls while Minilog was used in 90 hauls. A total of 195 species or taxa (139 fishes, 29 crustaceans, 27 cephalopods) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list (MEDITS Manual, 2007) sampled was 78,888. The first analysis highlighted no different trends in abundance and number of the species in respect to the previous years. For 2012, the GSA11 MEDITS survey is planned at around the end of May/beginning of June (about 30 working days), on board the vessel *Gisella*.

In 2011, the MEDITS survey in the Strait of Sicily (GSA 16) took place from the 23rd June to the 3rd August (40 days) onboard the vessel *Sant Anna*. A total of 120 valid hauls were performed, following the MEDITS protocol. Scanmar and Minilog were used in 120 hauls. A total of 129 species or taxa (26 fishes, 4 crustaceans, 6 cephalopods, 3 chondrichthyes and 90 other invertebrates) were identified counted and weighed. The total number of individual of species belonging to the MEDITS reference list (MEDITS Manual, 2007) sampled was 27,019, and the number of samples of hard tissues for age estimations from the following species: *M. merluccius*, *M. barbatus*, *M. surmuletus* and *P. erythrinus*, was around 1000. For 2012, the MEDITS survey in GSA 16 is planned around May, on board the vessel *Sant Anna*.

In 2011, the MEDITS survey in the North and Central Adriatic (GSA17) took place from the 3rd June 2011 to the 4th August 2011 (25 days of sampling work) onboard the vessel *Andrea*. The whole GSA 17 area was covered, including Italian, Slovenian and Croatian National Waters and International Waters. A total of 185 hauls, of which 182 are valid, were performed by the Laboratory of Marine Biology and Fishery of Fano (Italy), the Institute of Oceanography and Fisheries of Split (Croatia) and the Fishery Research Institute of Slovenia, following the MEDITS protocol. Minilog was used in all the hauls. A total of 164 species or taxa (121 fishes, 19 crustaceans, 21 cephalopods, 1 sea turtle and 2 other invertebrates) were identified counted and weighed. The total number of individual of species belonging to the MEDITS reference list (MEDITS Manual, 2007) sampled was about 32,200. No samples of hard tissues for age estimations were collected. For 2012, MEDITS survey is planned in the GSA17 from June to July, on board the vessel *Andrea*.

In 2011, the MEDITS survey in the South Adriatic Sea (GSA 18) took place from the 6th to the 29th July (17 days) on board the commercial vessel *Pasquale e Cristina* (UE number 19238), which was also used for sampling the GSA 10 (Central Southern Tyrrhenian Sea). The survey was interrupted for one day due to bad weather conditions. 90 hauls were performed following the MEDITS protocol; Scanmar was used in 60 haul, Minilog was used in all the hauls. A total of 353 species or taxa (138 fishes, 51 crustaceans, 28 cephalopods and 136 other invertebrates) were identified counted and weighed. The total number of sampled individuals of species belonging to the MEDITS reference list was 113,592 of which 28,399 were sampled for length distributions. The number of samples of hard tissues for age estimations collected was as follows: *M. merluccius* - 318 pairs, *M. barbatus* - 530 pairs, *M. surmuletus* - 11 pairs. In addition, samples from other teleosts were also taken. In 2011 the morphological parameters for the common MEDITS project 'Analyzing functional traits of target species' were also collected. For 2012, the GSA18 MEDITS survey is planned in July, on board the vessel *Pasquale e Cristina*, as in 2011.

In 2011, the MEDITS survey in the North-western Ionian Sea (GSA19) took place from the 19th June to the 2nd of July 2011 (14 days) onboard the vessel *Pasquale e Cristina*. A total of 70 hauls were performed by the team of the Department of Biology of University of Bari, following the MEDITS protocol. Scanmar was used throughout the area, a part from the hauls that were expected to be critical. Minilog was not used during the survey due to technical problems, however, bottom temperature was recorded by CTD in most of the hauls. A total of 216 species

(135 fishes, 53 crustaceans, 28 cephalopods, 49 species of other invertebrates) were identified, counted and weighed. A total number of 28,526 individuals of the target species belonging to the MEDITS reference list (MEDITS Manual, 2007) was sampled during the survey. For 2012, the 19th MEDITS survey is planned in June, on board the vessel *Pasquale e Cristina*.

In 2011, the MEDITS survey in the Strait of Sicily (GSA 15) took place onboard the vessel *S. Anna* from the 21st May till the 1st June, with only 9 working days due to very bad weather. A total of 44 valid hauls were performed, following the MEDITS protocol. Minilog readings were obtained for 40 hauls due to technical problems and Scanmar was not used. A total of 152 species or taxa (88 fishes, 25 selechians, 21 crustaceans and 18 cephalopods) were identified counted and weighed. The total number of individuals of species belonging to the MEDITS reference list (MEDITS Manual, 2007) for which length, individual weight, sex and maturity stage were obtained, was 12,699. For 2012, the MEDITS survey in GSA 15 is planned for June. The vessel will be chosen through the tendering procedure and thus, there is the possibility that it would not be the *S.Anna*, the vessel which till now was used all along the MEDITS data series in GSA 15. Malta will be adhering to the new MEDITS protocol once this is finalised. However, age data will only be collected if the new costs incurred due to this change in protocol will be accepted by the Commission as per Article 6 Paragraph 2 of EC Regulation 1078/2008.

Due to logistical problems, the MEDITS survey did not take place in Greece in 2011. Greece will participate to the following MEDITS campaign in 2012, in the context of the National Data Collection Program, according to the new upcoming law that still has to be voted for in Parliament. The Fisheries Research Institute will be responsible for the general coordination of the survey in coordination with HCMR.

In 2011, the MEDITS survey in Cyprus (GSA 25) took place from the 4th to the 15th July (11 days) on board the commercial vessel *Megalochari*. A total of 26 hauls were performed, following the MEDITS protocol. A total of 147 species or taxa (101 fish, 27 crustaceans and 18 cephalopods) were identified counted and weighed. All species were sampled for length, while sex and maturity stage was collected for the species included in the MEDITS reference list. The total number of individuals of species sampled for length was 8,806. Samples of hard tissues (otoliths) for age estimations were collected from the species *Mullus barbatus*, *M. surmuletus*, *Pagellus erythrinus and Spicara smaris*; the samples served as additional samples to the ones collected under the Cyprus National Data Collection Programme for the estimation of stock-related variables. For 2012, the Cyprus MEDITS survey is planned in June (between the 15th and 30th June), on board the vessel *Megalochari*.

In 2011, the research team from the National Institute for Marine Research and Development "Grigore Antipa" Constanta made two research surveys in the Black Sea (GSA 29) together with the Bulgarian colleagues. The first survey took place in the Romanian Black Sea waters in May (10 days) and 38 hauls between 13-58 m depth were performed, approximately 60 minutes per haul, at a 2.6-2.7 Kts speed. The second survey was conducted in the Bulgarian Black Sea waters in May (additional 10 days) and 40 hauls between 27-93 m depth were performed, approximately 60 minutes per haul, at a 2.6-2.7 Kts speed. The third survey took place in the Romanian Black Sea waters in October (10 days) and 38 hauls between 13-80 m depth were performed, approximately 60 minutes per haul, at a 2.5-2.7 Kts speed. The fourth survey was conducted in the Bulgarian Black Sea waters in October (additional 10 days) and 37 hauls between 26-86 m depth were performed, approximately 60 minutes per haul, at a 2.5-2.7 Kts speed. A total of 15 fish species, 4 crustaceans, 2 molluscs, 2 jellyfish and 5 other species were caught from all the four surveys.

In the MEDITS Project Romania and Bulgaria are available to contribute sharing knowledge and data regarding five demersal species: turbot (*Psetta maeotica*), red mullet (*Mullus barbatus*), whiting (*Merlangius merlangus*), sole (*Solea nasuta*) and spiny dog fish (*Squalus acanthias*). This availability was very welcomed by the MEDITS meeting and the exchange of information encouraged.

6 Management of the MEDITS data

6.1 Upgrade of RoME routine on MEDITS data

Isabella Bitetto, Maria Teresa Facchini, Maria Teresa Spedicato, COISPA, Italy

RoME is a tool performing multiple and cross checks on TA, TB and TC MEDITS files. It has been presented for the first time during the last MEDITS coordination meeting held in Nantes in March 2011 and an update was provided during the current meeting.

The main objectives in designing this tool was to unify the checks that were separately carried out on the MEDITS data by the 18 GSAs participating in the survey and to automate the data checking procedure by means of a routine able to detect errors, with the aim of having a common tool for all the GSAs. RoME does not correct the data: the correction is up to the user. The check procedure is carried out one year at a time and the checks are divided in 4 groups: checks on TA, on TB, on TC and cross checks.

RoME includes checks on parameters involved in the calculation of abundance indices like wing net opening and distance, as well as on the consistency in the TB file between the number of individuals and the total weight in the haul.

A specific order in the functions call has to be followed in order to avoid “cascade” errors. RoME stops if an error occurs, then the user has to correct the error and run the code again in order to continue with the other checks. RoME receives input through the TA, TB and TC files in either .xls or .csv formats; moreover, RoME uses additional tables needed in some of the checks (e.g. maturity checks, correctness of MEDITS code, etc.). RoME outputs a log file (Errors.dat) with the outcomes and error specifications from each check, graphics for qualitative controls automatically stored by RoME in a Graphs directory and R-SUFI files (traits, captures, taille and strata in .csv format).

Three more checks on maturity have been implemented in order to detect:

1. mature individuals caught outside the spawning period with size smaller than the size of smallest mature individual in bibliography;
2. immature individuals caught during the reproductive period, but with size greater than L_{50}+ 15% * L_{50}.

Moreover, RoME informs the user if there is presence of information on hermaphroditic species in the additional maturity table.

Currently work on RoME is underway on the following:

1. the new FM List will be included in RoME and updated in parallel with the update of the official list;
2. the possibility to check data from several years at a time;
3. checks on temperature data (TD) will be added.

In addition suitable modifications will be introduced according to the file specification in the new version of the MEDITS manual.

6.2 State and progress of the database (Regional MEDITS database)

Pino Lembo

Following the RCMed&BS recommendations and highlighting the importance of progressing on this issue since it's been on the MEDITS agenda for three years, Pino Lembo presented a proposal for a database named FishTrawl. The system is developed as a web-GIS-based information system, according to the most modern development standards for the web (HTML5, web service, scripting server-side, relational database, etc.).

Open source software is used for the implementation of all the components (not excluding proprietary file formats).
The main characteristics of the MEDITS common database will be:

- a simple database structure that can accommodate a wide range of data types, related to scientific surveys, easily linkable with GIS applications;
- capability to store, retrieve, update, manipulate and analyze trawl survey data, including spatially referenced information;
- capability to import and export data (or to download and upload data) in the consolidated format of TA, TB, TC, etc.

The system includes check routines allowing extensive quality control of data (internal and cross checks between tables) and data analysis and elaboration for different tasks linked to the DCF objectives, such as the estimation of ecosystem indicators throughout the Mediterranean.
The tentative time-table for developing the system is the following:

- Software under development (actually);
- Software implementation completed (April 2012);
- Software testing procedures completed (May 2012);
- β version tested by selected users (June 2012);
- Release 1.0 delivered (July 2012)

A reference group in order to contribute during the testing phase of the system was set up. Members of the group supporting the testing of the system are: P. Lembo (coordinator), B. Marceta, T. Quetglas, A. Jadaud, V. Trenkel, V. Badts, S. Kavadas, M.T. Facchini, G. Garofalo.

The meeting was informed that at the moment the EU is working on a regional database for fisheries and meetings are being held in this regard. The group agreed that the proposed data base should be in line with this work and that it is important that the MEDITS group is represented in related meetings. It is important to be part of the decision table, especially because of the specific characteristics of the Mediterranean (e.g. survey history, presence of EU and non-EU countries, role of GFCM, etc..).

It was agreed that once the database will be available, data will be made available on it and data for the EC's data call could be taken from there, so that different countries only need to upload the checked and validated data once. Furthermore, it was suggested that a deadline for the uploading of the data should be agreed and kept from year to the other so that work can be better planned and organised. However, the group emphasised that the procedure currently in place for the authorisation for the use of data should still be respected.

7 Finalization and adoption of the new lists (MEDITS G1 and MEDITS G2) list of species

During the last MEDITS coordination meeting (Nantes, 15-17 March 2011) the reference list was reviewed. Two groups of species were selected:

- MEDITS G1 includes 41 species with 10 demersal species and 31 Selachians. For these species individual length, number of individuals, total weight and also biological parameters such as sex, maturity, individual weight and age should be collected. It was decided that age should be only collected for the teleosts in this group, and thus for *Merluccius merluccius*, *Mullus barbatus*, *Mullus surmuletus* and *Pagellus erythrinus*;
- MEDITS G2 includes 42 species for which only individual length, number of individuals and total weight should be collected.

Spain proposed the following modifications to the protocol regarding ***Pagellus erythrinus***: The STECF meeting “Assessment of Mediterranean Sea stocks - Part 1 (STECF-11-05)" reviewed the quality of all data collected under the umbrella of the Data collection Framework. In point 7.5.2 “DCF data review of coastal species. MEDITS DATA” the group concluded that the capacity of MEDITS to sample coastal species, like *P. erythrinus*, *P. acarne* and others, is rather limited, and it suggested that in these cases, MEDITS data can only be used as a recruitment index. (For more details, see Annex 4 - Extract from the document Assessment of Mediterranean Sea stocks – part 1 (STECF-11-08), or page 214 of the source document). For this reason, Spain proposed to remove *Pagellus erythrinus* from the MEDITS G1 species and include it in the G2.

While taking into account that age reading of *P. erythrinus* is required in the case that the DCF indicator no. 4 is to be calculated for this species, the meeting decided to shift this species from Group 1 to Group 2. This also taking into account the sexual pattern of the species which is hermaphroditic, though part of the population might not change sex. Thus the protocol for the estimation of the indicator n. 4 seems less applicable for the common pandora. Nonetheless, each country is free to collect such information should it be deemed necessary (cfr. section 9 of this report: Harmonised protocol for collection of biological parameters (i.e. collection of otoliths, maturity stages and individual weight measurements)).

8 Progress of the Permanent Working Group for the updating of the MEDITS Reference taxonomic list

Following the decision taken in Nantes last year, the FM list of species was reorganized, maintaining the original codes of faunistic categories and of species. As established in Nantes, the list (Annex 5 – Updated MEDITS FM list) is subdivided into the following categories:

A Fish;
B Crustaceans (Decapoda, Stomatopoda, Eufausiacea);
C Cephalopods;
D Other commercial (edible) species;
E Other animal species but not commercial (edible);

G Portions or products of animal species (shell debris, eggs of gastropods, selachians, etc.);
H Portions or products of vegetal species (e.g. leaves of sea grasses, of terrestrial plants, etc.);
V Vegetalia;

For this classification, the main references used were Fisher et al. 1987, *Fiches FAO* d'*identification* des *espèces* pour les *besoins* de la *pêche*. *Méditerranée* et *mer* Noire. The last 3 categories ; G, H and V were added following last year's meeting.

The categories A, D and E were divided in the following subcategories:

Ao	Fish Osteichthyes;
Ae	Fish Elasmobranch;
Dmb/Emb	Mollusca Bivalvia;
Dmg/Emg	Mollusca Gastropoda;
Dec/ Eec	Echinoderms;
Dtu/ Etu	Tunicata (Ascidiacea);
Emo	Opistobranchia;
Esc	Scaphopoda;
Epo	Polychaeta;
Ebr	Bryozoa;
Esp	Sponges (Porifera);
Ecn	Cnidaria;

Other new codes can be added to the updated list. It was decided to not consider species lower than 1 cm like Isopoda, Amphipoda, small Polychaetes, etc.

The list of species belonging to Ao, Ae, B and C were sent to all the meeting participants some days before the meeting. The list of D and E species were shown during the meeting. The complete list will be available on the Medits website (at SIBM link for the time being) after the meeting to take into account the suggestions from the meeting and to include other taxonomic group not yet considered. For some species it is necessary to add a reference when the species is not described in the previous references below:

C = Clofnam
F = Fisher *et al*., 1987
Z = Zariquiey 1968
R = Riedle 1968

In the list there are some mistakes, which would be reviewed in the future like genus sp. when only one species is present in the Mediterranean (for example *Illex* sp. = *Illex coindetii*) and species not present in the Mediterranean sea. For this reason, the meeting suggested that in the future a list of the presence of different species in the GSAs should be compiled.

All the work and problems dealing with the FM list, in particular the introduction of new species will be managed by the FM list permanent WG established during the MEDITS Coordination meeting last year, being composed of Giulio Relini (coordinator), Enric Massuti, Bastien Mérigot and Angelo Tursi. Proposals for new species shall be sent to Relini Giulio using the attached form (Annex 5.1 – Form for introducing new species into the FM list). The checklist of Fauna and Flora of Italian seas is the main reference currently being used in order to check the valid scientific name of species present in the Italian seas.

9 Harmonised protocol for collection of biological parameters (i.e. collection of otoliths, maturity stages and individual weight measurements)

The working group established during the meeting in Nantes in 2011 for the purpose of finalising a proposal for a 'Harmonised protocol for collection of biological parameters' met during the present MEDITS meeting. A draft proposal was circulated to the members of this WG by M.T. Spedicato before the present MEDITS coordination meeting. During the meeting the working group was opened to all the colleagues who wished to join the WG, in order to finalise the 'Harmonised protocol for collection of biological parameters' and to make a final proposal to the MEDITS coordination meeting.

The group reviewed the list of species for which age is required. The working group, supported by the meeting, agreed to remove *Solea solea* from Group 1 to Group 2, because it was already included in the Group 2 in the previous MEDITS meeting in Nantes and shifted in the Group G1 for some mistake, thus only total weight and individual length of this species are required. Taking into account the importance of *Solea solea* in the Adriatic Sea, where considerable catches are reported, the otholits of this species could be voluntarily collected in this area. However, such a decision is up to the regional responsible and is not mandatory.

Following a long discussion on the inclusion of *Pagellus erythrinus* as a Group 1 species, the final decision was to shift this species to Group 2 due to the following reasons:

- There are some particular features in the life cycle of this species related to hermaphroditism (for example the different proportion of sex inversion year by year or the complete absence of sex inversion) that cannot allow to properly apply the protocol for the estimation of the indicator n.4 of DCF;
- There was a specific recommendation by STECF-EWG (Annex 4 - Extract from the document Assessment of Mediterranean Sea stocks – part 1 (STECF-11-08)) considering the MEDITS survey more suitable to estimates recruitment indices of this species.

Such as for *Solea solea*, biological parameters of this species, including age, can be collected on a voluntarily basis in those GSAs which deem information about this species necessary.

Thus, the following are the species, among teleosteans, for which otolith sampling and reading, individual weight and maturity staging are to become mandatory through the new protocol:

- *Merluccius merluccius*
- *Mullus barbatus*
- *Mullus surmuletus*

The group discussed between 2 different proposals for otolith sampling:

Methodology 1	to collect a random sub-sample for otoliths from the length sample;
Methodology 2	to collect a fixed number of otoliths according to a random stratified sampling by length class.

With regards to the 1st methodology, the possible drawback is that the age class 0-1 could be overestimated, since it is usually highly represented in the samples; thus, it could be better to stratify the samples in order to reach a representative number for each age class, also the less frequent (generally the larger individuals). Following this reasoning, the final decision was to choose methodology 2 and to adopt a random stratified sampling.

The group also discussed the distribution of the otolith samples from different hauls. In order to avoid an autocorrelation among individuals sampled from the same station, it was strongly suggested to collect samples from different hauls. Taking into account the different catches of each species by area, haul and depth, the general suggestion was to be more flexible in the distribution of samples among hauls, leaving the final decision to the responsible of the GSA. The protocol will state that otolith samples for age reading have to be collected from as different hauls as possible and not from a single or few hauls. The group also suggested to collect a number of specimens for otoliths bigger than needed, so as to have a larger selection in case of damage during extraction, poor reading, oversampling, etc….

With regards to the distribution inside each age class, another aspect to be considered is that for indicator 4, 100 adult individuals are requested for age data and only individuals at a maturity stage 2a, 2b, 2c and 3 for fish have to be considered for age reading, while juveniles or spent individuals are not necessary.
Since a smaller number of otoliths from juveniles is required than for adults, for each group is to define L_{25} at maturity to discriminate between age classes of juveniles and adults so as to be able to follow the following protocol:
Otoliths are to be collected through a random stratified sampling from different hauls and cannot be collected from only one haul (if present in more than one haul). For M. merluccius *length classes of 1 cm wide are adopted for stratification. For length classes under L_{25} at maturity, 5 otoliths per length class should be collected, while for length classes over L_{25} at maturity, 10 otoliths per length class should be collected. The sampling have to be carried out by sex, even at length lower than L_{25} at maturity, if sex is macroscopically distinguishable. For* M. barbatus *and* M. surmuletus *length classes of 0.5 cm wide are adopted for stratification. For length classes under L_{25} at maturity, 6 otoliths per length class should be collected, while for length classes over L_{25} at maturity, 14 otoliths per length class should be collected. The sampling have to be carried out by sex, even at length lower than L_{25} at maturity, if sex is macroscopically distinguishable. The length, individual weight and maturity stage have to be collected for all individuals from which the otoliths are sampled.*

The following sub-sampling procedure is to take place for the collection of length, individual weight, sex and maturity stage for Group 1 species other than teleosteans:

- For elasmobranches*; for length classes under L_{25} at maturity, 5 individuals per length class should be sampled per sex, while for length classes over L_{25} at maturity, 10 individuals per length class should be sampled per sex. This is the same sub-sampling procedure as for otolith sampling.*
- For crustaceans*; considering the small size of crustaceans and the length class of 0.1 cm, for length classes under L_{25} at maturity, 6 individuals per length class should be sampled per sex, while for length classes over L_{25} at maturity, 14 individuals per length class should be sampled per sex.*
- For cephalopods; *considering the high variability in sizes*, *for length classes under L_{25} at maturity, 5 individuals per length class should be sampled per sex, while for length classes over L_{25} at maturity, 30 individuals per length class should be sampled per sex.*

The group was informed of the conclusions of the hake otolith exchange in 2011 (Annex 3 - Extract from the Report on otolith exchange of European hake (2011)) which states the difficulties in age validation, as the new guidelines are not sufficient to rule out individual subjectivity of interpretation of hake otoliths. In addition, a transitional error matrix to rebuild historical ALKs due to the interpretation of hake otoliths for age estimation is imprecise and still cannot be validated.
Given these conclusions and uncertainty Spain proposed the following modifications to the protocol:

Merluccius merluccius. At the last Hake Age estimation Workshop (WKAEH 2009), an exchange of otoliths was recommended to build on the findings of the Workshop. This exercise was performed during 2011, and one of the objectives was to analyze the results and check the precision and bias of readers when using the new guidelines described during the WK. In view of the results (

Annex 3 - Extract from the Report on otolith exchange of European hake (2011)), the experts involved agreed not to build or use new keys until the international community reaches a new consensus. Due to this, Spain proposed that hake otoliths should be collected during the MEDITS survey but not read until an agreement is reached.

During the meeting it was confirmed that given the uncertainty in hake ageing, as highlighted in the conclusions of otolith exchange in 2011, IEO (Spain) and IFREMER (France) are collecting but not reading otoliths until a harmonised methodology is agreed. As the situation is different among countries it was suggested to follow the procedures adopted at country level in the DCF. Due to this, the MEDITS group decided that hake otoliths should be collected in all the GSAs, then it is up to the GSA responsible and/or to the national responsible of MEDITS if to read them immediately or to wait for the standardised protocol for hake age reading in order to process the otolith samples.

10 Format for the storage of the new data set on age and individual weight measurements

A second working group was set up during the meeting in order to work on the development of a TE file; the new MEDITS data file which will incorporate unaggregated biological information about the Group 1 individuals sampled. The file is found in this report in Annex 7 – TE file format.

Furthermore, the meeting agreed that amendments to the TC file should also be carried out so that links between the data can be made between it and the new TE file. However, due to time constraints this was not discussed in details during the meeting, but will be incorporated in the revised protocol which will be circulated when ready after the meeting.

11 Exercise with RoME routine on MEDITS data

A third working group met during the meeting, having the opportunity to work with and test the new version of RoME incorporating the changes described in the section 6.1 Upgrade of RoME routine on MEDITS data of this report.

The latest version of RoME will be circulated to all MEDITS members after the meeting.

12 The estimate of the gear geometry/performance, the quality check of the gear setting, equipment for the estimation for gear performance, data acquisition, data processing and analysis

Antonello Sala

The following are the main topics discussed during the presentation:

- general information on the MEDITS programme and of the project “Intercalibration des campagnes internationales de chalutage démersal en Méditerranée central” (IRPEM-CE project MED/93/015 – Final Report: 59 pp);

- instrumentation used by the fishing technology unit during the sea trials;
- discussion of the intercalibration experiment carried out in July 2011 in the Strait of Sicily on board the Sicilian and Tunisian vessels;
- state-of-the-art of the gear monitoring systems, such as Scanmar, Simrad, etc..

The main outcome during this discussion was the necessity to establish a new group of technologists in order to regularly investigate the full standardization of the MEDITS trawl survey (gear parameters, use of the gear and processing of data) in accordance with the newly revised protocol. The new group of technologists should regularly report to the MEDITS coordination group the findings of their work. The three main tasks related to this group are detailed below.

Check-up of MEDITS gear

The meeting felt the necessity to review/revise the manual and the protocol of the MEDITS gear in order to standardize as much as possible all the different phases of the capture process and to avoid the introduction of bias in the sampling.

Even if a precise and rigorous protocol was adopted in 1995, it must be noted that it was not completely followed in all GSAs. The intervention of the captain and of the crew on gear rigging was sometimes observed or known by the verbal report of some scientific staff. These alterations, which certainly had the intention to improve the gear efficiency, have to be avoided in any case. It must be clear that, because these alterations to the gear rigging derive from the practical experience of the fishermen, which are certainly very different, they could be contradictory and lead to different gear behaviour when used by different vessels.
For the reasons abovementioned, a new regular check of the MEDITS gears (trawl, rigging, doors) and of the protocol-abiding has been plenary proposed and accepted.

MEDITS gear performance

As appropriate instruments to control the gear behaviour are not regularly used during every haul of the MEDITS project, the Operative Units must use reliable models of horizontal- and vertical-net opening related to some other available parameters (i.e. warp length, depth, etc.), so that, estimated values of net openings can be derived and applied when necessary.

Nevertheless the use of these instruments is highly recommended because they give exact information on the gear behaviour. From one side, they give the measure of the horizontal and vertical net openings in all the conditions, even when some external and unpredictable effect (i.e. part of the net entangled or damaged, particular types of the bottom) can influence the above parameters and make the possible estimates inaccurate. From the other side, the knowledge of the gear behaviour could improve the setting operations and the determination of the exact tow duration also at large depths.

On the basis of all the available data, a general MEDITS model for the horizontal- and vertical-net opening, must be found and made available to all MEDITS Operative Units, such as Malta, Croatia, etc., which at the moment do not dispose of a gear monitoring system.

Standardization of data-processing

All the Operative Units must follow a common standardization of data-processing of the technological parameters (haul duration, horizontal- and vertical-net opening). The data-process must be consistent throughout the years, keeping eventual errors constant in the time series. Advices will be included in the revised manual and protocol which is to be made available to all the Units before the beginning of the next MEDITS surveys.

A multidisciplinary Working Group to further progress in the harmonization of the the MEDITS samplings in the Mediterranean Sea was proposed by the MEDITS coordinator and agreed by the coordination meeting. The WG should foresee the presence of technologists and other researchers with different expertise to tackle some relevant aspects related to the gear geometry and the estimates of gear parameters derived using for example acoustic technology.
This WG should report regularly to the MEDITS coordination group the findings of the investigations. The tasks of the WG can be summarised as follows:
1) preparing a clear, commented and documented (e.g. using photos, sketches, etc..) checklist for the quality control of the technical characteristics of the MEDITS gear, in order to avoid the use of a gear that has not exactly the same characteristics from year to year. The preparation of this checklist is of course a matter of technologists, but it should be conceived so that also non technologists are enabled to apply the protocol and contribute to possible improvement of the checklist;
2) preparing a clear and standard procedure, easily to apply in the field also for non technologists, for the monitoring and collection of the data on the gear performance, including the monitoring of gear horizontal and vertical openings, the duration of trawling and the measurement of the distance covered, etc.., in order to be sure from one side that comparable data are gathered among GSAs and on the other side that the consistency in the time series is maintained. This is a task to which technologists, biologists and possibly mathematicians or statisticians can contribute;
3) evaluate and make available tools that enable, using the same methodological approach, the estimate of the parameters of the gear performance which affect the estimates of the swept area, thus influencing the abundance indices. Also this is a task to which technologists, biologists and mathematicians or statisticians can contribute.

In this WG at least 1 person by GSA should participate and Antonello Sala is invited to coordinate the WG. In addition, in order to start soon with some preliminary standardization work, a first focus on this subject will be introduced in the forthcoming revision of the MEDITS manual, adding some details to the technical specifications of the gear characteristics and checks. This contribute should be considered preliminary as it will be further implemented by the established WG. For the time being ISMAR-CNR, IAMC-CNR (GSA16), COISPA (GSA10 and 18), Cagliari University (GSA11), Bari University (GSA19), IEO (GSA1, 2, 5 and 6) FRI (GSA22) gave their availability to take part to the WG. As not all the representatives of the GSAs were in the position to indicate a participant to the WG, they will send to the MEDITS international coordinator the name of the colleague(s) designated to this WG.

13 Harmonisation of methodology for estimating Ecosystem Indicators from fisheries independent research surveys (App. XIII EU Decision 93/2010)

Isabella Bitetto

The DCF Regulation 199/2008 requests the estimation of 9 ecosystem indicators; the indicators to be estimated using scientific survey data are Indicators 1 to 4. During the PGMed the methodologies used by the different countries have been checked; as conclusion of the meeting, PGMed requested the MEDITS and MEDIAS working groups to harmonize the methodologies and the different requirements as much as possible in order to propose a common approach. For a long time a common tool to calculate proxy of the requested indicators was represented by R-SUFI, developed by IFREMER (Nantes) in 2005.

After the comparison and investigation on the methodologies performed by the different Countries reported by PGMed and on the basis of the Commission Decision, we made an overview of the different methodologies and implemented an R-routine based on this overview.

To start with a methodological overview of the 4 indicators was given.

Indicator 1 – Conservation status of fish species

To start with an overview of indicators, according to the Commission Decision (2008), Indicator 1 is composed by two sub-indicators of biodiversity of vulnerable fish species:

1.a an indicator that responds to changes in the proportion of contributing species that are threatened;

1.b an indicator that tracks year-to-year changes in the abundance of contributing species.

Indicator 1.a has been first developed by Dulvy *et al.* (2006) and was identified in INDENT project (2006) as a useful indicator to describe the conservation of vulnerable fishes according to IUCN criteria. Afterwards this indicator has been investigated by two STECF working groups (SGNR-06-01 and SGMOS 10-03) as well as in MEFEPO project (Le Quesne, 2010).
As reported in Le Quesne (2010), the Conservation Status of Fish indicator was selected to report on GES descriptor 1 (biodiversity) within the Marine Strategy Framework Directive.
The first phase of the estimation, is represented by a selection of the species involved. All the species that have morphology, behavior or habitat preferences that are expected to lead to low and variable catchability to the survey gear, or cannot be identified reliably, or have a mean annual catch rate less than 20 in a consistent numbers of years of the time series or that have an L_∞ <=40 cm have to be excluded. The remaining species will constitute the List 1. Afterwards, the species in List 1 will be ordered from the highest L_∞ to the lower L_∞; the first 20 species will be part of List 2. For the species for which the L_∞ is lacking, the maximum recorded length will be used. Then, abundance indices will be calculated for every year and species for individuals longer than ½ L_∞. This selection of species is common to the 2 sub-indicators 1.

For <u>Indicator 1.a</u>, for each species a linear model will be estimated among the abundance indices from an year x to the year x+10 years, adding for each new regression one year (Decision Commission, 2008; Le Quesne, 2010). For each regression, a score will be associated to each species, according to the following criteria: slope <= -90%: score = 3 (critically endangered); slope <= -70%:score = 2 (endangered); slope <= -50%: score =1 (vulnerable); otherwise: score = 0 (without concern). Indicator 1.a will be calculated using information from the scores of the species in the List 2 as well as the information on the rebuilding of the species (defined in PGMed by France as a binomial variable that equals 0 for no rebuilding, 1 for rebuilding) after 10 year from the first year of the time series by means of a reference level of abundance to be defined in all the time series. This reference level is an average of the abundances in the first three years as reported in the Decision Commission and in Le Quesne (2010); in PGMed also a more strict value has been proposed by France equal to the average of the five highest abundances. This indicator would be directly linked to IUCN criteria to identify threatened species. Indicator 1.a varies from 0 (no species is threatened, no concern) and 3 (all the species are critically endangered). A decrease of the indicator would be a signal of a progress towards a sustainable fishery. The reference value for this indicator is 1 as suggested by the Commission Decision, MEFEPO and SGMOS 10-03.

Going through Indicator 1.b, according to Decision Commission (2008), it compares the current abundance of the large fish community to the reference period of the first three years. For each species the percentage of change in abundance in each year relatively to a reference value given by the average of abundance in the first 3 years will be calculated. Then, the proportions just calculated have to be log-transformed to calculate the geometric mean of the $P_{j,y}$ on all the selected species *j* for every year *y*. The reference direction for indicator 1.b is the increase along the years; indeed, an increase in the value of the indicator would show progress towards the Common Fishery Policy objective of ensuring that the impact of fishing on the ecosystem is sustainable.

Several open question, in our opinion, need a discussion: 40 cm value to select the species in List 2 is a threshold suitable for Mediterranean? Is it more correct to use L0.95 as a proxy of L_∞ (and not the maximum reported length)? How to define a reference value of abundance to decide if stock is rebuilding or not? Is it correct to use the first 3 years of time series as baseline?
As reported by SGMOS the variation in behaviour of the CSF indicators indicates that the species list selection criteria developed in EC (2008) should be reconsidered and potentially revised. Therefore, during SGMOS has been observed that the CSF indicators could give signals completely different if calculated on different sets of selected species.

The following questions are the main issues for discussion and insight :

- Is the 40 cm value a suitable threshold for the Mediterranean in order to select the species for List 2?
- Is it more correct to use L0.95 as a proxy of L_∞ (and not the maximum reported length)?
- How to define a reference value of abundance to decide if the stock is rebuilding or not?
- Is it suitable to use the first 3 years of time series as a baseline especially in long-history exploitation?

Indicator 2 – Proportion of large fish

For the estimation of this indicator, individual weights are necessary. Nonetheless, if individual weights are not available, the indicator also works with estimates obtained through length-weight relationships. If a length-weight relationship is not available, the indicator can only be calculated on the number of individuals as done by the R-SUFI routine. The calculation of the indicator should be performed on the standardized mean community. A positive trend in the proportion of large fish among the years has to be interpreted as a signal of a decreasing impact of fishing activity on the marine eco-system. Similar to indicator 1, the choice of a threshold value suitable for Mediterranean for this indicator was also put on the table for discussion.

Indicator 3 – Mean maximum length of fishes

For this indicator, an estimation of L_∞ for all the species included in the calculation is needed; in case of multiple estimates of L_∞, an average can be used. If the asymptotic length of one species is lacking, the Commission suggested the use of the maximum reported length in the time series. The indicator has to be computed as the weighted mean of the L_∞ values, weighting on the abundance by species. A positive trend in Indicator 3 among the years has to be interpreted as a signal of a decrease in fishing pressure on the marine ecosystem.

Once again the meeting was posed with the question if it is better to use $L_{0.95}$ as a proxy of L_∞

(and not the maximum reported length). Moreover, the Commission Decision seems to say that the indicator is required only for fish communities. However, the mean maximum lengths of crustaceans and cephalopods can be also estimated. Thus, the group was invited to comment on this aspect.

Indicator 4 – Size at maturation of exploited fish species

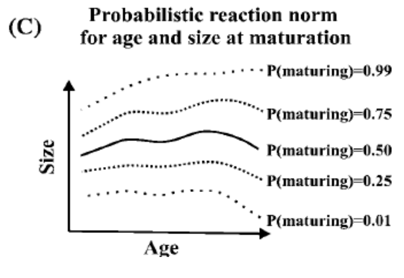
Indicator 4 has been never yet calculated in Mediterranean, because the age data are collected since short time. We investigated the methods to be used for the calculation of *probabilistic maturation reaction norm* and we developed a study case on simulated data.
Indicator 4 is based on the probabilistic reaction maturation norm (PMRN) method that try to disentangle plastic from possible genetically based changes in maturation (Heino *et al*. 2002, Barot *et al.* 2004a-b).
The average size at first maturation of exploited species can decrease as consequence of fishing pressure. However ascertain if a plastic or a genetic change is occurring is not an easy task. Until now $L_{m50\%}$ has been used as *proxy* of the Indicator 4, however maturity ogive model doesn't disentangle plastic and evolutionary change, because it contains the influence of growth and survival as it is highlighted also by SGNR 06-01. Instead the probabilistic reaction maturation norm allows to disentangle the evolutionary changes and phenotypic plasticity, using variation in individual growth as proxy for environmental variation. The indicator is based on the calculation of the number of successes in maturation, calculating the newly matured individuals in the cohort for each pair age-size *(a,s)*:

$$m(a,s) = \frac{o(a,s) - o(a-1, s-\Delta s(a))}{1 - o(a-1, s-\Delta s(a))},$$

where *o(a,s)* is the proportion of mature at age *a* and size *s* and $\Delta s(a)$ is the increment in size from age *a-1* to age *a*.
The method can be divided in 4 main steps:

1. estimation of a statistical model describing age and size-specific maturity ogive;
2. estimation of a statistical model describing age-specific growth to estimate the increment in size from an age to the subsequent;
3. calculation of maturation reaction norm by plugging the estimated ogive and growth increments into the equation above reported;
4. derivation of a simple parametric representation for the reaction norm.

The probabilistic maturation reaction norm is not an appropriate indicator since it has infinite dimensions, as it involves the specification of the probability of maturing for all relevant ages and sizes.



SGNR 06-01 suggested to focus on one of the probabilities that is part of the reaction norm: the length at which individuals has 50% of probability of *maturing*, that is, the so called mid-points of

the PMRN (Heino et al., 2002).
A long-term negative trend in the indicator, accompanied by no corresponding negative shift in growth, can be interpreted as a signal of an evolutionary trend probably caused by high fishing mortalities.
In the case study we created a simulated dataset of cohorts from 1994 to 2010 with individuals from age 0 to age 7; in 2001 we induced an earlier maturation, not changing the growth pattern. On this dataset we calculated Indicator 4 and a negative shift in the indicator is actually observed.

The presented methodology has been also implemented in an R-routine, named ECOSIN, except for Indicator 4. This routine uses directly TA, TB and TC files, combining them with biological information coming from the user (L_∞ and length-weight relationship coefficient). Moreover, 2 types of standardization and an unlimited number of threshold values for Indicator 2 calculation can be set. The output are saved in tables and graphs.

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Conclusions on Indicators 1-4 and comments of the meeting

The methodology presented in this overview, has been implemented in an R-routine, named ECOSIN, except for Indicator 4. This routine uses directly TA, TB and TC files, combining them with biological information coming from the user (L_∞ and length-weight relationship coefficient). Moreover, 2 types of standardization and an unlimited number of threshold values for Indicator 2 calculation can be set. The outputs are saved as tables and graphs.

The group agreed that from these indicators, trends in abundances can be analysed and that indicators are to be adopted as described in the Commission Staff Working Document COM (2008) 187, taking into account also the outcomes of the specific meeting held on the subject under the umbrella of DCF or expert WG. The inclusion of the maximum probable length obtained by an utility function of the FISAT software can be considered as an alternative for the indicator 3 when L_∞ are not available. The group noted that these indicators can be applied only to a small number of species, since only a few of the species in the MEDITS target species list reach over 40 cm and the species that do (such as most elasmobranches) are most of the times very rare. Thus, further analysis to test the indicator sensitivity is still required so as to verify their performances in the Mediterranean sea using MEDITS data. COISPA will make further investigations to test the sensitivity of the first 3 indicators and will update the group. In the meanwhile any contribution to the subject by the different teams using different data sets is strongly reccommended.

14 Review of the MEDITS manual

Work is currently in progress on the revised MEDITS manual. Decisions discussed during this meeting will be incorporated and the manual will be circulated to all MEDITS groups for their reviews. Once the manual will be finalised it will be once again circulated for its adoption for the 2012 surveys.

15 Progress in common research activity

15.1 Spatio-temporal modelling in diversity of demersal fish communities in the Mediterranean Sea - WG on Species assemblages and biodiversity

Bastien Mérigot

3 main points have been presented in line to those discussed/approved during the MEDITS meeting in Nantes (march 2011): i) spatio-temporal dynamics of demersal species in the Gulf of Lions (PhD Marie MORFIN), ii) Spatio-temporal modeling in diversity of demersal fish communities in the Mediterranean Sea (Ph. D Victoria SUNTOV) and iii) a focus on functional diversity.

Firstly, the spatio-temporal dynamics of demersal species in the Gulf of Lions during the period 1994-2010 have been addressed on 12 key species/group of species (see pdf presentation for more details). It has been showed for all of them a temporal persistence of spatial structures (geostatistical simulations) and of distribution maps (Empirical Orthogonal Functions) from 1994 to 2010 in the Gulf of Lions. In addition, a spatial matching has been observed between highest densities of juvenile and adults distributions (Morfin *et al. in revision Plos One*).

Secondly, it has been reminded the main objectives to be filled in the frame of a common research project of the MEDITS group that involve the PhD of Victoria SUNTOV (Univ. Montpellier 2, October 2011-2014): i) to analyse spatio-temporal pattern of species diversity from 1996 to 2009, ii) to build maps of the main diversity components (including phylogenetic and functional difference between species) and their respective turnover (*β*-diversity), and of the main environmental forcings, iii) to identify diversity “hotspots” and analyse the spatial congruence/mismatch of diversity components in a management perspective. The group has been thanked for providing fish abundance data for the studied period. It has been reminded that the project involves the use of data which some of them are not yet gathered for GSA: anthropogenic (fishing efforts) and environmental data (bottom temperature and substratum type for the eastern basin). B. Mérigot will thus send a reminder with details of the data needed. He also underlined that these data could be gathered in a common data base useful for other current research MEDITS projects.

Finally, progress in collecting and measuring functional traits of fish species has been presented to study functional diversity of assemblages in the above project and a complementary project led by Anik Brind'Amour. 5 GSAs have been thanked for their effort in collecting pictures and measuring fish on board in the 2011 MEDITS surveys. Measures on pictures are performing in Montpellier and Nantes since September and will be achieved by beginning of summer 2012. There is still a need to complete this sampling for some species in the GSAs already involve, and for GSAs that are invited to participate. B. Mérigot reminded that these data are kept within the MEDITS group, and that co-authorship will be proposed when used. He will circulate again the functional traits sampling protocol for the 2012 MEDITS survey.

15.2 Contrasting functional community structure across Mediterranean areas

Anik Brind'Amour, Marie-Joëlle Rochet, Verena Trenkel, Angélique Jadaud, Bastien Mérigot, Pierluigi Carbonara, Porzia Maiorano, and Jacques Bertrand

With the development of the ecosystem approach to fisheries, there is an increasing interest in analysing fish communities as sets of functional groups. Functional groups are groups of species that play a similar role in the food web and whose dynamics can be considered as consistent. We propose to build conceptual models of community structure and functioning in the MEDITS areas, starting from the species characteristics and relative abundances, rather than *a priori* assumptions or imposed model structure. The first question asked is whether these adjacent communities that share a common environment with local particulars differ in their functional structure. A second question is whether temporal changes have occurred within each area and how it is possible to compare dynamics of communities that have different structures. Do these different community structures react in different ways to environmental drivers and human pressures?

Following the research proposal from the last MEDITS coordination meeting held in Nantes in 2011, we proposed an analysis consisting of four steps:

1. To ascribe species to the functional groups based on an analysis of species traits and abundances; the number and definition of functional groups may vary between Mediterranean areas.
2. To build a community model relating these functional groups and the main environmental drivers.
3. To predict the combined trends in size and abundance in these groups that should have resulted from major environmental changes by a qualitative analysis of the model.
4. To use a likelihood approach to identify the most likely trends in metrics and the most likely combinations of trends, and contrast them across model structures.

We first completed a data-base for functional traits of MEDITS species. Using these new data we carried out analyses on these traits. The results clearly identified theoretical-based and reasonable functional groups of fish species which represented an improvement from a strict expert classification. However, some of the groups are still heterogeneous as some species seem to be misclassified. This will be improved by increasing the number of individuals/species using the new pictures received in March 2012 (GSA 11 & GSA 18). Adding another indicative trait of fish diet (gut length or dentition type) will also help disentangling these groups.

Besides the methodological aspects, the interest of the study is to compare the functional structures across the MEDITS areas. Surveys data (i.e. biomass and abundance indices) covering a large geographic gradient and contrasted areas (semi-enclosed bays, open and exposed coasts) are thus needed. The next step in developing the community model consists in connecting together the core community, that is the set of functional groups, and connecting all the groups with their environmental drivers and anthropogenic pressures. That is, the major drivers in the area need to be identified, and their links with the functional groups defined. This step will rely on expert knowledge about the area of interest, and the analysis of the model properties, with back and forth steps until a satisfactory model is designed.

15.3 Habitat modelling of juvenile hake in the Mediterranean Sea

Jean-Noel Druon

J-N Druon from the Joint Research Centre of the European Commission (EC-JRC) in Ispra, Italy, presented the latest analysis on hake habitat, notably regarding relations between the selected environmental variables and hake presence provided by 14 GSAs. The distribution with depth of hake using MEDITS data corroborated the information available in the literature. The main assumption in the presented modelling approach bears that frequent primary production events (chl-a fronts) must occur in the vicinity of juvenile hake populations in order to reply to their trophic needs; age 0 fish in nurseries shall be indirectly fed by regular loads of organic matter sinking at the seabed while age 1 to 3-4 mainly seek their prey at night in surface waters. Chl-a fronts, even if only moving a few kilometres per day, are active long enough (weeks to months) to allow a micro-zooplankton population to grow and, in turn, attract macro-zooplankton and small pelagic fish, i.e. hake prey or efficient vectors of organic matter export to the seabed. A preliminary calibration of the model was done, although it was recognized that abundance data, preferably in biomass, is required for proper modelling due to the high rate of presence in the MEDITS hauls. Presently, the retained variables are (a) chl-a fronts, (b) a specific chl-a range (currently from 0.07 to 0.54 $mg.m^{-3}$) and a maximum water depth (currently 577 m). The seabed sediment type did not show a clear correlation with presence data in the Western Mediterranean Sea, therefore this variable was not retained, although it will be tested in the case that a specific model calibration targeting only the nurseries (age 0) will be carried out. The 8-day primary production product will be tested in replacement of the 3-day chl-a content, but similar shapes of frequency distribution already show that similar performances are expected. 80% of the observations (n=646) were located at less than 10 km of the closest habitat and the habitat size was 5.5% of the Mediterranean Sea.

Fortnight, seasonal, annual anomalies and multi-annual composites maps of potential hake habitat were shown for the period 2003-2011 highlighting most of the known areas for hake fisheries and nurseries while one nursery area was missing in the North of the Tyrrhenian Sea. Abundance data is however needed to refine the model due to the high differences in the number of fish between hauls. A call for authorization to use the TA, TB, TC data files as well as to obtain regional weight/length relationships was circulated to the GSA representatives. 2012 should be the year of the proper model development on hake provided data is granted soon enough. A fruitful scientific collaboration is foreseen between MEDITS project contributors and EC-JRC.

15.4 Spatial patterns of fishing impact in the northern Mediterranean using demersal community metrics and effort data

Francesco Colloca

Coordinators: Francesco Colloca, Paolo Carpentieri
Participants: L. Maiorano, F. Fiorentino, C. Piccinetti, A. Joksimovic, N. Vrgoc, P. Sartor, G.D. Ardizzone, M.T. Spedicato, G. Garofalo, P. Lembo, A. Cau, C. Follesa, P. Maiorano, L. Sion, E. Massuti, L.Gil de Sola, M. Garcia, A. Kallianotis, P. Vidoris, L. Knettweis, A. Mannini, E. Massuti, M. Garcia, C. Papacostantinou, A. Jadaud, B. Merigot.

Fishing produce direct and indirect effects on the structure and functioning of fish communities (Rice and Gislason, 1996; Shin et al., 2005) such as change in the size structure (Pope and Knights,1982; Rice and Gislason, 1996) due to the reduction in the abundance of large predators and increase in the abundance of small prey. In addition, fishing also may directly affect species composition via the relative sensitivity of species to increased mortality (Jennings et al., 1998). In general, species with a low natural mortality (M) should be more sensitive to exploitation than species with a high M. Since overall M is inversely correlated with maximum size (Lmax), changes in Lmax spectra might be expected to provide a measure of the indirect effects of fishing, by reflecting changes in total mortality of the species in the community.
In interpreting potential impacts of fishing on the community, direct effects have to be separated from indirect effects (Daan et al., 2005). Indirect, compensatory effects in small fish, whether due to less predation mortality or to stock-recruit responses can also produce change in community properties and dynamics. Competition theory would predict that individuals try to compensate for size-dependent mortality with (size-dependent) redistribution to take advantage of the less competitive environment where fishing has occurred (Pimm and Hyman, 1987).
The different patterns expected depending on the causal mechanisms involved are an incentive to study variations in community properties on different spatial scales.
Sets of community indicators can be adopted to this aim since they can be used to report both simple and quantitative information about complex systems. Some of them have been proved to capture the effect of fishing on exploited marine ecosystem, hence demonstrating that fishing is probably the most important ecosystem driver (Rochet and Trenkel, 2003; Rochet et al., 2005; Link et al., 2010; Shin and Shannon, 2010). In Mediterranean, there is a growing consensus that overexploitation, combined with habitat loss and degradation are the main human drivers of historical change observed in the marine ecosystem (Coll et al., 2012; Lotze et al., 2011, Coll et al., 2010). In addition, the climate change and the increasing importance of alien species are also recognized as important threats affecting the high biodiversity of the Mediterranean.
Most of the studies carried out so far have been done at a large spatial scale (e.g. Mediterranean sub regions, GSAs), increasing knowledge on the evolution of the exploited marine communities across the last decades. There is however an increasing need to develop fine scale analyses of overlap between fishing pressure and the structure and composition of the marine communities to identify critical areas for conservation aims, also considering that the anthropogenic pressures on marine ecosystem are predicted to increase in the future.
In addition, it is however still very poorly understood, in particular in the Mediterranean, the impact of the on-going environmental change on the structure and functioning of Mediterranean marine fish and shellfish communities. The expected ecosystem effects of fishing, as measured by reference directions of communities indicators, can be masked by environmental drivers which can also have a combined and non additive effects as demonstrated in some Large Marine Ecosystem (Frank *et al*., 2006; Shannon *et al*., 2008). In the Mediterranean the ongoing temperature change has been proved to affect the population dynamics of important commercial stocks such as hake (Bartolino *et al*., 2008) and *Parapenaeus longirostris* (Ligas *et al*., 2010).
We proposed to explore Medits data on haul by haul basis to analyse the spatial pattern of several fish community properties, at different scales (e.g. basin, sub-basin), in order to answer three main questions:
1) Is it possible to develop models to explain and predict the spatial distribution of community metrics (indicators sensitive to fishing) ?
2) Can we separate the effects of environmental variability and fishing effort on the distribution of community metrics?
3) Can poorly impacted areas still be identified?
The final objective is to develop a spatial conservation plan for the Mediterranean demersal communities according to explicit conservation targets.

Preliminary analyses

The area considered in the study is the North Mediterranean Sea. The data sets used are the following:

- MEDITS survey data (TA TB TC) 2000-2010;
- Fishing effort data (where these are available, e.g. VMS)
- Maps of environmental variables (SST, Chl-a, primary production, depth, bottom stepness, distance from the shore)

The following set of indicators has been selected to be modelled in relation to fishing pressure data and environmental covariates:

- Total biomass (kg/km2)
- Biomass indices (kg/km2) of teleosteans, selaceens, crustaceans, cephalopods
- Mean weight of each taxa
- N. of species by taxa
- Density of fish >20, 30, 40 cm TL
- Density of crustaceans > 50 mm CL
- Abundance of rare species (e.g. *Scorpaena elongata, Polyprion americanus*, nektobenthic sharks , rays, etc.)
- Abundance of functional groups (e.g. benthic species)

With the aim to reconstruct the fishing effort distribution in the Italian Seas we have obtained the total number and KW of the trawl fleets occurring in each Italian Maritime Office (MO). An attempt to model the spatial distribution of the effort (*FP*) due to the Italian trawl fleet was done assuming a linear decline of the effort according to the distance from the port. It was also assumed that the activity range of a vessel is limited to an area within a 50 km range. The *FP* due to the trawlers of the MO *k* in the study area portion *i* was assumed to be the following:

$$FP_{i,k} = \frac{1}{d_i} Kw_k$$

where d_i is the distance of the area *i* from the port *k*.

Since the fishing areas of different ports may spatially overlap, the total *FP* in the study area portion *i* is :

$$FP_i = \sum_{n=1}^{k} \left(\frac{1}{d} Kw\right), d \leq 50\mathbf{km}$$

The model is clearly unrealistic for some areas, such as the Strait of Sicily, where the bulk of the trawl fleet is involved in offshore fisheries in areas beyond 50 km from the shore. An improvement of this model could be obtained building separate models for different areas to incorporate the different behaviour of local fleets. The expertize of the other co-authors involved in this project is therefore undeniably required.

A first attempt to model community indices derived from Medits hauls data for the period 2000-07 was done using an ensemble forecasting approach (Araujo & New 2007; Buisson et al., 2010). We modeled the spatial distribution of total biomass indices for the whole community and elasmobranchs only (Fig. 2), as kg/km2 for Italian GSAs, considering 6 different approaches (Artificial Neural Networks, GAM, GLM, GBM, MARS and Random Forest) with the following environmental variables: sea surface salinity (SSS), bathymetry (BAT), bathymetric slope (BATS), distance to shore (DTS), mean annual sea surface temperature (MSST), max annual salinity (MaxSS) with a spatial resolution of 1 km^2.

The program work for the next months includes the following steps to be developed with the contribution of participants:

1. Expand the study area to the other Mediterranean GSAs covered by the Medits project;
2. Include new explicative environmental variables (e.g. primary productivity) and eventually explore the possibility to use VMS data;
3. Develop better models for fishing pressure distribution taking into account geographical differences in the behavior of the fleet;
4. Develop models for sub-areas (e.g. biogeographic regions, shelf – slope);
5. Identify the more appropriate modelling approach (GAM, random forest, etc.)

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15.5 The effect of fishing exploitation on the recruitment of hake in the Mediterranean Sea

Francesco Colloca
(project coordinator: Giandomenico Ardizzone)

The study will be aimed at understanding the effect of the current exploitation pattern on the spatial recruitment dynamics of hake in the Mediterranean Sea. The observed density of hake juvenile shows significant spatial differences (Orsi-Relini et al., 2002) with peaks in some specific areas (e.g. GSA 9). At the same time different studies have showed the occurrence of spatially stable nursery areas where high densities of juvenile hake can be observed through time (e.g. Fiorentino et al., 2003, Maynou, 2003; Carlucci et al., 2009; Colloca et al., 2009; Murenu et al., 2010).

Although in some cases the spatial pattern in hake recruits distribution was correlated to the water circulation pattern and existence of oceanographic structures that can determine the distribution and retention of juveniles in nursery areas, the effect of fishing exploitation on the recruitment success has not yet understood.

In gadoid fish the density dependent effects (e.g. cannibalism) play a major role in the stock dynamics as observed also for hake from different oceanic marine areas (e.g. Link et al., 2011). Given the current growth overfishing condition of many hake stocks in the Mediterranean the reduced abundance of big hake can determine a predatory release effect on hake juveniles that can in turn affect the observed recruitment indices.

To test this hypothesis we would like to compare the MEDITS density indices of juveniles from different Mediterranean areas (GSAs or GSAs sectors) characterized by difference in fishing efforts and landings. The effect of different potentially explicative factors (e.g. fishing or total mortality, fishing effort, landings, abundance of spawners) on the observed MEDITS recruitment indices will be tested using common statistical approaches (e.g. GLM).

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15.6 Update from the WG on Maturity stages

Cristina Follesa

An update of the work done in 2011 by the Working group on Maturity stages was presented. At present, seven Italian GSAs are involved in the study: GSA 9 - Ligurian and North Tyrrhenian sea; GSA 10-18 - Central Tyrrhenian and Southern Adriatic sea; GSA 10b - Southern Tyrrhenian; GSA 11 - Sardinian sea; GSA 17 - Northern Adriatic sea; GSA 19 - Western Ionian sea. GSA 9 was added in 2011. Compared to 2010, the number of images collected has increased. In 2010, the maturity data of 42 species (24 bony fish, 5 elasmobranchs, 4 crustaceans and 9 cephalopods) were collected while in 2011, the number of species increased to 66 (26 bony fish, 26 elasmobranchs, 5 crustaceans and 9 cephalopods). In particular, for the bony fish, 4 macroscopic scales of females (*Boops boops*, *Lepidorhombus boscii*, *Merluccius merluccius*, *Thachurus trachurus*) and 3 of males (*Boops boops*, *Lepidorhombus boscii*, *Merluccius merluccius*) were completed. For the females of the first three species, a complete microscopic scale is also available. An almost complete macroscopic scale (lacks only 1 stage) is available for the females of *Aspitrigla cuculus*, *Micromesistius poutassou*, *Pagellus erythrinus*, *Solea vulgaris*, *Trachurus mediterraneus* and *Zeus faber* and for the males of *Lophius budegassa*, *Mullus barbatus*, *Trachurus mediterraneus*, *Trachurus trachurus* and *Zeus faber*. No or few data are available for *Citharus linguatula*, *Eutrigla gurnardus*, *Lophius piscatorius*, *Pagellus acarne*, *Spicara flexuosa*, *Sparus pagrus* and *Trigloporus lastoviza*.

As regards to the Elasmobranches, the number of photos collected has increased. A complete macroscopic scale is available for both sexes of *Galeus melastomus*, *Raja clavata*, *Scyliorhinus canicula*, *Squalus blainvillei*, *Etmopterus spinax* and *Dipturus oxyrhinchus*. For *Galeus melastomus*, *Etmopterus spinax* and *Squalus blainvillei* hystological analysis are also present. Few data of the species belonging to the family Torpenididae, Myliobatidae and Dasyatidae have been collected.

The collection of macro photos of crustaceans is complete for the females of the four MEDITS target species (*Aristeus antennatus*, *Aristaeomorpha foliacea*, *Parapenaeus longirostris* and *Nephrops norvegicus*).

Complete macroscopic scales are available for the females of three species of Cephalopods (*Eledone moschata*, *E. cirrhosa*, *Octopus vulgaris*) and the males of four species (*Eledone moschata*, *Illex coindetti*, *Loligo vulgaris*, *Octopus vulgaris* and *Sepia officinalis*).

The next steps for the Working group will be:
1) in the case where more photos are available for one macroscopic stage, an unanimous choice will be done by the different GSAs
2) All GSAs will continue to gather photos for the missing maturity stages or species (refer to Annex 8 – Collected data on maturity stages).

15.7 Spatial differences and temporal trends in cephalopod populations along the Mediterranean: Effects of environmental parameters and fishing exploitation

Antoni Quetglas

Introduction (from Andre et al. 2010)

Cephalopods are consistent marine keystone species, displaying clear responses to major perturbations to an ecosystem (Fulton et al., 2005; Rosas-Luis et al., 2008). They are both significant prey items (Clarke, 1996; Santos et al., 2001; Xavier et al., 2007), and voracious, opportunistic predators (Rodhouse & Nigmatullin, 1996). In addition to their important ecological role, cephalopods are a significant and growing component of fisheries production (FAO, 2009).

As a result of their short life spans (only 1–2 years), plasticity of life history and high environmental sensitivity, cephalopods can respond rapidly to changes in climate regime (Tian, 2009) with major consequences for upper and lower trophic levels in the ecosystem. Changes in cephalopod abundance have a potential mixed impact on marine communities and fisheries (Field, 2008) and have contributed, directly or partially, to changes in their predators and prey population abundance, as well as in their predator breeding success.

In the context of climate change, cephalopods are anticipated to respond much faster than longer-lived marine species, making them simultaneously drivers of ecosystem change and potential climate change indicators (Jackson & Domeier, 2003; Pierce et al., 2008). However, their high sensitivity to environmental factors obscures the underlying population dynamics and, in any case, their inter-annual population abundance is typically highly variable (Bellido et al., 2001; Boyle & Rodhouse, 2005) and often poorly understood.

Main objective

Owing to the high plasticity of cephalopod populations, it is expected to find spatial differences across the entire Mediterranean (western, central and eastern basins) and temporal trends during the time series covered by MEDITS (1994-present). Based on this expectation, the main aim of this proposal is to analyse spatial and temporal differences in cephalopod assemblages and populations along the Mediterranean, trying to identify putative drivers of those changes such as the effects of environmental parameters (climate) and fishing exploitation.

Specific objectives

1. Analyse differences in cephalopod assemblages along the Mediterranean (western, central, eastern). Descriptors: species richness, diversity, abundance/biomass spectra, size spectra and others.
2. Analyse temporal trends of biomass/abundance for the main species (e.g. octopuses, squids and cuttlefishes) in the different areas.
3. Analyse differences in life history traits (e.g. mean sizes, size at first maturity, LWR, condition, maturity) along the Mediterranean.
4. Analyse the effect of environmental parameters and fishing exploitation) on each of the previous points: differences in assemblages, temporal trends and differences in biological parameters.

Methods

1. Multivariate methods available in PRIMER to analyse community aspects.
2. Mixed Effects GLM and GAM to analyse spatio-temporal changes in 1) cephalopod community (Gislason and Rice 1998) and 2) life history traits (Carlson et al. 2009).
3. Threshold GAM to analyse the effect of climate and/or fishing exploitation on 1) community descriptors (e.g. abundance/biomass, diversity) and 2) life-history traits (e.g. mean size, condition).
4. Time series analysis techniques such as wavelets (Cazelles et al. 2008) to analyse changes in frequency over time for different descriptors (e.g. abundance/biomass).

Data

1. MEDITS data exclusively on cephalopod species: a) individual hauls (table TA); b) abundance/biomass data (table TB); c) biological data (table TC). To download this data we need the authorization of the person in charge of each country involved in MEDITS.
2. Environmental parameters (e.g. temperature, primary production, climatic index MO): data available on the web.

Other relevant information

PhD student with a grant funded by the IEO beginning in early 2012 working full time on this proposal. Duration of this grant: 4 years.

15.8 Harmonization of the data on Elasmobranches collected during the surveys

Fabrizio Serena (ARPAT, Italy)

Regarding the list of the elasmobranch species reported during the last MEDITS coordination meeting held in Nantes, not all the species have the same importance in terms of abundance (with density values greater than 1 kg/km^2). Only 13 species out of the 31 considered have a higher percentage of occurrence greater than 1%. Only for these species we can do some biological considerations and/or population dynamics.

According to IUCN criteria, 16 elasmobranch species are considered vulnerable, endangered and critically endangered from the conservation status point of view. Difficulties in the identification of the species have led to some complications, in particular for distinguishing *Raja montagui* from *Raja polystigma*. Genetic analysis have confirmed that almost all of the collected samples in the Mediterranean correspond to *R. polystigma*, while *R. montagui* is only confirmed in some areas of the North African coast of Algeria. Therefore we must revise the assessments made in the past.
Given the importance of *R. polystigma*, it is suggested to include this species among those to be processed in the MEDITS species list.

About 14 species of demersal elasmobranchs remain outside this list. Based on the improvements on knowledge derived from the application of the MEDITS protocol, we were able to make some observations on biogeography and biology of some important species. Three ecological groups are identified: Species living on the shelf, over the whole depth range, and on the slope. Some species are only living in the western Mediterranean basin and others, only in the Eastern part. *G. melastomus* and *S. canicula* are present in both parts of the basin with the same densities. Four species are the most abundant in the Mediterranean representing about 65% of the whole biomass (*S. canicula, R. clavata, G. melastomus* and *S. acanthias*). In general the individuals belonging to elasmobranchs collected in the surveys are small-sized. In this sense the length frequency distribution of the three of the main species captured furnishes a very clear example. For the main species caught it is possible to produce maps regarding biomass distribution or a specific analysis of the population structure. The information recorded in the archive allows us to produce also a table regarding the occurrence in terms of number and biomass of the adult and juvenile specimens for each Operational Units of the MEDITS project.
In the case of *S. canicula* in GSA9 the nursery area is located about 200 metres depth between Gorgona and Capraia islands in the North-Western Mediterranean basin.

Between 2004-2008 the coordination Medits produced the EC report of the project on the "Status of rays populations in the Mediterranean Sea and advice for sustainable exploitation of the stocks". We have been able to produce this report through the use of specific files TA, TB and TC defined under the MEDITS Protocol. The idea is to extend this experience for all elasmobranchs captured in scientific surveys. In order to achieve such goal we need to create a common database.

We have some questions to solve: first at all the correct identification at species level. The importance of the Identification Field Guide to chondrichthyan species as a tool for assessing the exploitation and the conservation status in the Mediterranean basin is highly prioritary. There are many examples of misidentifications: three different species of *Dipturus* live in the Mediterranean Sea (*D. oxyrinchus, D. batis* and *D. didarosiensis*) but the presence of *D. batis* needs to be validated. It is very difficult to distinguish *Raja polystigma* from *Raja montagui*. It seems there is no any valid species of *Centrophorus* in the Mediterranean Sea other than *C. granulosus*. This genus needs revision worldwide in any case. This is also true for *Squalus* (*S. blainvillei* and *S. megalops,* see Marouani's paper cited below), also for *Galeus,* and finally for *Dasyatis*, etc.

A correct fish species identification is critical for studies on fish ecology and for management of fisheries. During the field work, most of the times it is impossible to have available a great amount of books or documents that include identification keys for all the species expected to be caught. Such need is fulfilled through the construction of user-friendly field guides. Many synopsis and field guides are produced by FAO for facilitating the work of the researchers on the deck or board. In particular for the Mediterranean there are some manuals but we have to produce others like a field identification guide of demersal sharks and for batoids collected during the bottom trawl surveys.

For this reason we are collecting good pictures of specimens (lateral and ventral view of the body) of all the species that should be included in the above mentioned new field guides.
In the following tables the essential items that are still lacking for sharks and batoids are shown. X represents the species for which we already have a picture.

ORDER	FAMILY	Species	Body adult	Body juv.	head M	head F	Mouth M	Mouth F	Term embryo or egg
HEXANCHIFORMES	HEXANCHIDAE	*Heptranchias perlo*	X		X				
	HEXANCHIDAE	*Hexanchus griseus*	X						
	HEXANCHIDAE	*Hexanchus nakamurai*	X						
SQUALIFORMES	ECHINORHINIDAE	*Echinorhinus brucus*							
	SQUALIDAE	*Squalus acanthias*	X						
	SQUALIDAE	*Squalus blainvillei*	X						
	SQUALIDAE	*Squalus megalops*	X						
	ETMOPTERIDAE	*Etmopterus spinax*	X						X
	SOMNIOSIDAE	*Centroscymnus coelolepis*							
	SOMNIOSIDAE	*Somniosus rostratus*							
	CENTROPHORIDAE	*Centrophorus granulosus*	X						
	OXYNOTIDAE	*Oxynotus centrina*	X						
	DALATIIDAE	*Dalatias licha*	X						
SQUATINIFORMES	SQUATINIDAE	*Squatina aculeata*							
	SQUATINIDAE	*Squatina oculata*							
	SQUATINIDAE	*Squatina squatina*							
CARCHARHINIFORMES	SCYLIORHINIDAE	*Scyliorhinus canicula*	X						X
	SCYLIORHINIDAE	*Scyliorhinus stellaris*	X						X
	SCYLIORHINIDAE	*Galeus atlanticus*	X		X				
	SCYLIORHINIDAE	*Galeus melastomus*	X	X					X
	TRIAKIDAE	*Galeorhinus galeus*							
	TRIAKIDAE	*Mustelus asterias*							
	TRIAKIDAE	*Mustelus mustelus*							
	TRIAKIDAE	*Mustelus punctulatus*							

ORDER	FAMILY	Species	Body adult	Body juv.	head M	head F	Mouth M	Mouth F	Term embryo or egg
	PRISTIDAE	*Pristis pectinata*							
	PRISTIDAE	*Pristis pristis*							
	RHINOBATIDAE	*Rhinobatos cemiculus*	X						
	RHINOBATIDAE	*Rhinobatos rhinobatos*	X						
	RHINOBATIDAE	*Rhinobatos halavi*	X						
	TORPEDINIDAE	*Torpedo marmorata*	X						
	TORPEDINIDAE	*Torpedo nobiliana*	X						
RAJIFORMES	TORPEDINIDAE	*Torpedo sinuspersici*	X						
	TORPEDINIDAE	*Torpedo torpedo*	X						
	DASYATIDAE	*Dasyatis centroura*							
	DASYATIDAE	*Dasyatis marmorata*							
	DASYATIDAE	*Dasyatis pastinaca*							
	DASYATIDAE	*Himantura uarnak*	X						
	DASYATIDAE	*Pteroplatytrygon violacea*	X						
	DASYATIDAE	*Taeniura grabata*	X						
	GYMNURIDAE	*Gymnura altavela*							
	MYLIOBATIDAE	*Myliobatis aquila*	X						
	MYLIOBATIDAE	*Pteromylaeus bovinus*		X					
	RHINOPTERIDAE	*Rhinoptera marginata*							
	MOBULIDAE	*Mobula mobular*	X	X					X

Related to the species identification issues we need experimental studies on the mitochondrial DNA sequence markers of the Mediterranean elasmobranchs. These markers are nucleotide species-specific sequences and permit a valid and univocal species identification, representing a good tool to be integrated with the traditional taxonomic identification based on morphological features.

Some elasmobranch species, although not explicitly mentioned in the MEDITS protocol, are also of interest to ICCAT. These species are caught as by-catch by tuna fleets. By-catch include in particular pelagic oceanic sharks such as shortfin mako, porbeagle and blue shark. The elasmobranchs collected in the ICCAT area are showed in the following table, the elasmobranch species which overlap with the species considered in the report of the MEDITS coordination are highlighted in **red**.
The ICCAT protocol asks for the indication on whether the data refer to landings (L), dead discards (D), or live discards (DL). In particular they report the **C**atch-**a**t-**s**ize estimates classified by fishing fleet, gear, time strata and area strata for the major species (mako, porbeagle, blu shark) separately by sex.

Cod	Scientific name	Common name
BTH	Alopias superciliosus	Bigeye thresher shark
ALV	Alopias vulpinus	Thresher shark
CCA	Carcharhinus altimus	Bignose shark
BRO	Carcharhinus brachyurus	Copper shark
CCB	Carcharhinus brevipinna	Spinner shark
FAL	Carcharhinus falciformis	Silky shark
CCL	Carcharhinus limbatus	Blacktip shark Requin

DUS	Carcharhinus obscurus	Dusky shark
CCP	Carcharhinus plumbeus	Sandbar shark
CCT	Carcharias Taurus	Sand tiger shark
WSH	Carcharodon carcharias	Great white shark
GUP	Centrophorus granulosus	Gulper shark
BSK	Cetorhinus maximus	Basking shark
ETX	**Etmopterus spinax**	**Velvet belly**
GAG	Galeorhinus galeus	Tope shark
SHO	**Galeus melastomus**	**Blackmouth catshark**
HXT	Heptranchias perlo	Sharpnose sevengill shark
SBL	Hexanchus griseus	Bluntnose sixgill shark
SMA	Isurus oxyrinchus	Shortfin mako
LMA	Isurus paucus	Longfin mako
POR	Lamna nasus	Porbeagle
SDS	**Mustelus asterias**	**Starry smooth-hound**
SMD	**Mustelus mustelus**	**Smooth-hound**
LOO	Odontaspis ferox	Smalltooth sand tiger shark
BSH	Prionace glauca	Blue shark
SPL	Sphyrna lewini	Scalloped hammerhead
SPK	Sphyrna mokarran	Great hammerhead
SPN	Sphyrna spp	Hammerhead sharks nei
SPZ	Sphyrna zygaena	Smooth hammerhead
DGS	**Squalus acanthias**	**Picked dogfish**
QUB	**Squalus blainvillei**	**Longnose spurdog**
SUA	Squatina aculeata	Sawback angelshark
SUT	Squatina oculata	Smoothback angelshark
AGN	Squatina squatina	Angelshark
CXX	Coastal Sharks nei	
PXX	Pelagic Sharks nei	

In any case, for both protocols, there should be clearly specified the sampling procedures . Certainly the determination of the maturity stage is one of the most complex and important aspects (there are two protocols that we are using MEDITS and ICES, in any case comparable). In this sense we have to decide how many individuals to collect and in which size interval. It may happen that the caught specimens by species are too few or even are only represented by a single individual. In the case the specimen is still alive we can minimize the collection of information (e.g. Total Length and sex) and release the fish at sea.
There are few differences between ICCAT and MEDITS protocol regarding the morphological measurements to be collected: in the case of sharks Total Length or Fork Length for MEDITS, only TL for ICCAT. In the case of the batoids species TL or Disk Width for Medits, only DW for ICCAT.

In order to reach an operational standard work on board and in laboratory we can suggest here some recommendations for the future especially for the MEDITS coordination group:

- to produce an unique data base specific for elasmobranchs
- to finalize the identification field guides of demersal sharks and batoids collected during surveys
- to analyse the data sets in cooperation utilizing a common protocol.

References

MAROUANI et al., 2012. Taxonomic research on *Squalus megalops* (Macleay, 1881) and *Squalus blainvillei* (Risso, 1827) (Chondrichthyes: Squalidae) in Tunisian waters (central Mediterranean Sea). *Scientia Marina*.

15.9 General conclusions on common research activity

The group agreed that besides the common database of the routinely collected MEDITS data it would be very useful to build a common database including also environmental variables which would be available to the whole group. Bottom temperature collected during the surveys can be included in this database, together with other data which may be available in different GSAs. For example, information about the substratum or habitat type. However, it was pointed out that standardisation on how to classify such data has to be agreed, in order to share a common format.

The chair of the meeting emphasised that common research activity is important for the group, and it is essential that everybody contributes with data, suggestions and comments to progress in the common work. This will strengthen the work and the paper in progress that can be part of the special publication the MEDITS group has planned for the the near future.

Most of the ongoing research projects within MEDITS aim at providing insight into ecosystem changes trying to disentagle fishing pressure from environmental drivers. Habitat modelling is also seen as a powerful tool to predict, on the basis of environmental variable available at large scale, the resource distribution and abundance. A cooperation among the different proposals may contribute to widening the single perspective gathering more robust results.

Furthermore, the chair reiterated the importance of the procedure to ask for permission when the use of the data is required, pointing out that while some of the interested groups might reply and provide the necessary data immediately, other interested groups might have some time constraints. However, for the time being, the procedures for data gathering should be simplified, as there is an increasing demand of MEDITS data by end user. It is thus important that the MEDITS group makes all the efforts to use the data for joint high level scientific publication.

With regards to maturity scales it was repeated after last year’s meeting, that all MEDITS groups should be now using the updated maturity scale for oviparous elasmobranch species (the one recommended by the WKMSSEL) as well as the newly proposed vivaporous maturity scale. It was once again cleared that the MEDITS detailed maturity scale (alphanumeric maturity scale) for crustaceans is to be used for MEDITS samples. Last year, during the meeting in Nantes, the MEDITS crustacean maturity scale was compared with the one proposed by the WKMS CRUS only for conversion purposes. The maturity scale to be followed is the alphanumeric in the tables annexed to the MEDITS manual. The revised maturity scale for oviparous elasmobranch species and the new maturity scale for the vivaporous species will be included in the revised protocol.

16 MEDITS publication

Prof. Giulio Relini, the responsible for the MEDITS special publication, explained that this could be divided into 3 parts:

1. Population analysis over time including GLMs, stock assessments, etc.
2. Studies regarding specific taxonomic groups such as crustaceans and cephalopods

3. Papers from common research activities including data from all over the Mediterranean

There was the proposal by Jacques Bertrand of describing the distribution of species in the Mediterranean, especially ones in danger, following the IUCN criteria.

The meeting agreed that this work has to be treated through a more operative phase and thus coordinators for the 3 parts are to be established so that work can be started. A deadline is also to be established. Everybody has to keep in mind to produce a good quality work, so that journals would be made interested to publish the series.

The meeting also discussed if it is better to wait and have a 20 year data series or if to publish the series on the 20th anniversary from the first year that the MEDITS survey was started. However, the group decided for the latter, since 18 years of data are already enough to obtain good results.

Prof. Relini will circulate correspondences in order to start organizing the work.

17 Task sharing of the age reading of otolith among MS participating in the survey

Cyprus (GSA 25) and Malta (GSA 15) both asked the meeting for the task sharing of otolith age reading with other MS participating in the survey.
The MEDITS focal point for Cyprus informed the meeting that while they collect and read otoliths from *Mullus barbatus* and *Mullus surmuletus* they have no expertise with the age reading of *Merluccius merluccius*. Due to this reason and taking into account the difficulty in age reading of *M. merluccius*, Cyprus would like that this task will be performed by another country. In GSA 25, the average number of individuals encountered during the MEDITS survey (for the period 2005-2011) is 37 (from 22 – 77 individuals).
On the other hand, the Maltese MEDITS focal point said that they do not have any experience with the age reading of any of the species proposed. Thus, Malta is thinking about tendering this work to another country. However, the Maltese National reference point, pointed out that funds for this work have still to be requested to the DCF as per Article 6 Paragraph 2 of EC Regulation 1078/2008 once the revised protocol will be made available and thus would surely not be able to provide age reading results in December after the survey.

18 Review of the MEDITS web site

The new MEDITS web site will be hosted in a registered domain. The main aims of the web site are:

- to allow a large dissemination of the MEDITS trawl survey history, objectives and methodologies;
- to allow a large dissemination of the MEDITS outcomes (e.g. trends and indicators);
- to create a common environment where researchers involved in the MEDITS project can share information and work.

The contents of the web site will be split into several sections and it will possible to browse through a number of topics, such as: MEDITS project, Downloads, Geographical Sub Areas,

Links, Partnership, Photo gallery, Video gallery, Publications, Reports, Meetings, Manuals and Protocols, Software, MEDITS History, MEDITS Outcomes, Private Area and FTP, Search.
A restyling of the logo and the web site will also be produced for the approval of the Steering Committee. Suggestions for special arguments to be included in the web site or any collaboration for recovering past documentation in order to reconstruct the MEDITS history, will be welcome.

19 Cooperation within the MAREA project

M.T. Spedicato updated the group about the progress within the MAREA project, starting with a short overview of the different terms of reference of the tendering specification and on the partnership. She also evidenced that as most of the Institutions involved in MEDITS are also in the MAREA partnership an active participation can result in reciprocal benefits, because the outcomes of the specific projects within MAREA can have positive impacts on the MEDITS results and vice-versa. In addition, she informed the group of the outputs of the last meeting of the MAREA Steering Committee, also attended by Mr. Antonio Cervantes from DGMARE, and of the progress in the specific projects MEDISEH, ARCHIMEDES and BEMTOOL. Some tasks of MEDISEH (Mediterranean Sensitive Habitats), especially those regarding the identification of nursery areas of demersal species, are of mutual interest to the MEDITS group and, indeed, a wide use of MEDITS data is made there. Similarly MEDITS data will be of key importance in the progress of the specific project BEMTOOL aimed at constructing a new bio-economic model including fishery-independent modelling tools. In the next year another 3 specific projects will be launched and one of these will be aimed at identifying unit stocks, thus again involving a wide use of the MEDITS data. An active exchange of information and participation is suggested in order to strengthen the use of MEDITS data and the collaboration among the Institutions involved in the two projects, MEDITS and MAREA.

20 Activity planning of the group for the next 12 months

Due to the projects and work on the revision of the MEDITS protocol, the coming twelve months will be a busy period for the MEDITS group. The work includes:

i. MEDITS data checking application – Rome
   This involves work in order to improve the application as well as in the different GSAs in order to continue checking the data with this application
ii. Work on the common MEDITS database
iii. The group of technologists established during this meeting should start working towards the standardisation of gear and other fishing parameters
iv. Work on the DCF indicators
v. Last few works on the revised version of the MEDITS protocol which will be circulated for reviewing and adopted for the 2012 survey
vi. Work on common research activities
vii. Work on the MEDITS publication
viii. Review of the MEDITS website
ix. A continuation of the updating of the MEDITS reference species list

The Greek representative proposed and invited the next MEDITS Coordination Meeting in 2013 to be held in their home country. The group welcomed the invitation heartily and agreed that details about the exact venue will be circulated at a later date. The date of the meeting was agreed to be during the weeks between the 4th and 15th March.

Annex 1 – 2012 MEDITS Coordination meeting agenda

MEDITS	MEDITS 2012-02-02 Draft agenda Ljubljana (Slovenia), 6-8 March 2012
28/02/2012	Ref.: medits mcm 2012 report - final

2012 MEDITS Coordination Meeting Draft Agenda
The meeting will start at 14.00 of March 06 2012 and will end on March 08 (~18.00)

Tuesday 06th March 2012 (14.00-18.00)
14.00-14.15
- Welcome to the participant
- Approval of the Agenda
- Conclusions of the last Coordination meeting in Nantes

14.15-15.00
1. The MEDITS survey within the Data Collection Framework (inputs from RCMMed&BS, PGMED, etc.)
2. The role and use of MEDITS data within EWG-STECF (Reference to the analysis of minilog, net opening, Atris, etc. reference to the report of Cyprus 2011)
3. Review the implications of GFCM activities and recommendations (Fabio Fiorentino)

15.00-16.15
4. Review on achievement of the 2011 MEDITS survey in each country/GSA
5. Planning of the MEDITS survey 2012

16.15-16.30 Coffee break
16.30-17.00
6. Management of the MEDITS data:
   - Upgrade of RoME routine on MEDITS data (Isabella Bitetto);
   - State and progress of the database (Regional Medits Database) (Pino Lembo)
7. Discussion

17.00-18.00
8. Finalization and adoption of the new lists (Medits G1 and Medits G2) of species.
9. Progress of the Permanent Working Group for the updating of the MEDITS Reference Taxonomic list (criteria and methods adopted for revision) (Giulio Relini)
10. Discussion

Wednesday 07th March 2012 (09.00-18.00)
09.00-11.00
11. Working Group A. Harmonised protocol for collection of biological parameters (i.e. collection of otolith and individual weight measurements).
12. Working Group B. Format for the storage of the new data set on age and individual weight measurements
13. Working Group C. Exercise with RoME routine on MEDITS data
14. Results from the WG and Discussion (plenary)

11.00-11.15 Coffee break
11.15-12.00

15. The estimate of the gear geometry/performance, the quality check of the gear setting, equipment for the estimation of gear performance, data acquisition, data processing and analyses (Antonello Sala)
16. Discussion

12.00-13.00

17. Harmonization of methodology for estimating Ecosystem Indicators from fisheries independent research surveys (App. XIII EU Decision 93/2010) (Isabella Bitetto)
18. Discussion

13-14.30 Lunch break

14.30-16.00

19. Review of the MEDITS manual

16.00-16.15 Coffee Break

16.15-18.00

20. Continue the review of the MEDITS manual, reading and approval

Thursday 08th March 2012 (09.00-18.00)

09.00-11.00

21. Progress in common research activity:
    - Species assemblages and diversity (Bastien Mérigot);
    - Analysing functional community changes in the Mediterranean (Anik Brin'Amour);
    - Habitat prediction approach and possible application in connection with MEDITS (Jean Noel Druon);
    - Spatial patterns of fishing impact in the northern Mediterranean using demersal community metrics and effort data (Francesco Colloca)
22. Discussion

11.00-11.15 Coffee Break

11.15-13.00

- The effect of fishing exploitation on the recruitment of hake in the Mediterranean Sea (Francesco Colloca);
- WG on Maturity stages update (Cristina Follesa)
- Spatial differences and temporal trends in cephalopod populations along the Mediterranean: effects of environmental parameters and fishing exploitation" (Antoni Quetglas)
- Harmonization (field guide, methodology….) of the data on Elasmobranches collected under the surveys (Fabrizio Serena)

23. Discussion

13.00-14.30 Lunch break

14.30-18.00

24. MEDITS publication (Giulio Relini)
25. Task sharing of the age reading of otolith among MS participating to the survey
26. Review of the MEDITS web site
27. Cooperation within MAREA project
28. Planning of activity of the group for the next twelve months, including venue and date for the next meeting
29. Other issues

Annex 2 - List of participants

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Annex 3 - Extract from the Report on otolith exchange of European hake (2011)

Conclusions

1. The variable degree of participant experience in age determination of hake otoliths produced a high variability in the results.

2. The new guidelines are not sufficient to rule out individual subjectivity of interpretation of hake otoliths. This is due to the lack of a validated method that is necessary to confirm the frequency of growth rings in the otoliths.

3. Results clearly show the unsuitability of these new guidelines since the precision management in the absence of accuracy cannot, under any account, guarantee data quality (De Pontual *et al.,* 2006).

4. We are still not at a stage where we can validate the age of hake from otoliths as the new

method is still subjective to a large extent. The new guidelines are a first step towards the age determination of hake from otoliths. However research on the effects of environmental

factors on otolith formation in combination with work on daily growth and tagging experiments will add to the overall understanding of the otolith structure and interpretation.

5. The results of this exchange demonstrated that will not be possible to build up a transitional error matrix to rebuild historical ALKs due to the interpretation of hake otoliths for age estimation is imprecise and still cannot be validated.

6. In summary, the use of the WebGR is very useful for calibration exercises; however, some improvements are needed for efficient running of the application in order to encourage general use of the tool (see Table 4).

Reference

Carmen Piñeiro and María Saínza (2011) - Report on otolith exchange of European hake. http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp#ices

Annex 4 - Extract from the document Assessment of Mediterranean Sea stocks – part 1 (STECF-11-08)

7.5.2 MEDITS data

As shown in table 7.5.2.1, some coastal species are not well represented in the catches of MEDITS. Thus for example, Mugilidae*, D. sargus, D. labrax* and *S. aurata* only appear in relatively few hauls and in small numbers. Therefore, MEDITS trawl survey is not efficient for evaluating these coastal species that are mainly restricted in shallow waters (see background documents). Only *B. boops, P. erythrinus* and *P. acarne* appear in relatively large number of hauls, in large numbers. However, even in those cases, the efficiency of MEDITS to sample these species is doubtful. Thus, the evaluation of *P. erythrinus* and *P. acarne* MEDITS ES data carried out in the frame of the "Atlas of the Spanish Fishery Species" (IEO, in press), showed that both stocks are distributed in coastal waters mainly (<60 m depth) and therefore the capacity of MEDITS ES to sample these species is rather limited (see the example for *P. erythrinus* in Fig. 7.5.2.1 and 7.5.2.2). The analysis of *P. acarne* and *P. erythrinus* based on MEDITS data done by Spedicato et al (2002) also showed that in many sectors of the Mediterranean shelf covered by the MEDITS, the highest abundance and biomass indices of both species are found in the shallowest strata (0-50 m depth, Fig. 7.5.2.1).

Furthermore, nearly all individuals caught by MEDITS were juveniles or small adults (see the example for *P. erythrinus* in Fig. 7.5.2.2).

The study carried out by Spedicato et al (2002) also showed that *P. acarne* and *P. erythrinus* catches obtained along the Mediterranean shelf with the MEDITS trawl survey are made of juveniles and small adults (10-20 cm in length). These results suggest that most adults of these sparids remain inaccessible to MEDITS trawl survey, because they live in rocky habitats inaccessible to trawl where they are targeted by artisanal fishing using gears such as gillnet and longline. Furthermore, considering that these species are hermaphrodite, the skewed sampling of MEDITS towards small individuals means that obtained sex ratio is biased. Overall, it is here suggested that in cases such as *P. acarne* and *P. erythrinus*, MEDITS data can only be used as a recruitment index.

Tables 7.5.2.2 and 3 show the number and percentage of trawls carried out by MEDITS surveys in coastal waters (<50 m depth) in the different GSAs (1994-2010). Only a small percentage (<15%) of trawls have been done at depths < 50 m (all years, all GSAs). Nevertheless, there are differences between and within sectors / years: in GSAs 2, 5, 8 and 15 the percentage falls below 2%, whereas in GSA 17 about 70% of the total hauls were carried out at <50m. It is here concluded therefore that the MEDITS survey cannot sample effectively the coastal waters. This is logical because these waters comprise complex areas such as rocky bottoms, coralligenous beds and *Posidonia oceanica* meadows that are not possible to sample with trawl.

Annex 5 – Updated MEDITS FM list

List of bony fish: Osteichthyes

	Medits Code	Scientific Name	Source	Reference	CATFAU	CODLON	Valid Name	Species added by
1	ACATPAL	Acantholabrus palloni	C	145.2.1	A O	0	Acantholabrus palloni (Risso, 1810)	
2	ALEPROS	Alepocephalus rostratus	C	30.1.1	A O	0	Alepocephalus rostratus Risso, 1820	
3	ALOSFAL	Alosa fallax	C	33.6.3	A O	0	Alosa fallax (Lacepède, 1803)	
4	ANARGRA	Anarchias euryurus (grassii)	C	73.3.1	A O	0	Anarchias euryurus (Lea, 1913)	
5	ANGUANG	Anguilla anguilla	C	71.1.1	A O	0	Anguilla anguilla (Linnaeus, 1758)	
6	ANTHANT	Anthias anthias	C	124.2.1	A O	0	Anthias anthias (Linnaeus, 1758)	
7	ANTOMEG	Antonogadus megalokynodon	C	101.19.2	A O	0	Gaidropsarus biscayensis (Collett, 1890)	
8	ANTOSPP	Antonogadus spp.	C	101.19	A O	0	Gaidropsarus Rafinesque, 1810	
9	APHIMIN	Aphia minuta	C	162.2.1	A O	0	Aphia minuta (Risso, 1810)	
10	APOGIMB	Apogon imberbis	C	127.1.1	A O	0	Apogon imberbis (Linnaeus, 1758)	
11	APTECAE	Apterichthus caecus	C	86.2.1	A O	0	Apterichtus caecus (Linnaeus, 1758)	
12	ARGESPY	Argentina sphyraena	C	46.1.1	A O	0	Argentina sphyraena Linnaeus, 1758	
13	ARGRACU	Argyropelecus aculeatus	C	38.2.2	A O	0	Argyropelecus aculeatus Valenciennes, 1850	
14	ARGRHEM	Argyropelecus hemigymnus	C	38.2.1	A O	0	Argyropelecus hemigymnus Cocco, 1829	
15	ARGYREG	Argyrosomus regius	C	137.2.1	A O	0	Argyrosomus regius (Asso, 1801)	
16	ARIOBAL	Ariosoma balearicum	C	82.2.1	A O	0	Ariosoma balearicum (Delaroche, 1809)	
17	ARNOIMP	Arnoglossus imperialis	C	196.2.2	A O	0	Arnoglossus imperialis (Rafinesque, 1810)	
18	ARNOKES	Arnoglossus kessleri	C	196.2.3	A O	0	Arnoglossus kessleri Schmidt, 1915	LM e MT
19	ARNOLAT	Arnoglossus laterna	C	196.2.1	A O	0	Arnoglossus laterna (Walbaum, 1792)	
20	ARNORUP	Arnoglossus rueppelli	C	196.2.4	A O	0	Arnoglossus rueppelii (Cocco, 1844)	
21	ARNOSPP	Arnoglossus spp.	C	196.2	A O	0	Arnoglossus Bleeker, 1872	LM
22	ARNOTHO	Arnoglossus thori	C	196.2.5	A O	0	Arnoglossus thori Kyle, 1913	
23	ASPICUC	Aspitrigla cuculus	C	185.2.1	A O	0	Aspitrigla cuculus (Linnaeus, 1758)	
24	ASPIOBS	Aspitrigla obscura	C	185.2.2	A O	0	Chelidonichthys obscurus (Block & Schneider,	
25	AULOFIL	Aulopus filamentosus	C	50.1.1	A O	0	Aulopus filamentosus (Bloch, 1792)	
26	BALICAR	Balistes carolinensis	C	201.1.2	A O	0	Balistes capriscus Gmelin, 1789	
27	BASOPRO	Bathysolea profundicola	C	198.2.1	A O	0	Bathysolea profundicola (Vaillant, 1888)	
28	BATHDUB	Bathypterois dubius	C	53.1.1	A O	0	Bathypterois dubius Vaillant, 1888	a1
29	BATHMED	Bathypterois mediterraneus	C	53.1.2	A O	0	Bathypterois dubius Vaillant, 1888	a1
30	BATONIG	Bathophilus nigerrimus	C	42.2.1	A O	0	Bathophilus nigerrimus Giglioli, 1882	SB, LM e MT
31	BELLAPO	Bellotia apoda	C	172.3.1	A O	0	Bellottia apoda Giglioli, 1883	
32	BENSGLA	Benthosema glaciale	C	58.2.1	A O	0	Benthosema glaciale (Reinhardt, 1837)	
33	BENTROB	Benthocometes robustus	C	172.4.1	A O	0	Benthocometes robustus (Goode & Bean, 1886)	
34	BERYDEC	Beryx decadactylus	C	112.1.1	A O	0	Beryx decadactylus Cuvier, 1829	
35	BERYSPL	Beryx splendens	C	112.1.2	A O	0	Beryx splendens Lowe, 1834	
36	BLENBAS	Lipophrys (Blennius) basiliscus	C	164.1.3	A O	0	Salaria basilisca (Valenciennes, 1836)	

37	BLENCRI	Scartella (Blennius) cristata	C	164.1.6	A O	0	Scartella cristata (Linnaeus, 1758)	
38	BLENGAT	Parablennius (Blennius)	C	164.1.8	A O	0	Parablennius gattorugine (Linnaeus, 1758)	
39	BLENOCE	Blennius ocellaris	C	164.1.1	A O	0	Blennius ocellaris Linnaeus, 1758	
40	BLENPAV	Lipophrys (Blennius) pavo	C	164.1.12	A O	0	Salaria pavo (Risso, 1810)	
41	BLENSPP	Blenniidae	C	164	A O	0	Blenniidae	
42	BLENSPY	Aidablennius (Blennius) sphynx	C	164.1.17	A O	0	Aidablennius sphynx (Valenciennes, 1836)	
43	BLENTEN	Parablennius (Blennius) tentaculari	C	164.1.18	A O	0	Parablennius tentacularis (Brünnich, 1768)	
44	BOOPBOO	Boops boops	C	139.2.1	A O	0	Boops boops (Linnaeus, 1758)	
45	BOROANT	Borostomias antarcticus	C	39.2.1	A O	0	Borostomias antarcticus (Lönnberg, 1905)	
46	BOTHPOD	Bothus podas	C	196.1.1	A O	0	Bothus podas (Delaroche, 1809)	
47	BRAMBRA	Brama brama	C	133.2.1	A O	0	Brama brama (Bonnaterre, 1788)	MT
48	BUGLLUT	Buglossidium luteum	C	198.3.1	A O	0	Buglossidium luteum (Risso, 1810)	
49	CALLRIS	Callionymus risso	C	163a.1.7.	A O	0	Callionymus risso Lesueur, 1814	a2
50	CALLRUB	Callanthias ruber	C	124.3.1	A O	0	Callanthias ruber (Rafinesque, 1810)	
51	CALMFAS	Callionymus fasciatus	C	163a.1.3	A O	0	Callionymus fasciatus Valenciennes, 1837	LM
52	CALMLYR	Callionymus lyra	C	163a.1.1	A O	0	Callionymus lyra Linnaeus, 1758	
53	CALMMAC	Callionymus maculatus	C	163a.1.3	A O	0	Callionymus maculatus Rafinesque, 1810	
54	CALMPHA	Synchiropus (Callionymus)	C	163a.1.4	A O	0	Synchiropus phaeton (Günther, 1861)	
55	CALMRIS	Callionymus risso	C	163a.1.7	A O	0	Callionymus risso Lesueur, 1814	a2
56	CALMSPP	Callionymus	C	163a.1	A O	0	Callionymus Linnaeus, 1758	
57	CAPOAPE	Capros aper	C	123.1.1	A O	0	Capros aper (Linnaeus, 1758)	
58	CARAHIP	Caranx hippos	C	131.1.1	A O	0	Caranx hippos (Linnaeus, 1766)	
59	CARARHO	Caranx rhonchus	C	131.1.5	A O	0	Caranx rhonchus Geoffroy Saint-Hilaire, 1817	
60	CARPACU	Carapus acus	C	175.1.1	A O	0	Carapus acus (Brünnich, 1768)	
61	CATAALL	Cataetyx alleni	C	172.6.1	A O	0	Cataetyx alleni (Byrne, 1906)	
62	CECACIR	Centracanthus cirrus	C	141.1.1	A O	0	Centracanthus cirrus Rafinesque, 1810	
63	CENONIG	Centrolophus niger	C	176.1.1	A O	0	Centrolophus niger (Gmelin, 1789)	
64	CEPHVOL	Dactylopterus (Cephalacanthus)	C	193.1.1	A O	0	Dactylopterus volitans (Linnaeus, 1758)	
65	CEPOMAC	Cepola rubescens	C	128.1.1	A O	0	Cepola macrophthalma (Linnaeus, 1758)	
66	CERAMAD	Cerastocopelus maderensis	C	58.4.1	A O	0	Ceratoscopelus maderensis (Lowe, 1839)	
67	CHAUSLO	Chauliodus sloani	C	40.1.1	A O	0	Chauliodus sloani Bloch & Schneider, 1801	
68	CHEOLAB	Chelon labrosus	C	181.2.1	A O	0	Chelon labrosus (Risso, 1827)	
69	CHROCHR	Chromis chromis	C	144.1.1	A O	0	Chromis chromis (Linnaeus, 1758)	
70	CITHMAC	Citharus linguatula	C	194.1.1	A O	0	Citharus linguatula (Linnaeus, 1758)	
71	CLOPBIC	Chlopsis bicolor	C	77.1.1	A O	0	Chlopsis bicolor Rafinesque, 1810	
72	CLORAGA	Chlorophthalmus agassizi	C	55.1.1	A O	0	Chlorophthalmus agassizi Bonaparte, 1840	
73	COBLGAL	Coryphoblennius galerita	C	164.2.1	A O	0	Coryphoblennius galerita (Linnaeus, 1758)	
74	COELCOE	Coelorhynchus coelorhynchus	C	99.12.1	A O	0	Coelorinchus caelorhincus (Risso, 1810)	
75	COELOCC	Coelorhynchus occa (C. labiatus)	C	99.12.2	A O	0	Coelorinchus occa (Goode & Bean, 1885)	
76	CONGCON	Conger conger	C	82.1.1	A O	0	Conger conger (Linnaeus, 1758)	
77	CORIJUL	Coris julis	C	145.4.1	A O	0	Coris julis (Linnaeus, 1758)	

78	CORYGUN	Coryphaenoides guentheri	C	99.13.2	A O	0	Coryphaenoides guentheri (Vaillant, 1888)	
79	CUBIGRA	Cubiceps gracilis	C	177.2.1	A O	0	Cubiceps gracilis (Lowe, 1843)	
80	CYCLBRA	Cyclothone braueri	C	37.4.3	A O	m	Cyclothone braueri Jespersen & Tåning, 1926	SB
81	CYCLPIG	Cyclothone pygmaea	C	37.4.8	A O	m	Cyclothone pygmaea Jespersen & Tåning, 1926	
82	CYCLSPP	Cyclothone spp.	C	37.4	A O	m	Cyclothone Goode & Bean, 1883	
83	CYNPFER	Cynoponticus ferox	C	79.1.1	A O	0	Cynoponticus ferox Costa, 1846	
84	DALOIMB	Dalophis imberbis	C	86.3.1	A O	0	Dalophis imberbis (Delaroche, 1809)	
85	DENTDEN	Dentex dentex	C	139.3.1	A O	0	Dentex dentex (Linnaeus, 1758)	
86	DENTGIB	Dentex gibbosus	C	139.3.3	A O	0	Dentex gibbosus (Rafinesque, 1810)	
87	DENTMAC	Dentex macrophthalmus	C	139.3.4	A O	0	Dentex macrophthalmus (Bloch, 1791)	
88	DENTMAR	Dentex maroccanus	C	139.3.5	A O	0	Dentex maroccanus Valenciennes, 1830	
89	DIAPHOL	Diaphus holti	C	58.6.5	A O	0	Diaphus holti Tåning, 1918	
90	DIAPMET	Diaphus metopoclampus	C	58.6.7	A O	0	Diaphus metopoclampus (Cocco, 1829)	
91	DIAPRAF	Diaphus rafinesquei	C	58.6.9	A O	0	Diaphus rafinesquii (Cocco, 1838)	
92	DIAPSPP	Diaphus spp.	C	58.6	A O	0	Diaphus Eigenmann & Eigenmann, 1890	
93	DICELAB	Dicentrarchus labrax	C	124.4.1	A O	0	Dicentrarchus labrax (Linnaeus, 1758)	
94	DICEPUN	Dicentrarchus punctatus	C	124.4.2	A O	0	Dicentrarchus punctatus (Bloch, 1792)	
95	DICOCUN	Dicologoglossa cuneata	C	198.4.2	A O	0	Dicologlossa cuneata (Moreau, 1881)	
96	DIPGBIM	Diplacogaster bimaculata	C	208.2.1	A O	0	Diplecogaster bimaculata bimaculata (Bonnaterre,	
97	DIPLANN	Diplodus annularis	C	139.4.1	A O	0	Diplodus annularis (Linnaeus, 1758)	
98	DIPLCER	Diplodus cervinus cervinus	C	139.4.2.	A O	0	Diplodus cervinus cervinus (Lowe, 1838)	
99	DIPLPUN	Diplodus puntazo	C	139.8.1	A O	0	Diplodus puntazzo (Cetti, 1777)	
100	DIPLSAR	Diplodus sargus	C	139.4.3	A O	0	Diplodus sargus sargus (Linnaeus, 1758)	
101	DIPLVUL	Diplodus vulgaris	C	139.4.4	A O	0	Diplodus vulgaris (Geoffroy Saint-Hilaire, 1817)	
102	DUSSELO	Dussumieria elopsoides	X	X	A O	0	Dussumieria elopsoides Bleeker, 1849	
103	ECHEMIR	Echelus myrus	C	84.1.1	A O	0	Echelus myrus (Linnaeus, 1758)	
104	ECHIDEN	Echiodon dentatus	C	175.2.2	A O	0	Echiodon dentatus (Cuvier, 1829)	
105	ELECRIS	Electrona rissoi	C	58.8.1	A O	0	Electrona risso (Cocco, 1829)	
106	ENGRENC	Engraulis encrasicolus	C	35.1.1	A O	0	Engraulis encrasicolus (Linnaeus, 1758)	
107	EPHIGUT	Ephippion guttiferum	C	204.1.1	A O	0	Ephippion guttifer (Bennett, 1831)	
108	EPIGCON	Epigonus constanciae	C	127.2.3	A O	0	Epigonus constanciae (Giglioli, 1880)	
109	EPIGDEN	Epigonus denticulatus	C	127.2.2	A O	0	Epigonus denticulatus Dieuzeide, 1950	
110	EPIGSPP	Epigonus spp.	C	127.2	A O	0	Epigonus Rafinesque, 1810	SB
111	EPIGTEL	Epigonus telescopus	C	127.2.1	A O	0	Epigonus telescopus (Risso, 1810)	
112	EPINAEN	Epinephelus aeneus	C	124.5.1	A O	0	Epinephelus aeneus (Geoffroy Saint-Hilaire, 1817)	
113	EPINALE	Epinephelus alexandrinus	C	124.5.2	A O	0	Epinephelus costae (Steindachner, 1878)	
114	EPINCAN	Epinephelus caninus	C	124.5.3	A O	0	Epinephelus caninus (Valenciennes, 1843)	
115	EPINGUA	Epinephelus guaza	C	124.5.4	A O	0	Epinephelus marginatus (Lowe, 1834)	
116	EPINSPP	Epinephelus spp.	C	124.5	A O	0	Epinephelus Bloch, 1793	
117	ERETKLE	Eretmophorus kleinenbergi	C	103.1.1	A O	0	Eretmophorus kleinenbergi Giglioli, 1889	
118	EUTRGUR	Eutrigla gurnardus	C	185.3.1	A O	0	Eutrigla gurnardus (Linnaeus, 1758)	

119	EVERBAL	Evermannella balboi (= balbo)	C	60.1.1	A O	0	Evermannella balbo (Risso, 1820)	
120	GADAMAR	Gadella maraldi	C	103.3.1	A O	0	Gadella maraldi (Risso, 1810)	
121	GADIARG	Gadiculus argenteus	C	101.5.1	A O	0	Gadiculus argenteus argenteus Guichenot, 1850	
122	GADUMER	Merlangius merlangus	C	101.7.1	A O	0	Merlangius merlangus (Linnaeus, 1758)	
123	GAIDMED	Gaidropsarus mediterraneus	C	101.20.1	A O	0	Gaidropsarus mediterraneus (Linnaeus, 1758)	
124	GAIDVUL	Gaidropsarus vulgaris	C	101.20.4	A O	0	Gaidropsarus vulgaris (Cloquet, 1824)	
125	GALIDEC	Galeoides decadactylus	C	182.1.1	A O	0	Galeoides decadactylus (Bloch, 1795)	
126	GEPYDAR	Gephyroberyx darwini	C	115.1.1	A O	0	Gephyroberyx darwinii (Johnson, 1866)	
127	GLOSLEI	Glossanodon leioglossus	C	46.2.1	A O	0	Glossanodon leioglossus (Valenciennes, 1848)	
128	GNATMYS	Gnathophis mystax	C	82.3.1	A O	0	Gnathophis mystax (Delaroche, 1809)	
129	GOBICOL	Deltentosteus (Gobius) colonialus	C	162.10.2	A O	0	Deltentosteus collonianus (Risso, 1820)	
130	GOBIFRI	Leusueurigobius (Gobius) friesii	C	162.16.2	A O	0	Lesueurigobius friesii (Malm, 1874)	
131	GOBIGEN	Gobius geniporus	C	162.1.8	A O	0	Gobius geniporus Valenciennes, 1837	
132	GOBILIN	Crystallogobius (Gobius) linearis	C	162.9.1	A O	0	Crystallogobius linearis (Düben, 1845)	
133	GOBINIG	Gobius niger	C	162.1.1	A O	0	Gobius niger Linnaeus, 1758	
134	GOBIQUA	Deltentosteus (Gobius)	C	162.10.1	A O	0	Deltentosteus quadrimaculatus (Valenciennes,	
135	GOBISAN	Lesueurigobius (Gobius) sanzoi	C	162.16.4	A O	0	Lesueurigobius sanzi (De Buen, 1918)	
136	GOBISPP	Gobius spp.	C	162	A O	0	Gobius Linnaeus, 1758	
137	GOBISUE	Lesueurigobius suerii	C	162.16.1	A O	0	Lesueurigobius suerii (Risso, 1810)	
138	GONICOC	Gonichthys coccoi	C	58.9.1	A O	0	Gonichthys cocco (Cocco, 1829)	
139	GONODEN	Gonostoma denudatum	C	37.1.1	A O	0	Gonostoma denudatum Rafinesque, 1810	
140	GONOSPP	Gonostoma spp.	C	37.1	A O	0	Gonostoma Rafinesque, 1810	SB
141	GYMACIC	Gymnammodytes cicerellus	C	147.2.1	A O	0	Gymnammodytes cicerelus (Rafinesque, 1810)	
142	HELIDAC	Helicolenus dactylopterus	C	184.2.1	A O	0	Helicolenus dactylopterus dactylopterus	
143	HIPPGUT	Hippocampus guttulatus	C	97.4.2	A O	0	Hippocampus guttulatus Cuvier, 1829	SB
144	HIPPHIC	Hippocampus hippocampus	C	97.4.1	A O	0	Hippocampus hippocampus (Linnaeus, 1758)	
145	HOPLATL	Hoplostethus atlanticus	C	115.2.2	A O	0	Hoplostethus atlanticus Collett, 1889	
146	HOPLMED	Hoplostethus mediterraneus	C	115.2.1	A O	0	Hoplostethus mediterraneus mediterraneus Cuvier,	
147	HYGOBEN	Hygophum benoiti	C	58.10.2	A O	0	Hygophum benoiti (Cocco, 1838)	
148	HYGOHIG	Hygophum hygomii	C	58.10.1	A O	0	Hygophum hygomii (Lütken, 1892)	
149	HYGOSPP	Hygophum spp.	C	58.10	A O	0	Hygophum Bolin, 1939	MT
150	HYMEITA	Hymenocephalus italicus	C	99.5.1	A O	0	Hymenocephalus italicus Giglioli, 1884	
151	HYPOPIC	Hyporhamphus picarti	C	93.2.1	A O	0	Hyporhamphus picarti (Valenciennes, 1847)	
152	ICHTOVA	Ichthyococcus ovatus	C	37.6.1	A O	0	Ichthyococcus ovatus (Cocco, 1838)	
153	LABRVIR	Labrus viridis	C	145.1.4	A O	0	Labrus viridis Linnaeus, 1758	
154	LABSBIM	Labrus bimaculatus	C	145.1.1	A O	0	Labrus mixtus Linnaeus, 1758	
155	LAGOLAG	Lagocephalus lagocephalus	C	204.2.1	A O	0	Lagocephalus lagocephalus lagocephalus	
156	LAMACRO	Lampanyctus crocodilus	C	58.12.1	A O	0	Lampanyctus crocodilus (Risso, 1810)	
157	LAMAPUS	Lampanyctus pusillus	C	58.12.10	A O	0	Lampanyctus pusillus (Johnson, 1890)	
158	LAMASPP	Lampanyctus spp.	C	58.12	A O	0	Lampanyctus Bonaparte, 1840	
159	LAMPGUT	Lampris guttatus	C	105.1.1	A O	0	Lampris guttatus (Brünnich, 1788)	

160	LAPPFAS	Lappanella fasciata	C	145.7.1	A O	0	Lappanella fasciata (Cocco, 1833)	
161	LEPALEP	Lepadogaster lepadogaster	C	208.4.1	A O	0	Lepadogaster lepadogaster (Bonnaterre, 1788)	
162	LEPASPP	Lepadogaster spp.	C	208.4	A O	0	Lepadogaster Goüan, 1770	SB
163	LEPICAU	Lepidopus caudatus	C	155.4.1	A O	0	Lepidopus caudatus (Euphrasen, 1788)	
164	LEPMBOS	Lepidorhombus boscii	C	195.2.2	A O	0	Lepidorhombus boscii (Risso, 1810)	
165	LEPMWHS	Lepidorhombus whiffiagonis	C	195.2.1	A O	0	Lepidorhombus whiffiagonis (Walbaum, 1792)	
166	LEPOLEP	Lepidion lepidion	C	103.6.1	A O	0	Lepidion lepidion (Risso, 1810)	
167	LEPTCAV	Lepidotrigla cavillone	C	185.4.1	A O	0	Lepidotrigla cavillone (Lacepède, 1801)	
168	LEPTDIE	Lepidotrigla dieuzeidei	C	185.4.2	A O	0	Lepidotrigla dieuzeidei Blanc & Hureau, 1973	
169	LESTSPD	Lestidiops sphyrenoides	C	63.2.1	A O	0	Lestidiops sphyrenoides (Risso, 1820)	
170	LESTSPP	Lestidiops spp.	C	63.2	A O	0	Lestidiops Hubbs, 1916	
171	LICHAMI	Lichia amia	C	131.5.1	A O	0	Lichia amia (Linnaeus, 1758)	
172	LITHMOR	Lithognathus mormyrus	C	139.5.1	A O	0	Lithognathus mormyrus (Linnaeus, 1758)	
173	LIZAAUR	Liza aurata	C	181.3.2	A O	0	Liza aurata (Risso, 1810)	
174	LIZARAM	Liza ramada	C	181.3.1	A O	0	Liza ramado (Risso, 1810)	
175	LIZASAL	Liza saliens	C	181.3.4	A O	0	Liza saliens (Risso, 1810)	
176	LOBIDOF	Lobianchia dofleini	C	58.14.12	A O	0	Lobianchia dofleini (Zugmayer, 1911)	
177	LOBIGEM	Lobianchia gemellarii	C	58.14.1	A O	0	Lobianchia gemellarii (Cocco, 1838)	
178	LOPHBUD	Lophius budegassa	C	210.1.2	A O	0	Lophius budegassa Spinola, 1807	
179	LOPHPIS	Lophius piscatorius	C	210.1.1	A O	0	Lophius piscatorius Linnaeus, 1758	
180	LOPHSPP	Lophius	C	210.1	A O	0	Lophius Linnaeus, 1758	
181	MACOSCO	Macrorhamphosus scolopax	C	96.1.1	A O	0	Macroramphosus scolopax (Linnaeus, 1758)	
182	MAURMUE	Maurolicus muelleri	C	37.8.1	A O	0	Maurolicus muelleri (Gmelin, 1789)	
183	MELAATL	Melanostigma atlanticum	C	170.6.1	A O	0	Melanostigma atlanticum Koefoed, 1952	
184	MERLMER	Merluccius merluccius	C	100.1.1	A O	0	Merluccius merluccius (Linnaeus, 1758)	
185	MICICOC	Microichthys coccoi	C	127.4.1	A O	0	Microichthys coccoi Rüppell, 1852	SB e MT
186	MICMPOU	Micromesistius poutassou	C	101.8.1	A O	0	Micromesistius poutassou (Risso, 1826)	
187	MICRMCS	Microstoma microstoma	C	46.1.3	A O	0	Microstoma microstoma (Risso, 1810)	
188	MICUAZE	Microchirus azevia	C	198.5.2	A O	0	Microchirus theophila (Risso, 1810)	
189	MICUBOS	Microchirus boscanion	C	198.5.4	A O	0	Microchirus boscanion (Chabanaud, 1926)	
190	MICUOCE	Microchirus ocellatus	C	198.5.3	A O	0	Microchirus ocellatus (Linnaeus, 1758)	
191	MICUVAR	Microchirus variegatus	C	198.5.1	A O	0	Microchirus variegatus (Donovan, 1808)	
192	MOLAMOL	Mola mola	C	207.1.1	A O	0	Mola mola (Linnaeus, 1758)	
193	MOLVDYP	Molva dipterygia	C	101.14.2	A O	0	Molva dipterygia (Pennant, 1784)	
194	MOLVMOL	Molva molva	C	101.14.1	A O	0	Molva molva (Linnaeus, 1758)	
195	MONOHIS	Monochirus hispidus	C	198.6.1	A O	0	Monochirus hispidus Rafinesque, 1814	
196	MORAMOR	Mora moro	C	103.7.1	A O	0	Mora moro (Risso, 1810)	
197	MUGICEP	Mugil cephalus	C	181.1.1	A O	0	Mugil cephalus Linnaeus, 1758	
198	MUGISPP	Mugilidae	C	181	A O	0	Mugilidae	
199	MULLBAR	Mullus barbatus	C	138.1.1	A O	0	Mullus barbatus Linnaeus, 1758	
200	MULLSUR	Mullus surmuletus	C	138.1.2	A O	0	Mullus surmuletus Linnaeus, 1758	

201	MURAHEL	Muraena helena	C	73.1.1	A O	0	Muraena helena Linnaeus, 1758	
202	MYCOPUN	Myctophum punctatum	C	58.1.1	A O	0	Myctophum punctatum Rafinesque, 1810	
203	MYCOSPP	Myctophidae	C	58	A O	0	Myctophidae	
204	MYCTRUB	Mycteroperca rubra	C	124.6.1	A O	0	Mycteroperca rubra (Bloch, 1793)	
205	NANSOBI	Nansenia oblita	C	46.4.2	A O	0	Nansenia oblita (Facciolà, 1887)	
206	NAUCDUC	Naucrates ductor	C	131.6.1	A O	0	Naucrates ductor (Linnaeus, 1758)	
207	NEMISCO	Nemichthys scolopaceus	C	76.1.1	A O	0	Nemichthys scolopaceus Richardson, 1848	
208	NEROMAC	Nerophis maculatus	C	97.2.1	A O	0	Nerophis maculatus Rafinesque, 1810	
209	NEROOPH	Nerophis ophidion	C	97.2.2	A O	0	Nerophis ophidion (Linnaeus, 1758)	
210	NETOBRE	Dysomma (Nettodarus) brevirostris	C	81.1.1	A O	0	Dysomma brevirostre (Facciolà, 1887)	
211	NETTMEL	Nettastoma melanurum	C	80.1.1	A O	0	Nettastoma melanurum Rafinesque, 1810	
212	NEZUAEQ	Nezumia aequalis	C	99.9.1	A O	0	Nezumia aequalis (Günther, 1878)	
213	NEZUSCL	Nezumia sclerorhynchus	C	99.9.2	A O	0	Nezumia sclerorhynchus (Valenciennes, 1838)	
214	NOTABON	Notacanthus bonapartei	C	89.1.2	A O	0	Notacanthus bonaparte Risso, 1840	
215	NOTORIS	Notolepis rissoi	C	63.4.1	A O	0	Arctozenus risso (Bonaparte, 1840)	
216	NOTSBOL	Notoscopelus bolini	C	58.17.5	A O	0	Notoscopelus bolini Nafpaktitis, 1975	a3
217	NOTSELO	Notoscopelus elongatus	C	58.17.3	A O	0	Notoscopelus elongatus (Costa, 1844)	
218	NOTSKRO	Notoscopelus kroeyerii	C	58.17.4	A O	0	Notoscopelus bolini Nafpaktitis, 1975	a3
219	NOTSSPP	Notoscopelus spp.	C	58.17	A O	0	Notoscopelus Günther, 1864	MT
220	OBLAMEL	Oblada melanura	C	139.6.1	A O	0	Oblada melanura (Linnaeus, 1758)	
221	OEDALAB	Oedalechilus labeo	C	181.4.1	A O	0	Oedalechilus labeo (Cuvier, 1829)	
222	OLIGATE	Oligopus ater	C	172.1.1	A O	0	Grammonus ater (Risso, 1810)	
223	OPDIBAR	Ophidion barbatum	C	173.1.1	A O	0	Ophidion barbatum Linnaeus, 1758	
224	OPDIROC	Ophidion rochei	C	173.1.2+3	A O	0	Ophidion rochei Müller, 1845	
225	OPHCRUF	Ophichthus rufus	C	86.1.2	A O	0	Ophichthus rufus (Rafinesque, 1810)	
226	OPHISER	Ophisurus serpens	C	86.4.1	A O	0	Ophisurus serpens (Linnaeus, 1758)	
227	PAGEACA	Pagellus acarne	C	139.7.2	A O	0	Pagellus acarne (Risso, 1827)	
228	PAGEBOG	Pagellus bogaraveo	C	139.7.3	A O	0	Pagellus bogaraveo (Brünnich, 1768)	
229	PAGEERY	Pagellus erythrinus	C	139.7.1	A O	0	Pagellus erythrinus (Linnaeus, 1758)	
230	PAPOHUM	Parapristipoma humile	C	136.3.1	A O	0	Parapristipoma humile (Bowdich, 1825)	
231	PAPOOCT	Parapristipoma octolineatum	C	136.3.2	A O	0	Parapristipoma octolineatum (Valenciennes, 1833)	
232	PARALEP	Paraliparis leptochirus	C	192.3.3	A O	0	Eutelichthys leptochirus Tortonese, 1959	
233	PARLCOR	Paralepis coregonoides	C	63.1	A O	0	Paralepis coregonoides Risso, 1820	a4
234	PARLSPE	Paralepis speciosa	C	63.1.5	A O	0	Paralepis coregonoides Risso, 1820	a4
235	PERICAT	Peristedion cataphractum	C	186.1.1	A O	0	Peristedion cataphractum (Linnaeus, 1758)	
236	PHRYREG	Phrynorhombus regius	C	195.3.1	A O	0	Zeugopterus regius (Bonnaterre, 1788)	
237	PHRYSPP	Phrynorhombus	C	195.3.1	A O	0	Zeugopterus Gottsche, 1835	
238	PHYIBLE	Phycis blennoides	C	101.15.2	A O	0	Phycis blennoides (Brünnich, 1768)	
239	PHYIPHY	Phycis phycis	C	101.15.1	A O	0	Phycis phycis (Linnaeus, 1766)	
240	PHYSDAL	Physiculus dalwigki	C	103.8.1	A O	0	Physiculus dalwigki Kaup, 1858	
241	PLATFLE	Platichys flesus	C	197.8.1	A O	0	Platichthys flesus (Linnaeus, 1758)	

242	PLEOMED	Plectorhinchus mediterraneus	C	136.4.1	A O	0	Plectorhinchus mediterraneus (Guichenot, 1850)	
243	POLARIS	Polyacanthonotus rissoanus	C	89.2.1	A O	0	Polyacanthonotus rissoanus (De Filippi & Verany,	
244	POLYAME	Polyprion americanum	C	124.7.1	A O	0	Polyprion americanus (Bloch & Schneider, 1801)	
245	POMABEN	Pomadasys incisus (bennetti)	C	136.1.1	A O	0	Pomadasys incisus (Bowdich, 1825)	
246	POMSMAR	Pomatoschistus marmoratus	C	162.21.4	A O	0	Pomatoschistus marmoratus (Risso, 1810)	
247	POMSMIC	Pomatoschistus microps	C	162.21.5	A O	0	Pomatoschistus microps (Krøyer, 1838)	
248	POMSMIN	Pomatoschistus minutus	C	162.21.1	A O	0	Pomatoschistus minutus (Pallas, 1770)	
249	POMTSAL	Pomatomus saltator	C	129.1.1	A O	0	Pomatomus saltatrix (Linnaeus, 1766)	
250	PONIKUH	Pontinus kuhlii	C	184.3.1	A O	0	Pontinus kuhlii (Bowdich, 1825)	
251	PSENPEL	Psenes pellucidus	C	177.3.2	A O	0	Psenes pellucidus Lütken, 1880	
252	PSETMAX	Psetta maxima	C	195.4.1	A O	0	Psetta maxima (Linnaeus, 1758)	
253	PTEAPEL	Pteragogus pelycus	X	X	A O	0	Pteragogus pelycus Randall, 1981	
254	PUNTPUN	Diplodus (Puntazzo) puntazzo	C	137.8.1	A O	0	Diplodus puntazzo (Cetti, 1777)	
255	REGAGLE	Regalecus glesne	C	106.1.1.	A O	0	Regalecus glesne Ascanius, 1772	
256	RHYNHEP	Rhynchogadus hepaticus	C	103.9.1	A O	0	Rhynchogadus hepaticus (Facciolà, 1884)	
257	SADASAR	Sarda sarda	C	158.4.1	A O	0	Sarda sarda (Bloch, 1793)	
258	SALOTRU	Salmo trutta trutta	C	45.1.2	A O	0	Salmo trutta trutta Linnaeus, 1758	
259	SARDPIL	Sardina pilchardus	C	33.3.1	A O	0	Sardina pilchardus (Walbaum, 1792)	
260	SARIAUR	Sardinella aurita	C	33.4.1	A O	0	Sardinella aurita Valenciennes, 1847	
261	SARIMAD	Sardinella maderensis	C	33.4.2	A O	0	Sardinella maderensis (Lowe, 1838)	
262	SARPSAL	Sarpa salpa	C	139.9.1	A O	0	Sarpa salpa (Linnaeus, 1758)	
263	SCHEMED	Schedophilus medusophagus	C	176.3.1	A O	0	Schedophilus medusophagus Cocco, 1829	SB e MT
264	SCHEOVA	Schedophilus ovalis	C	176.3.2	A O	0	Schedophilus ovalis (Cuvier, 1833)	
265	SCIAUMB	Sciaena umbra	C	137.1.1	A O	0	Sciaena umbra Linnaeus, 1758	
266	SCOBSAU	Scomberesox saurus	C	91.1.1	A O	0	Scomberesox saurus saurus (Walbaum, 1792)	
267	SCOHRHO	Scophthalmus rhombus	C	195.1.1	A O	0	Scophthalmus rhombus (Linnaeus, 1758)	
268	SCOMPNE	Scomber (Pneumatophorus)	C	156.1.2	A O	0	Scomber colias Gmelin, 1789	
269	SCOMSCO	Scomber scombrus	C	156.1.1	A O	0	Scomber scombrus Linnaeus, 1758	
270	SCORELO	Scorpaena elongata	C	184.1.3	A O	0	Scorpaena elongata Cadenat, 1943	
271	SCORLOP	Scorpaena loppei	C	184.1.5	A O	0	Scorpaena loppei Cadenat, 1943	
272	SCORMAD	Scorpaena maderensis	C	184.1.6	A O	0	Scorpaena madurensis Valenciennes, 1833	
273	SCORNOT	Scorpaena notata	C	184.1.7	A O	0	Scorpaena notata Rafinesque, 1810	
274	SCORPOR	Scorpaena porcus	C	184.1.1	A O	0	Scorpaena porcus Linnaeus, 1758	
275	SCORSCO	Scorpaena scrofa	C	184.1.8	A O	0	Scorpaena scrofa Linnaeus, 1758	
276	SCORSPP	Scorpaena spp.	C	184.1	A O	0	Scorpaena Linnaeus, 1758	MT
277	SERAATR	Serranus atricauda	C	124.1.2	A O	0	Serranus atricauda Günther, 1874	
278	SERACAB	Serranus cabrilla	C	124.1.1	A O	0	Serranus cabrilla (Linnaeus, 1758)	
279	SERAHEP	Serranus hepatus	C	124.1.3	A O	0	Serranus hepatus (Linnaeus, 1758)	
280	SERASCR	Serranus scriba	C	124.1.4	A O	0	Serranus scriba (Linnaeus, 1758)	
281	SERIDUM	Seriola dumerili	C	131.9.1	A O	0	Seriola dumerili (Risso, 1810)	
282	SOLEIMP	Solea impar	C	198.1.2	A O	0	Pegusa impar (Bennett, 1831)	

283	SOLEKLE	Solea kleini	C	198.1.3	A O	0	Synapturichthys kleinii (Risso, 1827)	
284	SOLELAS	Solea lascaris	C	198.1.4	A O	0	Pegusa lascaris (Risso, 1810)	
285	SOLESEN	Solea senegalensis	C	198.1.6	A O	0	Solea senegalensis Kaup, 1858	
286	SOLESPP	Solea spp.	C	198.1	A O	0	Solea Quensel, 1906	LM
287	SOLEVUL	Solea vulgaris	C	198.1.1	A O	0	Solea solea (Linnaeus, 1758)	
288	SPARAUR	Sparus aurata	C	139.1.1	A O	0	Sparus aurata Linnaeus, 1758	
289	SPARCAE	Pagrus (Sparus) coeruleostictus	C	139.11.2	A O	0	Pagrus caeruleostictus (Valenciennes, 1830)	
290	SPARPAG	Pagrus (Sparus) pagrus	C	139.11.3	A O	0	Pagrus pagrus (Linnaeus, 1758)	
291	SPHOCUT	Sphoeroides cutaneus	C	204.3.2	A O	0	Sphoeroides pachygaster (Müller & Troschel, 1848)	
292	SPHYSPY	Sphyraena sphyraena	C	180.1.1	A O	0	Sphyraena sphyraena (Linnaeus, 1758)	
293	SPICFLE	Spicara flexuosa	C	141.2.2	A O	0	Spicara flexuosa Rafinesque, 1810	
294	SPICMAE	Spicara maena	C	141.2.1	A O	0	Spicara maena (Linnaeus, 1758)	
295	SPICSMA	Spicara smaris	C	141.2.3	A O	0	Spicara smaris (Linnaeus, 1758)	
296	SPICSPP	Spicara	C	141.2	A O	0	Spicara Rafinesque, 1810	
297	SPODCAN	Spondyliosoma cantharus	C	139.10.1	A O	0	Spondyliosoma cantharus (Linnaeus, 1758)	
298	SPRASPR	Sprattus sprattus	C	33.5.1	A O	0	Sprattus sprattus sprattus (Linnaeus, 1758)	
299	STEPDIA	Stephanolepis diaspros	C	202.1.2	A O	0	Stephanolepis diaspros Fraser-Brunner, 1940	
300	STOMBOA	Stomias boa	C	41.1.1	A O	0	Stomias boa boa (Risso, 1810)	
301	STROFIA	Stromateus fiatola	C	179.1.1	A O	0	Stromateus fiatola Linnaeus, 1758	
302	SUDIHYA	Sudis hyalina	C	63.5.1	A O	0	Sudis hyalina Rafinesque, 1810	LM e MT
303	SYMBVER	Symbolophorus veranyi	C	58.19.1	A O	0	Symbolophorus veranyi (Moreau, 1888)	
304	SYMDCIN	Symphodus cinereus	C	145.9.3	A O	0	Symphodus cinereus (Bonnaterre, 1788)	
305	SYMDMED	Symphodus mediterraneus	C	145.9.6	A O	0	Symphodus mediterraneus (Linnaeus, 1758)	
306	SYMDOCE	Symphodus ocellatus	C	145.9.9	A O	0	Symphodus ocellatus (Forsskål, 1775)	
307	SYMDROI	Symphodus roissali	C	145.9.11	A O	0	Symphodus roissali (Risso, 1810)	SB e MT
308	SYMDROS	Symphodus rostratus	C	145.9.1	A O	0	Symphodus rostratus (Bloch, 1791)	
309	SYMDTIN	Symphodus tinca	C	145.9.12	A O	0	Symphodus tinca (Linnaeus, 1758)	
310	SYMPLIG	Symphurus ligulatus	C	199.2.2	A O	0	Symphurus ligulatus (Cocco, 1844)	
311	SYMPNIG	Symphurus nigrescens	C	199.2.1	A O	0	Symphurus nigrescens Rafinesque, 1810	
312	SYNDSAU	Synodus saurus	C	51.1.2	A O	0	Synodus saurus (Linnaeus, 1758)	
313	SYNGACU	Syngnathus acus	C	97.1.1	A O	0	Syngnathus acus Linnaeus, 1758	
314	SYNGPHL	Syngnathus phlegon	C	97.1.3	A O	0	Syngnathus phlegon Risso, 1827	
315	SYNGTAE	Syngnathus taenionotus	C	97.1.6	A O	0	Syngnathus taenionotus Canestrini, 1871	
316	SYNGTEN	Syngnathus tenuirostris	C	97.1.7	A O	0	Syngnathus tenuirostris Rathke, 1837	LM
317	SYNGTYP	Syngnathus typhle	C	97.1.8	A O	0	Syngnathus typhle Linnaeus, 1758	
318	SYNGSPP	Syngnathus spp.	C	97.1	A O	0	Syngnathus Linnaeus, 1758	MT
319	TRACMED	Trachurus mediterraneus	C	131.10.3	A O	0	Trachurus mediterraneus (Steindachner, 1868)	
320	TRACPIC	Trachurus picturatus	C	131.10.4	A O	0	Trachurus picturatus (Bowdich, 1825)	
321	TRACTRA	Trachurus trachurus	C	131.10.1	A O	0	Trachurus trachurus (Linnaeus, 1758)	
322	TRAHARA	Trachinus araneus	C	148.1.2	A O	0	Trachinus araneus Cuvier, 1829	
323	TRAHDRA	Trachinus draco	C	148.1.1	A O	0	Trachinus draco Linnaeus, 1758	

324	TRAHRAD	Trachinus radiatus	C	148.1.3	A O	0	Trachinus radiatus Cuvier, 1829	
325	TRARTRA	Trachyrhynchus trachyrhynchus	C	99.1.1	A O	0	Trachyrincus scabrus (Rafinesque, 1810)	
326	TRAYCRI	Trachyscorpia cristulata	C	184.7.1	A O	0	Trachyscorpia cristulata echinata (Koehler, 1896)	
327	TRIGLUC	Trigla lucerna	C	185.1.2	A O	0	Chelidonichthys lucerna (Linnaeus, 1758)	
328	TRIGLYR	Trigla lyra	C	185.1.1	A O	0	Trigla lyra Linnaeus, 1758	
329	TRIILEP	Trichiurus lepturus	C	155.1.1	A O	0	Trichiurus lepturus Linnaeus, 1758	
330	TRIPLAS	Trigloporus lastoviza	C	185.5.1	A O	0	Trigloporus lastoviza (Bonnaterre, 1788)	
331	TRISCAP	Trisopterus minutus capelanus	C	101.11.1	A O	0	Trisopterus minutus (Linnaeus, 1758)	
332	TRISLUS	Trisopterus luscus	C	101.11.3	A O	0	Trisopterus luscus (Linnaeus, 1758)	
333	UMBRCAN	Umbrina canariensis	C	137.4.2	A O	0	Umbrina canariensis Valenciennes, 1843	
334	UMBRCIR	Umbrina cirrosa	C	137.4.1	A O	0	Umbrina cirrosa (Linnaeus, 1758)	
335	UMBRRON	Umbrina ronchus	C	137.4.3	A O	0	Umbrina ronchus Valenciennes, 1843	
336	UPENMOL	Upeneus moluccensis	C	138.3.1	A O	0	Upeneus moluccensis (Bleeker, 1855)	
337	URANSCA	Uranoscopus scaber	C	149.1.1	A O	0	Uranoscopus scaber Linnaeus, 1758	
338	VINCATT	Vinciguerria attenuata	C	37.12.1	A O	0	Vinciguerria attenuata (Cocco, 1838)	
339	VINCPOW	Vinciguerria poweriae	C	37.12.3	A O	0	Vinciguerria poweriae (Cocco, 1838)	
340	XIPHGLA	Xiphias gladius	C	161.1.1	A O	0	Xiphias gladius Linnaeus, 1758	
341	XYRINOV	Xyrichthys novacula	C	145.11.1	A O	0	Xyrichthys novacula (Linnaeus, 1758)	LM e MT
342	ZEUSFAB	Zeus faber	C	120.1.1	A O	0	Zeus faber Linnaeus, 1758	
343	ZOSTOPH	Zostoricessor ophiocephalus	C	162.26.1	A O	0	Zosterisessor ophiocephalus (Pallas, 1814)	

Notes:

a1: The species *Bathypterois dubius* has two codes **BATHDUB** and **BATHMED** (*Bathypterois mediterraneus* is considered non valid species);

a2: The species *Callionymus risso* has two codes **CALLRIS** and **CALMRIS** because of input mistake;

a3: The species *Notoscopelus bolini* has two codes **NOTSBOL** and **NOTSKRO** (*Notoscopelus kroeyerii* is considered non valid species);

a4: The species *Paralepis coregonoides* has two codes **PARLCOR** and **PARLSPE** (*Paralepis speciosa* is considered non valid species, probably juvenile of *P. coregonoides*)

List of Elasmobranchs

	Medits Code	Scientific Name	Source	Reference	CATFAU	CODLON	Valid Name	Species added by
1	ALOPVUL	Alopias vulpinus	C	9.1.1	A e	0	Alopias vulpinus (Bonnaterre, 1788)	
2	CARCPLU	Carcharhinus plumbeus	C	13.1.7	A e	0	Carcharhinus plumbeus (Nardo, 1827)	
3	CARCSPP	Carcharhinus spp.	C	13.1	A e	0	Carcharhinus Blainville, 1816	
4	CENTGRA	Centrophorus granulosus	C	16.1.2	A e	0	Centrophorus granulosus (Bloch & Schneider,	
5	CENTUYA	Centrophorus uyato	C	16.2.4	A e	0	Centrophorus uyato (Rafinesque, 1810)	
6	CHIMMON	Chimaera monstrosa	C	26.1.1	A e	0	Chimaera monstrosa Linnaeus, 1758	
7	DASICEN	Dasyatis centroura	C	22.1.2	A e	0	Dasyatis centroura (Mitchill, 1815)	
8	DASIPAS	Dasyatis pastinaca	C	22.1.1	A e	0	Dasyatis pastinaca (Linnaeus, 1758)	b1
9	DASITOR	Dasyatis tortonesi	C	22.1.4	A e	0	Dasyatis pastinaca (Linnaeus, 1758)	b1
10	DASIVIO	Dasyatis violacea	C	22.1.3	A e	0	Pteroplatytrygon violacea (Bonaparte, 1832)	
11	ETMOSPI	Etmopterus spinax	C	16.6.1	A e	0	Etmopterus spinax (Linnaeus, 1758)	

12	GALEGAL	Galeorhinus galeus	C	13.3.1	A e	0	Galeorhinus galeus (Linnaeus, 1758)	
13	GALUATL	Galeus atlanticus	F	SCYL Gal	A e	0	Galeus atlanticus (Vaillant, 1888)	
14	GALUMEL	Galeus melastomus	C	11.3.1	A e	0	Galeus melastomus Rafinesque, 1810	
15	GYMNALT	Gymnura altavela	C	22.2.1	A e	0	Gymnura altavela (Linnaeus, 1758)	
16	HEPTPER	Heptranchias perlo	C	3.2.1	A e	0	Heptranchias perlo (Bonnaterre, 1788)	
17	HEXAGRI	Hexanchus griseus	C	3.1.1	A e	0	Hexanchus griseus (Bonnaterre, 1788)	
18	HEXAVIT	Hexanchus nakamurai	C	3.1.2	A e	0	Hexanchus nakamurai Teng, 1962	
19	MUSTAST	Mustelus asterias	C	13c.5.2	A e	0	Mustelus asterias Cloquet, 1821	
20	MUSTMED	Mustelus mediterraneus	C	13c.5.3	A e	0	Mustelus punctulatus Risso, 1827	
21	MUSTMUS	Mustelus mustelus	C	13c.5.1	A e	0	Mustelus mustelus (Linnaeus, 1758)	
22	MYLIAQU	Myliobatis aquila	C	23.1.1	A e	0	Myliobatis aquila (Linnaeus, 1758)	
23	ODONFER	Odontaspis ferox	C	5.1.1	A e	0	Odontaspis ferox (Risso, 1810)	
24	ODONTAU	Eugonphodus (Odontaspis)	C	5.1.3	A e	0	Carcharias taurus Rafinesque, 1810	
25	OXYNCEN	Oxynotus centrina	C	15.1.1	A e	0	Oxynotus centrina (Linnaeus, 1758)	
26	PRIOGLA	Prionace glauca	C	13.8.1	A e	0	Prionace glauca (Linnaeus, 1758)	
27	PTEOBOV	Pteromylaeus bovinus	C	23.2.1	A e	0	Pteromylaeus bovinus (Geoffroy Saint-Hilaire,	
28	RAJAALB	Raja alba	C	21.1.18	A e	0	Rostroraja alba (Lacepède, 1803)	
29	RAJAAST	Raja asterias	C	21.1.2	A e	0	Raja asterias Delaroche, 1809	
30	RAJABAT	Raja batis	C	21.1.10	A e	0	Dipturus batis (Linnaeus, 1758)	
31	RAJABRA	Raja brachyura	C	21.1.3	A e	0	Raja brachyura Lafont, 1873	
32	RAJACIR	Raja circularis	C	21.1.14	A e	0	Leucoraja circularis (Couch, 1838)	
33	RAJACLA	Raja clavata	C	21.1.4	A e	0	Raja clavata Linnaeus, 1758	
34	RAJAFUL	Raja fullonica	C	21.1.13	A e	0	Leucoraja fullonica (Linnaeus, 1758)	
35	RAJAMEL	Raja melitensis	C	21.1.21	A e	0	Leucoraja melitensis (Clark, 1926)	
36	RAJAMIR	Raja miraletus	C	21.1.1	A e	0	Raja miraletus Linnaeus, 1758	
37	RAJAMON	Raja montagui	C	21.1.7	A e	0	Raja montagui Fowler, 1910	
38	RAJANAE	Raja naevus	C	21.1.15	A e	0	Leucoraja naevus (Müller & Henle, 1841)	
39	RAJAOXY	Raja oxyrinchus	C	21.1.12	A e	0	Dipturus oxyrinchus (Linnaeus, 1758)	
40	RAJAPOL	Raja polystigma	C	21.1.22	A e	0	Raja polystigma Regan, 1923	
41	RAJARDA	Raja radula	C	21.1.23	A e	0	Raja radula Delaroche, 1809	
42	RAJASPP	Raja	C	21.1.12	A e	0	Raja Linnaeus, 1758	
43	RAJAUND	Raja undulata	C	21.1.25	A e	0	Raja undulata Lacepède, 1802	
44	RHINCEM	Rhinobatos cemiculus	C	19.1.2	A e	0	Rhinobatos cemiculus Geoffroy Saint-Hilaire,	
45	RHINRHI	Rhinobatos rhinobatos	C	19.1.1	A e	0	Rhinobatos rhinobatos (Linnaeus, 1758)	
46	RHIPMAR	Rhinoptera marginata	C	24.1.1	A e	0	Rhinoptera marginata (Geoffroy Saint-Hilaire,	
47	SCYMLIC	Dalatias (Scymnorhinus)	C	16.4.3	A e	0	Dalatias licha (Bonnaterre, 1788)	
48	SCYOCAN	Scyliorhinus canicula	C	11.1.1	A e	0	Scyliorhinus canicula (Linnaeus, 1758)	
49	SCYOSTE	Scyliorhinus stellaris	C	11.1.2	A e	0	Scyliorhinus stellaris (Linnaeus, 1758)	
50	SQUAACA	Squalus acanthias	C	16.1.1	A e	0	Squalus acanthias Linnaeus, 1758	
51	SQUABLA	Squalus blainvillei	C	16.1.2	A e	0	Squalus blainvillei (Risso, 1827)	
52	SQUTACU	Squatina aculeata	C	17.1.2	A e	0	Squatina aculeata Cuvier, 1829	

53	SQUTOCL	Squatina oculata	C	17.1.3	A e	0	Squatina oculata Bonaparte, 1840	
54	SQUTSPP	Squatina spp.	C	17.1	A e	0	Squatina Duméril, 1806	
55	SQUTSQU	Squatina squatina	C	17.1.1	A e	0	Squatina squatina (Linnaeus, 1758)	
56	TAENGRA	Taeniura grabata	C	22.4.1	A e	0	Taeniura grabata (Geoffroy Saint-Hilaire, 1817)	
57	TORPMAR	Torpedo marmorata	C	20.1.2	A e	0	Torpedo marmorata Risso, 1810	
58	TORPNOB	Torpedo nobiliana	C	20.1.3	A e	0	Torpedo nobiliana Bonaparte, 1835	
59	TORPSPP	Torpedo	C	20.1	A e	0	Torpedo Houttuyn, 1764	
60	TORPTOR	Torpedo torpedo	C	20.1.1	A e	0	Torpedo torpedo (Linnaeus, 1758)	

Notes:
b1: The specie *Dasyatis pastinaca* has two codes **DASIPAS** and **DASITOR** (*Dasyatis tortonesi* is considered non valid species);

List of Crustaceans (Decapoda, Stomatopoda, Euphausiacea)

	Medits Code	Scientific Name	Source	Reference	CATFAU	CODLON	Valid Name	Species added by
1	ACANEXI	Acantephyra eximia	Z	Z	B	m	Acanthephyra eximia S.I. Smith, 1884	
2	ACANPEL	Acanthephyra pelagica	Z	Z	B	m	Acanthephyra pelagica (Risso, 1816)	
3	ACANSPP	Acanthephyra spp.			B		Acanthephyra A. Milne Edwards, 1881	LM e MT
4	ALPHGLA	Alpheus glaber	F	ALPH Alph 5	B	m	Alpheus glaber (Olivi, 1792)	
5	ALPHPLA	Alpheus platydactylus	Z	Z	B	m	Alpheus platydactylus Coutière, 1897	
6	ANAMRIS	Anamathia rissoana	Z	Z	B	m	Anamathia rissoana (Roux, 1828)	
7	ANAPBIC	Anapagurus bicorniger	Z	Z	B	m	Anapagurus bicorniger A. Milne-Edwards & Bouvier,	
8	ANAPLAE	Anapagurus laevis	Z	Z	B	m	Anapagurus laevis (Bell, 1845)	
9	ARISFOL	Aristaeomorpha foliacea	F	ARIST Aris 1	B	m	Aristaeomorpha foliacea (Risso, 1827)	
10	ARITANT	Aristeus antennatus	F	ARIST Arist 1	B	m	Aristeus antennatus (Risso, 1816)	
11	ATELROT	Atelecyclus rotundatus	Z	Z	B	0	Atelecyclus rotundatus (Olivi, 1792)	
12	BATYMAR	Bathynectes maravigna	F	PORT	B	m	Bathynectes maravigna (Prestandrea, 1839)	c1
13	BATYSUP	Bathynectes superbus	Z	Z	B	m	Bathynectes maravigna (Prestandrea, 1839)	c1
14	BRANSEX	Brachynotus sexdentatus			B		Brachynotus sexdentatus (Risso, 1827)	MT
15	CALAGRA	Calappa granulata	F	CAL Cal 2	B	m	Calappa granulata (Linnaeus, 1758)	
16	CALATUE	Calappa tuerkayana			B		Calappa tuerkayana Pastore, 1995	LM
17	CALCTUB	Calcinus tubularis	Z	Z	B	m	Calcinus tubularis (Linnaeus, 1767)	
18	CALOCOR	Calocarides coronatus			B	m	Calocarides coronatus (Trybom, 1904)	
19	CALOMAC	Calocaris macandreae	Z	Z	B	m	Calocaris macandreae Bell, 1846	
20	CARISTE	Caridion steveni	F	HIPPOL	B	0	Caridion steveni Lebour, 1930	
21	CHLOGRA	Chlorotocus crassicornis	Z	Z	B	m	Chlorotocus crassicornis (A. Costa, 1871)	
22	CORYCAS	Corystes cassivelaunus			B		Corystes cassivelaunus (Pennant, 1777)	SB
23	CRANSPP	Crangon sp.	F	CRANG	B	m	Crangon J.C. Fabricius, 1798	
24	DARDARR	Dardanus arrosor	Z	Z	B	m	Dardanus arrosor (Herbst, 1796)	
25	DARDCAL	Dardanus calidus	Z	Z	B	m	Dardanus calidus (Risso, 1827)	
26	DARDSPP	Dardanus spp.			B		Dardanus Paulson, 1875	SB

27	DEOARA	Deosergestes arachnipodus			B		Deosergestes arachnipodus (Cocco, 1832)	LM
28	DICAMAY	Dicranodromia mayheuxi	Z	Z	B	m	Dicranodromia mahieuxii A. Milne-Edwards, 1883	
29	DORHTHO	Dorhynchus thomsoni	Z	Z	B	m	Dorhynchus thomsoni Wyville & Thomson, 1873	c2
30	DORILAN	Dorippe lanata	Z	Z	B	m	Medorippe lanata (Linnaeus, 1767)	
31	DORITHO	Dorhynchus thomsoni	Z	Z	B	m	Dorhynchus thomsoni Wyville & Thomson, 1873	c2
32	DROMPER	Dromia personata	F	DROM Drom 1	B	m	Dromia personata (Linnaeus, 1758)	
33	EBALCRA	Ebalia cranchi	Z	Z	B	0	Ebalia cranchii Leach, 1817	
34	EBALNUX	Ebalia nux	Z	Z	B	m	Ebalia nux A. Milne-Edwards, 1883	
35	ERGACLO	Ergasticus clouei	Z	Z	B	m	Ergasticus clouei A. Milne-Edwards, 1882	
36	ETHUMAS	Ethusa mascarone	Z	Z	B	m	Ethusa mascarone (Herbst, 1785)	
37	EUCHLIG	Euchirograpsus liguricus	Z	Z	B	m	Euchirograpsus liguricus H. Milne-Edwards, 1853	
38	EUPHKRO	Euphausia krohni			B eu		Euphausia krohni (Brandt, 1851)	LM
39	EUPHSPP	Euphausiidae			B eu	m	Euphausiidae Dana, 1852	
40	EURYASP	Eurynome aspera	Z	Z	B	m	Eurynome aspera (Pennant, 1777)	
41	FUNCWOO	Funchalia woodwardi	F	PEN	B	m	Funchalia woodwardi Johnson, 1868	
42	GALADIS	Galathea dispersa	Z	Z	B	m	Galathea dispersa Bate, 1859	
43	GALAINT	Galathea intermedia	Z	Z	B	m	Galathea intermedia Liljeborg, 1851	
44	GALANEX	Galathea nexa	Z	Z	B	m	Galathea nexa Embleton, 1834	
45	GENNELE	Gennadas elegans	F	ARIST	B	m	Gennadas elegans (S.I. Smith, 1882)	
46	GERYLON	Geryon longipes	F	GER Ger 2	B	m	Geryon longipes A. Milne-Edwards, 1882	
47	GONERHO	Goneplax rhomboides (=	Z	Z	B	m	Goneplax rhomboides (Linnaeus, 1758)	
48	HOMAVUL	Homarus vulgaris	F	NEPH Hom 1	B	m	Homarus gammarus (Linnaeus, 1758)	
49	HOMOBAR	Homola barbata	Z	Z	B	m	Homola barbata (J.C. Fabricius, 1793)	
50	HYMPSPP	Hymenopenaeus sp.	Z	Z	B	m	Hymenopenaeus Smith, 1882	
51	ILIANUC	Ilia nucleus			B		Ilia nucleus (Linnaeus, 1758)	SB
52	INACCOM	Inachus communissimus	Z	Z	B	m	Inachus communissimus Rizza, 1839	
53	INACDOR	Inachus dorsettensis	Z	Z	B	m	Inachus dorsettensis (Pennant, 1777)	
54	INACPAR	Inachus parvirostris			B		Inachus parvirostris (Risso, 1816)	SB
55	INACSPP	Inachus spp.			B		Inachus Weber, 1795	SB, LM e
56	INACTHO	Inachus thoracicus	Z	Z	B	m	Inachus thoracicus P. Roux, 1830	
57	JAXENOC	Jaxea nocturna			B	m	Jaxea nocturna Nardo, 1847	
58	LATRELE	Latreillia elegans			B		Latreillia elegans Roux, 1830	SB, LM e
59	LATRSPP	Lattreillia			B		Latreillia Roux, 1830	
60	LIGUENS	Ligur ensiferus	Z	Z	B	m	Ligur ensiferus (Risso, 1816)	
61	LISSCHI	Lissa chinagra	Z	Z	B	m	Lissa chiragra (J.C. Fabricius, 1775)	
62	LOPOTYP	Lophogaster typicus			B	0	Lophogaster typicus M. Sars, 1857	
63	MACRLIN	Macropodia linaresi	Z	Z	B	m	Macropodia linaresi Forest & Zariquiey-Alvarez, 1964	
64	MACRLON	Macropodia longipes	Z	Z	B	m	Macropodia longipes (A. Milne-Edwards & Bouvier,	
65	MACRROS	Macropodia rostrata	F	MAJI	B	m	Macropodia rostrata (Linnaeus, 1761)	
66	MACRSPP	Macropodia spp.			B		Macropodia Leach, 1814	SB
67	MAJACRI	Maja crispata	F	MAJI Maja	B	m	Maja crispata Risso, 1827	

68	MAJAGOL	Maja goltziana			B		Maja goltziana d'Oliveira, 1888	MT
69	MAJASQU	Maja squinado	F	MAJI Maja 1	B	m	Maja squinado (Herbst, 1788)	
70	MCPIARC	Liocarcinus arcuatus	F	PORT Lioc 3	B	m	Liocarcinus navigator (Herbst, 1794)	
71	MCPICOR	Liocarcinus corrugatus		Zariquiey	B	m	Liocarcinus corrugatus (Pennant, 1777)	
72	MCPIDEP	Liocarcinus (Macropipus)	F	PORT Lioc 4	B	m	Liocarcinus depurator (Linnaeus, 1758)	
73	MCPIMAC	Liocarcinus maculatus	F	PORT Lioc	B	m	Liocarcinus maculatus (Risso, 1827)	
74	MCPIPUB	Necora (Macropipus) puber	F	PORT Neco 1	B	m	Necora puber (Linnaeus, 1767)	
75	MCPITUB	Macropipus tuberculatus	F	PORT Macro 1	B	m	Macropipus tuberculatus (Roux, 1830)	
76	MCPIVER	Liocarcinus vernalis			B		Liocarcinus vernalis (Risso, 1827)	SB e MT
77	MEGANOR	Meganyctiphanes norvegica			B eu	m	Meganyctiphanes norvegica (M. Sars, 1857)	
78	MONDCOU	Monodaeus couchii			B		Monodaeus couchii (Couch, 1851)	MT
79	MUNICUR	Munida curvimana	Z	Z	B	m	Munida curvimana A. Milne-Edwards & Bouvier, 1894	
80	MUNIINT	Munida intermedia	Z	Z	B	m	Munida intermedia A. Milne-Edwards & Bouvier, 1899	
81	MUNIIRI	Munida iris	Z	Z	B	m	Munida rutllanti Zariquiey-Alvarez, 1952	
82	MUNIPER	Munida perarmata (=	Z	Z	B	m	Munida tenuimana G.O. Sars, 1872	c3
83	MUNIRUG	Munida rugosa	Z	Z	B	m	Munida rugosa (J.C. Fabricius, 1775)	
84	MUNISPP	Munida	Z	Z	B	m	Munida Leach, 1820	
85	MUNITEN	Munida tenuimana	Z	Z	B	m	Munida tenuimana G.O. Sars, 1872	c3
86	NEPRNOR	Nephrops norvegicus	F	NEPH Neph 1	B	m	Nephrops norvegicus (Linnaeus, 1758)	
87	OPLOSPP	Oplophoridae	Z	Z	B	m	Oplophoridae Dana, 1852	
88	PAGIERE	Paguristes eremita			B	m	Paguristes eremita (Linnaeus, 1767)	
89	PAGUALA	Pagurus alatus	Z	Z	B	m	Pagurus alatus (J.C. Fabricius, 1775)	
90	PAGUCUA	Pagurus cuanensis			B	m	Pagurus cuanensis Bell, 1845	
91	PAGUEXC	Pagurus excavatus	Z	Z	B	m	Pagurus excavatus (Herbst, 1791)	
92	PAGUFOR	Pagurus forbesii	Z	Z	B	m	Pagurus forbesii Bell, 1845	
93	PAGUPRI	Pagurus prideauxi	Z	Z	B	m	Pagurus prideaux Leach, 1815	
94	PAGUSPP	Pagurus spp.			B		Pagurus Fabricius, 1775	SB, LM e
95	PALIELE	Palinurus elephas	F	PALIN Palin 1	B	m	Palinurus elephas (J.C. Fabricius, 1787)	
96	PALIMAU	Palinurus mauritanicus	F	PALIN Palin 3	B	m	Palinurus mauritanicus Gruvel, 1911	
97	PALISPP	Palinurus	F	PALIN	B	m	Palinurus Weber, 1795	
98	PANDPRO	Pandalina profonda	F	PANDL	B	m	Pandalina profunda Holthuis, 1946	
99	PAPANAR	Parapandalus narval	F	PANDL	B	m	Plesionika narval (J.C. Fabricius, 1787)	
100	PAPELON	Parapenaeus longirostris	F	PEN Parap 1	B	m	Parapenaeus longirostris (Lucas, 1846)	
101	PARAFER	Parasquilla ferussaci			B st		Parasquilla ferussaci (Roux, 1830)	MT
102	PAROCUV	Paromola cuvieri	F	HOM Par 1	B	m	Paromola cuvieri (Risso, 1816)	
103	PARTANG	Partenope angulifrons	Z	Z	B	m	Derilambrus angulifrons (Latreille, 1825)	
104	PARTMAC	Parthenope macrochelos	Z	Z	B	m	Spinolambrus macrochelos (Herbst, 1790)	
105	PARTMAS	Parthenope massena	Z	Z	B	m	Parthenopoides massena (Roux, 1830)	
106	PARTSPP	Parthenopoides			B		Parthenopoides Miers, 1879	LM e MT
107	PASIMUL	Pasiphaea multidentata	F	PASI Pasi 1	B	m	Pasiphaea multidentata Esmark, 1866	
108	PASISIV	Pasiphaea sivado	F	PASI Pasi 2	B	m	Pasiphaea sivado (Risso, 1816)	

109	PASISPP	Pasiphaea spp.			B		Pasiphaea Savigny, 1816	LM e MT
110	PENAKER	Penaeus kerathurus	F	PEN Pen 1	B	m	Melicertus kerathurus (Forsskål, 1775)	
111	PERCGRA	Periclimenes granulatus	Z	Z	B	m	Periclimenes granulatus Holthuis, 1950	
112	PHILECH	Philoceras echinulatus	F	CRANG	B	m	Philocheras echinulatus (M. Sars, 1861)	
113	PILUSPI	Pilumnus spinifer	Z	Z	B	m	Pilumnus spinifer H. Milne-Edwards, 1834	
114	PILUVIL	Pilumnus villosissimus	Z	Z	B	m	Pilumnus villosissimus (Rafinesque, 1814)	
115	PINOPIN	Pinnotheres pinnotheres	Z	Z	B	m	Nepinnotheres pinnotheres (Linnaeus, 1758)	
116	PISAARN	Pisa armata	Z	Z	B	m	Pisa armata (Latreille, 1803)	
117	PISANOD	Pisa nodipes	Z	Z	B	m	Pisa nodipes (Leach, 1815)	
118	PISASPP	Pisa spp.			B		Pisa Leach, 1814	SB
119	PISILON	Pisidia longicornis	Z	Z	B	m	Pisidia longicornis (Linnaeus, 1767)	
120	PLESACA	Plesionika acanthonotus	Z	Z	B	m	Plesionika acanthonotus (S.I. Smith, 1882)	
121	PLESANT	Plesionika antigai	Z	Z	B	m	Plesionika antigai Zariquiey-Alvarez, 1955	
122	PLESEDW	Plesionika edwardsii	F	PANDL Plesio	B	m	Plesionika edwardsii (Brandt, 1851)	
123	PLESGIG	Plesionika gigliolii	Z	Z	B	m	Plesionika gigliolii (Senna, 1903)	
124	PLESHET	Plesionika heterocarpus	F	PANDL Plesio	B	m	Plesionika heterocarpus (A. Costa, 1871)	
125	PLESMAR	Plesionika martia	F	PANDL Plesio	B	m	Plesionika martia (A. Milne-Edwards, 1883)	
126	PLESSPP	Plesionika spp.			B		Plesionika Bate, 1888	SB e LM
127	POLBHEN	Polybius henslowi	F	PORT	B	m	Polybius henslowii Leach, 1820	
128	POLCTYP	Polycheles typhlops	Z	Z	B	m	Polycheles typhlops Heller, 1862	
129	PONPNOR	Pontophilus norvegicus	Z	Z	B	m	Pontophilus norvegicus (M. Sars, 1861)	
130	PONPSPI	Pontophilus spinosus	F	CRANG	B	m	Pontophilus spinosus (Leach, 1815)	
131	PONTCAT	Pontocaris cataphractus	Z	Z	B	m	Aegaeon cataphractus (Olivi, 1792)	
132	PONTLAC	Pontocaris lacazei	F	CRANG Pont	B	m	Aegaeon lacazei (Gourret, 1887)	
133	PROCEDU	Processa edulis	F	PROC Proc 2	B	m	Processa edulis edulis (Risso, 1816)	
134	PROCMED	Processa canaliculata	F	PROC Proc 1	B	m	Processa canaliculata Leach, 1815	
135	PROCNOU	Processa nouveli	F	PROC	B	m	Processa nouveli Al-Adhub & Williamson, 1975	
136	PROCSPP	Processa spp.			B		Processa Leach, 1815	SB, LM e
137	PSEUCER	Pseudosquillopsis cerisii			B st		Pseudosquillopsis cerisii (Roux, 1828)	LM
138	RICHFRE	Richardina fredericii	Z	Z	B	0	Richardina fredericii Lo Bianco, 1903	
139	RISSDES	Rissoides desmaresti	F	SQUIL	B st	0	Rissoides desmaresti (Risso, 1816)	
140	RISSPAL	Rissoides pallidus	F	SQUIL	B st	m	Rissoides pallidus (Giesbrecht, 1910)	
141	ROCHCAR	Rochinia carpenteri	Z	Z	B	m	Rochinia carpenteri (Thomson, 1873)	
142	SCYLARC	Scyllarus arctus	F	SCYL Scylr 1	B	m	Scyllarus arctus (Linnaeus, 1758)	
143	SCYLLAT	Scyllarides latus	F	SCYL Scyld 1	B	m	Scyllarides latus (Latreille, 1803)	
144	SCYLPYG	Scyllarus pygmaeus	F	SCYL Scylr 2	B	m	Scyllarus pygmaeus (Bate, 1888)	
145	SERGARC	Sergestes arcticus	Z	Z	B	m	Eusergestes arcticus (Krøyer, 1855)	
146	SERGROB	Sergestes robustus	Z	Z	B	m	Sergia robusta (S.I. Smith, 1882)	
147	SERGSAR	Sergestes sargassi (= henseni)	Z	Z	B	m	Allosergestes sargassi (Ortmann, 1893)	
148	SOLOMEM	Solenocera membranacea	F	SOLENO	B	m	Solenocera membranacea (Risso, 1816)	
149	SQUIMAN	Squilla mantis	F	SQUIL Squil 5	B st	m	Squilla mantis (Linnaeus, 1758)	

150	STENSPI	Stenopus spinosus			B		Stenopus spinosus Risso, 1827	SB
151	SICYCAR	Sicyonia carinata			B		Sicyonia carinata (Brünnich, 1768)	LM
152	THAMPOI	Thalamita poissonii	Y	Y	B	0	Thalamita poissonii (Audouin, 1826)	
153	XANTCOU	Medaeus (Xantho) couchi	Z	Z	B	m	Monodaeus couchi (Couch, 1851)	
154	XANTPIL	Xantho pilipes			B		Xantho pilipes A. Milne-Edwards, 1867	MT

Notes:

c1: The specie *Bathynectes maravigna* has two codes **BATYMAR** and **BATYSUP** (*Bathynectes superbus* is considered non valid species);

c2: The specie *Dorhynchus thomsoni* has two codes **DORHTHO** and **DORITHO** because of wrong input;

c3: The specie *Munida tenuimana* has two codes **MUNIPER** and **MUNITEN** because *Munida perarmata* is a synonym of *Munida tenuimana*;

List of Cephalopods

	Medits Code	Scientific Name	Source	Reference	CATFAU	CODLON	Valid Name	Species added by
1	ABRAVER	Abralia veranyi	F	ENOP	C	0	Abralia verany (Rüppell, 1844)	
2	ABRIMOR	Abraliopsis morisii	F	ENOP	C	0	Abraliopsis morisii (Vérany, 1839)	LM
3	ALLOMED	Alloteuthis media	F	LOLIG Allot 3	C	0	Alloteuthis media (Linnaeus, 1758)	
4	ALLOSPP	Alloteuthis spp.	F	LOLIG Allot	C	0	Alloteuthis Wülker, 1920	
5	ALLOSUB	Alloteuthis subulata	F	LOLIG Allot 2	C	0	Alloteuthis subulata (Lamarck, 1798)	
6	ANCOLES	Ancistrocheirus	F	ENOP	C	0	Ancistrocheirus lesueurii (d'Orbigny, 1842)	LM
7	ANCINIC	Ancistroteuthis	F	ONYCHO	C	0	Ancistroteuthis lichtensteinii (Férussac [in Férussac & d'Orbigny],	
8	ARGOARG	Argonauta argo	F	ARGO Argo 1	C	0	Argonauta argo Linnaeus, 1758	LM
9	BATISPO	Bathypolypus sponsalis	F	OCT Bath 2	C	0	Bathypolypus sponsalis (P. Fischer & H. Fischer, 1892)	
10	BRACRII	Brachioteuthis riisei	F	BRACHIO Bra.	C	0	Brachioteuthis riisei (Steenstrup, 1882)	
11	CHIRVER	Chiroteuthis veranii	F	CHIRO Chiro 1	C	0	Chiroteuthis veranii (Férussac, 1835)	LM
12	CHTESIC	Chtenopteryx sicula	F	CTENO Cteno	C	0	Chtenopteryx sicula (Vérany, 1851)	SB e LM
13	ELEDCIR	Eledone cirrhosa	F	OCT Eled 1	C	0	Eledone cirrhosa (Lamarck, 1798)	
14	ELEDMOS	Eledone moschata	F	OCT Eled 2	C	0	Eledone moschata (Lamarck, 1798)	
15	ELEDSPP	Eledone spp.	F	OCT Eled	C	0	Eledone Leach, 1817	
16	HETEDIS	Heteroteuthis dispar	F	SEPIOL	C	0	Heteroteuthis dispar (Rüppell, 1844)	
17	HISTBON	Histioteuthis bonnellii	F	HISTIO	C	0	Histioteuthis bonnellii (Férussac, 1835)	
18	HISTREV	Histioteuthis reversa	F	HISTIO	C	0	Histioteuthis reversa (Verrill, 1880)	
19	HISTSPP	Histioteuthis spp.	F	HISTIO	C	0	Histioteuthis d'Orbigny, 1841	
20	ILLECOI	Illex coindetii	F	OMMAS III 1	C	0	Illex coindetii (Vérany, 1839)	
21	ILLESPP	Illex	F	OMMAS III	C	0	Illex Steenstrup, 1880	
22	LOLIFOR	Loligo forbesi	F	LOLIG Lolig 2	C	0	Loligo forbesi Steenstrup, 1856	
23	LOLISPP	Loligo	F	LOLIG Lolig	C	0	Loligo Lamarck, 1798	
24	LOLIVUL	Loligo vulgaris	F	LOLIG Lolig 1	C	0	Loligo vulgaris Lamarck, 1798	
25	NEORCAR	Neorossia caroli	F	SEPIOL	C	0	Neorossia caroli (Joubin, 1902)	

26	OCTESIC	Octopoteuthis sicula	F	OCTO Oct 1	C	0	Octopoteuthis sicula Rüppell, 1844	LM
27	OCTODEP	Octopus defilippi	F	OCT Oct 10	C	0	Octopus defilippi Vérany, 1851	
28	OCTOMAC	Octopus macropus	F	OCT Oct 2	C	0	Octopus macropus Risso, 1826	
29	OCTOSAL	Octopus salutii	F	OCT Oct 23	C	0	Octopus salutii Vérany, 1839	
30	OCTOSPP	Octopus spp.	F	OCT Oct	C	0	Octopus Cuvier, 1797	
31	OCTOTET	Pteroctopus	F	OCT Pter 1	C	0	Pteroctopus tetracirrhus (Delle Chiaje, 1830)	
32	OCTOVUL	Octopus vulgaris	F	OCT Oct 1	C	0	Octopus vulgaris Cuvier, 1797	
33	OCYTTUB	Ocythoe tuberculata	F	OCY ocy 1	C	0	Ocythoe tuberculata Rafinesque, 1814	
34	ONYCBAN	Onychoteuthis banksi	F	ONYCHO	C	0	Onychoteuthis banksii (Leach, 1817)	
35	ONYCSPP	Onychoteuthis spp.	F	ONYCHO	C	0	Onychoteuthis Lichtenstein, 1818	
36	OPTOAGA	Opistoteuthis agassizii		FAUNA IBER	C	m	Opisthoteuthis calypso Villanueva, Collins, Sánchez e Voss, 2002	
37	PYROMAR	Pyroteuthis	F	ENOP	C	0	Pyroteuthis margaritifera (Rüppell, 1844)	LM
38	RONDMIN	Rondeletiola minor	F	SEPIOL	C	0	Rondeletiola minor (Naef, 1912)	
39	ROSSMAC	Rossia macrosoma	F	SEPIOL Ross 1	C	0	Rossia macrosoma (Delle Chiaje, 1830)	
40	SCAEUNI	Scaeurgus unicirrhus	F	OCT Scae 1	C	0	Scaeurgus unicirrhus (Delle Chiaje, 1841)	
41	SEPENEG	Sepietta neglecta	F	SEPIOL	C	0	Sepietta neglecta Naef, 1916	
42	SEPEOBS	Sepietta obscura	F	SEPIOL	C	0	Sepietta obscura Naef, 1916	
43	SEPEOWE	Sepietta oweniana	F	SEPIOL	C	0	Sepietta oweniana (d'Orbigny, 1841)	
44	SEPESPP	Sepietta spp.	F	SEPIOL	C	0	Sepietta Naef, 1912	
45	SEPIELE	Sepia elegans	F	SEP Sep 3	C	0	Sepia elegans De Blainville, 1827	
46	SEPIOFF	Sepia officinalis	F	SEP Sep 1	C	0	Sepia officinalis Linnaeus, 1758	
47	SEPIORB	Sepia orbignyana	F	SEP Sep 4	C	0	Sepia orbignyana Férussac, 1826	
48	SEPISPP	Sepia	F	SEP Sep 1	C	0	Sepia Linnaeus, 1758	
49	SEPOAFF	Sepiola affinis	F	SEPIOL	C	0	Sepiola affinis Naef, 1912	
50	SEPOINT	Sepiola intermedia	F	SEPIOL	C	0	Sepiola intermedia Naef, 1912	
51	SEPOLIG	Sepiola ligulata	F	SEPIOL	C	0	Sepiola ligulata Naef, 1912	
52	SEPOROB	Sepiola robusta	F	SEPIOL	C	0	Sepiola robusta Naef, 1912	
53	SEPORON	Sepiola rondeleti	F	SEPIOL	C	0	Sepiola rondeleti Leach, 1817	
54	SEPOSPP	Sepiola spp.	F	SEP	C	0	Sepiola Leach, 1817	
55	STOLLEU	Stoloteuthis leucoptera	F	SEPIOL	C	0	Stoloteuthis leucoptera (Verrill, 1878)	
56	TODASAG	Todarodes sagittatus	F	OMMAS	C	0	Todarodes sagittatus (Lamarck, 1798)	
57	TODIEBL	Todaropsis eblanae	F	OMMAS	C	0	Todaropsis eblanae (Ball, 1841)	

Annex 5.1 – Form for introducing new species into the FM list

Sheet for proposal of inclusion of new species and code					
Name of scientist:				Date:	
GSA:					
Proposed Code		Scientific name	Reference for scientific name description	Geographical position	Stratum
Genus	Specie				

Sheet to be send to:

prof. Giulio Relini
Centro di Biologia Marina
biolmar@unige.it

Annex 6 - Draft proposal for sampling otoliths and individual weight of Medits target species

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Objectives

The MEDITS meeting held in Nantes on 15-17 March 2011 established to increase the information recorded during the MEDITS survey, including the monitoring of new biological variables, as age of bony fish species coded G1 in the new list of target species, and individual weight of all the species coded G1 in the same list.

Age monitoring of bony fish, which implies otolith sampling, requires a common protocol to harmonise sampling technique, sample size, and information recording.

It is thus important to first identify the objectives of the new implementation.

Sampling otoliths can be aimed to:

1) estimate indices of abundance at age and monitoring of stock structure along the time;
2) monitor the spatial distribution of age groups;
3) use length at age data to estimate growth curves;
4) estimate structured survey indices to be used in tuning procedures for stock assessment;
5) use age data to estimate, in particular, the probability reaction norm of maturation (PRNM) i.e. the indicator n. 4 of the DCF.

Monitoring of individual weight can be aimed to:

1) estimate length-weight relationship of target species;
2) estimate growth curve in weight, if also otoliths are sampled;
3) estimate the condition factor of the sampled species as a welfare indicator of wild population;
4) use weight at length to estimate the ecosystem indicator that requires individual weight (as plarge in the DCF).

Sampling frame

A sampling protocol that enables the fulfilment of all these objectives is preferable, in terms of costs and sampling effort.

In general two different sampling strategies are applied when collecting otoliths:

1. length-stratified sampling in which a fixed number of otoliths are collected from each length class;
2. random sampling in which otoliths are collected from a subsample of fish taken for length measurements.

Both methods have pros and cons. The first method is generally used to build age-length-key (ALK) (Doubleday, 1981), to derive population structure by age, to estimate longevity and growth curves, because potentially provides good samples of otoliths across the whole length range. The second method known as ROS (random otolith sampling) (Patterson et al. 2001) provides a direct estimate of the age structure of the population, but may not be suitable for the development of growth curves if all age classes are not fully represented. On the other hand the growth curve derived from analysis of otolith samples collected with the ALK method might not really reflect the growth curve of the population (Bettoli, 2000), given for example the selectivity or catchability effects of the gear used in the survey. However, when otolith sample sizes are small, or the randomness of otolith samples is a concern, the ALK method may work better.

According to a study of Mandado and Vasquez (2011) on the effects of sampling strategy on VPA results, it was concluded that a stratified sampling is preferable to a random one. Also results from Chih (2009b) support the view that the ALK sampling method is more efficient than the ROS method when otolith samples are used for the determination of age composition and growth curves.

In general, otolith sample sizes are considerably smaller than length sample sizes, thus according to Chih (2009a, 2009b) age frequency distributions or growth curves estimated from otolith samples need to be re-weighted by the length frequency distribution for length samples. The results showed that the reweighted growth curves constructed from ALK samples were more precise and accurate than growth curves obtained from ROS data for all sample sizes examined, because the reweighted ALK growth curves resulted in a lower variability of growth parameters and thus provided greater accuracy and precision in predicting mean lengths at age. In addition reweighing removed the effects of non-random sampling but retained the more accurate information of age at length.

Baroth et al. (2004) investigating the long term trend in the maturation reaction norm of two cod stocks were using random but stratified samples by length, so that comparable number of fish are taken for each 1-cm length class which ensures a wide length range can be covered without increasing too much the sample size.

Sampling requirements and size

The considerations above let lean towards the ALK sampling, that is also the one adopted in the trawl surveys carried out in Europe, like in Evohe and IBTS. The possibility of combining the ALK sampling with reweighing techniques will be considered at a future stage.

In the IBTS manual of protocols (AA.VV., 2010b) the following general recommendations in samplings age according to the ALK method are reported:

- for the smallest size groups, that presumably contain only one age group, the number of otoliths per length class may be reduced, conversely more otoliths per length are required for the larger length classes;
- targets should be set to ensure that data are collected from the entire survey area;
- sex, maturity and weight data should be reported for all the target species for which age data are collected, maturity stages should be reported;
- participants are encouraged to collect age samples also from other commercially important species and any other species deemed important to the DCF.

The optimum number of otoliths per length class cannot be given in a universal form.
A description of the optimum sample size of age readings and length measurements dependent on a universal cost function is given in Oeberst (2000). The analyses showed that the necessary number age readings in a length class depend on (AA.VV., 2011):

- the portion of the length class within the length frequency,
- the maximum variance of the portions of the age-groups within the length class.

The table 1 below gives for BITS (AA.VV., 2011) the minimum number of otoliths by length class.

Table 1 - Minimum number of otoliths by length class in BITS survey (AA.VV., 2011).

Criterion	Sample size
With probably only one age-group (age-group 0, 1)	2 to 5

With probably more than on age-group	
Portion of the length class less than 5%	10
Portion of the length class more than 5%	20

According to Mandado and Vasquez (2011) a sample of 20 otoliths in a stratified sampling by length class was considered the optimum for a species with 30-40 length classes.

Experiences gathered in the DCF for samplings of commercial catches in Italian GSAs evidenced an acceptable coefficient of variations (around 5%) when sampling 5 otoliths by sex per length class (0.5 or 1 cm depending on the species).

The number of individuals suggested in the IBTS survey protocols (AA.VV., 2010a, b) for the same species as in MEDITS, or for species with comparable number of size classes, can be taken into consideration as a first approximation. In addition, the requirements for the calculation of the indicator n. 4 of DCF, for which a number of 100 otoliths per age class (possibly by sex) can be considered suitable for the indicator estimate, should be also taken into account.

In the following table 2, a sample size is proposed for the MEDITS species coded as G1 in the new list of target species (Report of the Medits Coordination Meeting in Nantes, 15-17 March 2011).

Table 2 - Sample size proposed for the MEDITS species coded as G1 in the new list of target species.

Species	length class	sample size	sex	Remarks
Hypothesis 1 *Merluccius merluccius*	1 cm	8 otoliths	by sex	for undetermined only 8 individuals per length class
Hypothesis 2 *Merluccius merluccius*	1 cm	5 otoliths 10 otoliths	undetermined by sex	a larger numbers for adults given the wider range of expected ages
Hypothesis 1 *Mullus barbatus*	0.5 cm	12 otoliths	by sex	for undetermined only 12 individuals per length class
Hypothesis 2 *Mullus barbatus*	0.5 cm	6 otoliths 14 otoliths	undetermined by sex	a larger numbers for adults given the wider range of expected ages
Hypothesis 1 *Mullus surmuletus*	0.5 cm	12 otoliths	by sex	for undetermined only 12 individuals per length class
Hypothesis 2 *Mullus surmuletus*	0.5 cm	6 otoliths 14 otoliths	undetermined by sex	a larger numbers for adults given the wider range of expected ages
Solea vulgaris	1	all	all	the occurrence of the species is supposed to be low
*Engraulis encrasicolus**	0.5 cm	10 20 otoliths	undetermined by sex	a larger numbers for adults given the wider range of expected ages
*Sardina pilchardus**	0.5 cm	10 20 otoliths	undetermined by sex	a larger numbers for adults given the wider range of expected ages

*to be decided as these species are the target of MEDIAS survey.

It is expected that for the species in table 2 the number of otoliths required for the estimation of indicator n.4 in the DCF should be fulfilled (for this indicator neither juveniles nor older individuals are relevant).

It is recommended that otoliths are collect by each haul (e.g. 1-2 per haul). This would avoid autocorrelation in the sample (e.g. individuals belonging to the same school). The procedure of re-measuring the fish, weighing, estimating of sex, maturity stage and the cutting of otoliths might be made most efficient at one work-procedure for each individual in the above-mentioned sequence. Otolith are then dried stored for later age determination.

Consequently, the number of fish selected for estimating of individual weight, sex, maturity stage and cutting of otoliths are equal.

According to the protocols used in the Evohe survey or in the IBTS surveys there are three possibilities for obtaining age information for a length class if an age distribution is missing for that length class (AA.VV. **NS-IBTS indices calculation procedure)**:

- if length is less than a minimum predefined length, the age is set to age 1 in first quarter and 0 in all other quarters;
- if length is between minimum length and maximum predefined length, then age is set to the nearest ALK either at a length class before or at a length class after the one which misses an ALK; if there is one below and one after the length class at equal distance in length, a mean is taken.
- if the length is larger than max length, the age is set to the plus group.

Estimates of abundance indices at age

After the age distribution is allocated to the length distribution, the age based indices are calculated. The precision of the ALK can be estimated using the method of Baird (1983) or Oeberst (2000).

In the estimates of the abundance indices at age it is necessary, in a first phase, to compute the average numbers at length and associated variances.

The mean stratified standardization formulas by Souplet (1996) will be used for the computation of average numbers at length and associated variances by stratum (formulas (1) and (2) below) and for the total area (formulas (3) and (4) below):

$$\bar{x}_{k,j} = \frac{\sum_{h=1}^{H} x_{h,k,j}}{\sum_{h=1}^{H} A_{h,k}} \quad (1)$$

$$V(\bar{x}_{k,j}) = \frac{1}{H-1} \sum_{h=1}^{H} A_{h,k} \left(\frac{x_{h,k,j}}{A_{h,k}} - \bar{x}_{k,j} \right)^2 \quad (2)$$

$$I_j = \sum_{k=1}^{K} W_k * \bar{x}_{k,j} \quad (3)$$

$$V(I_j) = \sum_{k=1}^{K} \frac{W_k^2 S(\bar{x}_{h,j})^2}{\sum_{h=1}^{H} A_{h,k}} (1 - f_k) \quad (4)$$

where:

$x_{h,k,j}$ is the number of individuals in the haul *h* of the stratum *k* and length class *j*;

$A_{h,k}$ is the swept area of haul *h* in stratum *k;*

$\bar{x}_{k,j}$ is the average number at length *j* in the stratum *k;*

$V(\bar{x}_{k,j})$ is the variance of the average number at length *j* in the stratum *k;*

W_k is the stratum weight calculated as the area of stratum *k* divided by the GSA area;

I_j is the abundance index of the length class *j*;

$V(I_j)$ is the variance of the abundance index of the length class;

f_k is the finite population correction factor.

In a second phase, when building the age-length key, the computation of the proportions at age *i* per length class *j* and associated variances is computed as:

$$p_{i,j} = \frac{n_{i,j}}{n_j} \quad (5)$$

$$V(p_{i,j}) = \frac{p_{i,j}(1 - p_{i,j})}{n_j} \quad (6)$$

where :

$n_{i,j}$ is the number of otoliths of age *i* in the length class *j*;

n_j is the total number of otolith in the length class *j*;

$p_{i,j}$ is the proportion of age *i* in the length class *j;*

$V(p_{i,j})$ is the variance of the proportion of age *i* in the length class *j.*

In a third phase, the computation of mean numbers at age and the associated variances are computed. The mean numbers at age are given by :

$$I_i = \sum_{j=1}^{J} I_j * p_{i,j} \quad (7)$$

and the associated variance is:

$$V(I_i) = \sum_{j=1}^{J} \left[V(I_j) p_{i,j}^2 + I_j^2 V(p_{i,j}) + V(p_{i,j}) V(I_j) \right] \quad (8)$$

where

I_i is the abundance index of the age class *i* and $V(I_i)$ its variance.

These computations are done by sex and the total age composition is given for each age *i* by:

$$Itot_i = Ima_i + Ife_i \quad (9)$$

its variance is:

$$V(Itot_i) = V(Ima_i) + V(Ife_i) \quad (10)$$

and the sampling being independent on sex the covariance is not considered.

In case of ROS sampling frame were taken into consideration, the approach of two-stage sampling or cluster sampling should be adopted, considering a random sample of *n* clusters (hauls) and a random subsample for age of m_i fish from a total of M_i individual fish for length in a cluster *i* (haul) (e.g. Aanes S. and M. Pennington, 2003; Pennington et al., 2002)

Individual weight sampling

For the aged fish, individual weight, sex and maturity should also been recorded. Regarding the sampling for individual weight the sampled fish will be the same as for age. The sample size will be set as in the hypothesis 2 in table 2 in case the hypothesis 1 will be selected.

Regarding the G1 species that will not be aged the sample size for individual weight will be set according to a similar framework as for the aged species. The precision of the body weight will be 0.1 grams.

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Annex 7 – TE file format (proposal)

This table will be filled in only for specimens (already entered in TC) for which individual measures have been collected

Name	Type*	Range	Comments
TYPE_OF_FILE	2A	TE	Fixed value
COUNTRY	3A	See Annex I	ISO Code
AREA	2N	See **Annex ???**	GFCM Code
VESSEL	3A	See Annex I	MEDITS Code
YEAR	4N		E.g. 2000
HAUL_NUMBER	3N	1 to 999	One series by vessel/year
GENUS	4A	See Annex XV	Following the Reference List
SPECIES	3A	See Annex XV	Following the Reference List
LENGTH_CLASSES_CODE	1A	m, 0, 1	Type of classes: m: 1 mm; 0: 0.5 cm; 1: 1 cm
SEX	1A	M, F, I, N	M: male; F: female; I: indetermined; N: not determined
NO_PER_SEX_MEASURED_IN_SUB_SAMPLE_FOR_OTOLITH	6N	1 to 999999	Number of individuals of the above sex measured in the sub-sample and lenght class for otolith
LENGTH_CLASS	4N	1 to 9999	Identifier: lower limit of the class in mm; e.g. 30.5-31 cm ->305 (LENGTH_CLASS_CODE:0); 30-31 cm ->300 (LENGTH_CLASS_CODE:1)
MATURITY	1N	0 to 4	0: not determined; 1: immature; 2: maturing; 3: mature or spawning; 4: post-spawning. See Annexes VIII and IX
MATSUB	1A	See Annexes VIII and IX	Sub-stages of maturity from A to E
INDIVIDUAL_WEIGHT	6N	0 to 999999	Only for the species in List G1. See **Annex** ???
NO_PER_SEX_MEASURED_IN_SUB_SAMPLE_FOR_WEIGHT	6N	1 to 999999	Number of individuals of the above sex measured in the sub-sample for individual weight
OTOLITH_SAMPLED	2A	Y or N for Teleosts and NR for the other species	NR: not requested; for species in G1 list see **Annex ???**
NO_PER_SEX_MEASURED_IN_SUB_SAMPLE_FOR_AGEING	6N	1 to 999999	Number of individuals of the above sex measured in the sub-sample for ageing
OTOLITH_READ	2A	Y or N for Teleosts and NR for the other species	NR: not requested; Y: otolith read; N: otolith not read
AGE	4N	0 to 99	Also decimal number for age (e.g. 10.5);
OTOLITH_CODE	35A	[Country][GSA][Vessel][Year][Haul][Genr_Spec][Stage][Sex][Length]	ITA10PEC2012100MULL_BAR2AM110

Legend for the TE file:

A alphabetic field
N numerical field
NR species for which aging is not requested
Before the type of the field there is the number of digit allowed for the field (e.g. 2N: numeric field with length 2)

Annex 8 – Collected data on maturity stages

Available photos by maturity stage, sex and species (each colour is associated to a contributor)

Legend

GSA 11 – Sardinian seas
GSA 17 – Northern Adriatic sea
GSA 10a and GSA18 – Central Tyrrhenian and Southern Adriatic Sea
GSA 19 – Western Ionian Sea
GSA 9 – Ligurian and North Tyrrhenian Sea
GSA 10b – Southern Tyrrhenian

M= macroscopic photos;
H= histological photos.

	females									
	Stage 1		Stage 2a		Stage 2b		Stage 3a		Stage 3b	
SPECIES	M	H	M	H	M	H	M	H	M	H
Eledone cirrhosa										
Eledone moschata										
Illex coindetti										
Loligo vulgaris										
Octopus vulgaris										
Sepia officinalis										
Loligo forbesi										
Todaropsis eblanae										
Todarodes sagittatus										

	males									
	Stage 1		Stage 2a		Stage 2b		Stage 3a		Stage 3b	
SPECIES	M	H	M	H	M	H	M	H	M	H
Eledone cirrhosa										
Eledone moschata										
Illex coindetti										
Loligo vulgaris										
Octopus vulgaris										
Sepia officinalis										
Loligo forbesi										
Todaropsis eblanae										
Todarodes sagittatus										

Bony fish

	females													
	Stage 1		Stage 2a		Stage 2b		Stage 2c		Stage 3		Stage 4a		Stage 4b	
SPECIES	M	H	M	H	M	H	M	H	M	H	M	H	M	H
Aspitrigla cuculus														
Boops boops														
Citharus linguatula														
Eutrigla gurnardus														
Helicolenus dactylopterus														
Lepidorhombus boscii														
Lophius budegassa														
Lophius piscatorius														
Merluccius merluccius														
Micromesistius poutassou														
Mullus barbatus														
Mullus surmuletus														
Pagellus acarne														
Pagellus bogaraveo														
Pagellus erythrinus														
Sparus pagrus														
Phycis blennoides														
Solea vulgaris														
Spicara flexuosa														
Spicara smaris														
Trachurus mediterraneus														
Trachurus trachurus														
Trigla lucerna														
Trigloporus lastoviza														
Trisopterus minutus capelanus														
Zeus faber														
Scomber japonicus														

Bony fish

	males													
	Stage 1		Stage 2a		Stage 2b		Stage 2c		Stage 3		Stage 4a		Stage 4b	
SPECIES	M	H	M	H	M	H	M	H	M	H	M	H	M	H
Aspitrigla cuculus														
Boops boops														
Citharus linguatula														
Eutrigla gurnardus														
Helicolenus dactylopterus														
Lepidorhombus boscii														

Lophius budegassa	
Lophius piscatorius	
Merluccius merluccius	
Micromesistius poutassou	
Mullus barbatus	
Mullus surmuletus	
Pagellus acarne	
Pagellus bogaraveo	
Pagellus erythrinus	
Sparus pagrus	
Phycis blennoides	
Solea vulgaris	
Spicara flexuosa	
Spicara smaris	
Trachurus mediterraneus	
Trachurus trachurus	
Trigla lucerna	
Trigloporus lastoviza	
Trisopterus minutus capelanus	
Zeus faber	
Scomber japonicus	

Elasmobraches

	females									
	Stage 1		Stage 2		Stage 3a		Stage 3b		Stage 4	
SPECIES	M	H	M	H	M	H	M	H	M	H
Centrophorus granulosus										
Centrophorus sp.										
Chimaera monstrosa										
Dalatias licha										
Dasyatis centroura										
Dasyatis pastinaca										
Dipturus nidarosiensis										
Dipturus oxyrhinchus										
Etmopteus spinax										
Galeus melastomus										
Heptranchias perlo										
Hexanchus griseus										
Leucoraja circularis										

Myliobatis aquila										
Oxynotus centrina										
Pteromiylaeus bovinus										
Raja alba										
Raja asterias										
Raja brachyura										
Raja clavata										
Raja miraletus										
Raja polystigma										
Scyliorhinus canicula										
Squalus blanivillei										
Torpedo marmorata										
Torpedo torpedo										

	males									
Elasmobraches	**Stage 1**		**Stage 2**		**Stage 3a**		**Stage 3b**		**Stage 4**	
SPECIES	M	H	M	H	M	H	M	H	M	H
Centrophorus granulosus										
Centrophorus sp.										
Chimaera monstrosa										
Dalatias licha										
Dasyatis centroura										
Dasyatis pastinaca										
Dipturus nidarosiensis										
Dipturus oxyrhinchus										
Etmopteus spinax										
Galeus melastomus										
Heptranchias perlo										
Hexanchus griseus										
Leucoraja circularis										
Myliobatis aquila										
Oxynotus centrina										
Pteromiylaeus bovinus										
Raja alba										

Raja asterias
Raja brachyura
Raja clavata
Raja miraletus
Raja polystigma
Scyliorhinus canicula
Squalus blanivillei
Torpedo marmorata
Torpedo torpedo

Crusatceans

	females													
	Stage 1		Stage 2a		Stage 2b		Stage 2c		Stage 2d		Stage 2e		Stage 3	
SPECIES	M	H	M	H	M	H	M	H	M	H	M	H	M	H
Aristaeomorpha foliacea														
Aristeus antennatus														
Nephrops norvegicus														
Parapenaeus longirostris														
Palinurus elephas														

	males													
	Stage 1		Stage 2a		Stage 2b		Stage 2c		Stage 2d		Stage 2e		Stage 3	
SPECIES	M	H	M	H	M	H	M	H	M	H	M	H	M	H
Aristaeomorpha foliacea														
Aristeus antennatus														
Nephrops norvegicus														
Parapenaeus longirostris														
Palinurus elephas														

Maturity stage, sex and species that still need documentation

Bony fish	females	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Aspitrigla cuculus	**stages 2a, 2c**	**all stages**
Boops boops	**complete scale**	**complete scale**
Citharus linguatula	**stages 2c, 3, 4a**	**all stages**
Eutrigla gurnardus	**stages 1, 2a, 2b, 2c,4a, 4b**	**all stages**
Helicolenus dactylopterus	**stages 1, 3, 4b**	**all stages**
Lepidorhombus boscii	**complete scale**	**stadio 4b**
Lophius budegassa	**stages 4a, 4b**	**all stages**
Lophius piscatorius	**stages 2a, 2b, 2c, 3, 4a, 4b**	**all stages**
Merluccius merluccius	**complete scale**	**complete scale**
Micromesistius poutassou	**stage 4b**	**all stages**
Mullus barbatus	**stage 1**	**all stages**
Mullus surmuletus	**stages 1, 2a, 2c, 4a**	**all stages**
Pagellus acarne	**stages 1, 2a, 2b, 2c, 4a**	**all stages**
Pagellus bogaraveo	**stages 1, 2a,3, 4a, 4b**	**all stages**
Pagellus erythrinus	**stage 4a**	**all stages**
Sparus pagrus	**all stages**	**all stages**
Phycis blennoides	**stages 2b, 4a, 4b**	**all stages**
Solea vulgaris	**complete scale**	**all stages**
Spicara flexuosa	**stages 1, 2a, 2c, 4b**	**all stages**
Spicara smaris	**stages 1, 2b, 4a, 4b**	**all stages**
Trachurus mediterraneus	**stage 2c**	**all stages**
Trachurus trachurus	**complete scale**	**all stages**
Trigla lucerna	**stages 1, 4a, 4b**	**all stages**
Trigloporus lastoviza	**stages 1, 2a, 2b, 2c, 3, 4b**	**all stages**
Trisopterus minutus capelanus	**stages 1, 2b, 3, 4b**	**all stages**
Zeus faber	**stage 2a**	**all stages**
Scomber japonicus	**stages 1, 2a, 2b**	**all stages**

	males	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Aspitrigla cuculus	**stages 2a, 2c, 3**	**all stages**
Boops boops	**complete scale**	**complete scale**
Citharus linguatula	**stages 2a, 2b, 2c, 3, 4a, 4b**	**all stages**
Eutrigla gurnardus	**stages 2a, 2b, 2c, 3, 4a, 4b**	**all stages**
Helicolenus dactylopterus	**stages 1, 2a, 2b**	**all stages**
Lepidorhombus boscii	**stage 2c**	**stage 4b**
Lophius budegassa	**stage 4a**	**all stages**
Lophius piscatorius	**stages 2b, 4a, 4b**	**all stages**
Merluccius merluccius	**complete scale**	**all stages**
Micromesistius poutassou	**stages 2b, 3, 4a, 4b**	**all stages**
Mullus barbatus	**stages 1, 2a, 4b**	**all stages**
Mullus surmuletus	**stages1, 2a,2c**	**all stages**
Pagellus acarne	**stages 1, 2a, 2b, 2c, 4a, 4b**	**all stages**
Pagellus bogaraveo	**stages 1, 2b, 3, 4a, 4b**	**all stages**
Pagellus erythrinus	**stages 1, 2a, 2b, 4b**	**all stages**
Sparus pagrus	**all stages**	**all stages**
Phycis blennoides	**stages 3, 4a, 4b**	**all stages**
Solea vulgaris	**all stages**	**all stages**
Spicara flexuosa	**stages1, 2a, 2b, 2c, 3, 4b**	**all stages**
Spicara smaris	**stages 1, 2a, 2b, 4a, 4b**	**all stages**

Trachurus mediterraneus	stages 1, 2a	all stages
Trachurus trachurus	stages 1, 2b, 4a	all stages
Trigla lucerna	stages 1, 2c, 4a, 4b	all stages
Trigloporus lastoviza	stages 1, 2a, 2b, 2c, 3, 4b	all stages
Trisopterus minutus capelanus	stages 1, 2b, 2c, 3, 4a, 4b	all stages
Zeus faber	stages2b, 3, 4a, 4b	all stages
Scomber japonicus	stages1, 2a, 2b, 4b	all stages

Elasmobrachs	females	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Centrophorus granulosus	all stages	all stages
Centrophorus sp.	stage 2	all stages
Chimaera monstrosa	stages 3b, 4	all stages
Dalatias licha	stage 3b	all stages
Dasyatis centroura	all stages	all stages
Dasyatis pastinaca	all stages	all stages
Dipturus nidarosiensis	stage 3b	stages 1, 3a,3b, 4
Dipturus oxyrhinchus	complete scale	all stages
Etmopteus spinax	complete scale	stadi 3b, 4
Galeus melastomus	complete scale	stages 3a, 3b, 4
Heptranchias perlo	stages 2, 3a, 3b, 4	all stages
Hexanchus griseus	stages 2, 3a, 3b, 4	all stages
Leucoraja circularis	stages 3a, 3b, 4	all stages
Myliobatis aquila	stages 3a, 3b	all stages
Oxynotus centrina	stages 2, 3b	all stages
Pteromiylaeus bovinus	stages 2, 3a, 3b, 4	all stages
Raja alba	stages 1, 2, 3a, 3b	all stages
Raja asterias	complete scale	all stages
Raja brachyura	stages 2, 4	all stages
Raja clavata	complete scale	all stages
Raja miraletus	complete scale	all stages
Raja polystigma	stages 2, 3a, 4	all stages
Scyliorhinus canicula	stage 4	all stages
Squalus blanivillei	stage 4	stages 3a, 3b, 4
Torpedo marmorata	stages 2, 4	all stages
Torpedo torpedo	stages 1, 4	all stages

	males	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Centrophorus granulosus	stages 1, 2, 3b, 4	all stages
Centrophorus sp.	stages 2,3a, 4	all stages
Chimaera monstrosa	stages 2,3b, 4	all stages
Dalatias licha	stage 4	all stages
Dasyatis centroura	stages 2, 3a, 3b, 4	all stages
Dasyatis pastinaca	stages 2, 3a, 3b, 4	all stages
Dipturus nidarosiensis	stages 3b, 4	stages 3a, 3b, 4
Dipturus oxyrhinchus	complete scale	all stages
Etmopteus spinax	stages 3a, 4	stages 2, 3a, 3b, 4
Galeus melastomus	complete scale	stadio 4
Heptranchias perlo	all stages	all stages
Hexanchus griseus	all stages	all stages
Leucoraja circularis	stages 3a, 3b, 4	all stages
Myliobatis aquila	all stages	all stages
Oxynotus centrina	stages 2, 3a, 4	all stages
Pteromiylaeus bovinus	all stages	all stages

Raja alba	**all stages**	**all stages**
Raja asterias	**stage 3b**	**all stages**
Raja brachyura	**stage 4**	**all stages**
Raja clavata	**complete scale**	**all stages**
Raja miraletus	**stage 3b**	**all stages**
Raja polystigma	**complete scale**	**all stages**
Scyliorhinus canicula	**complete scale**	**all stages**
Squalus blanivillei	**complete scale**	**stages 3a, 4**
Torpedo marmorata	**stages 1, 2, 3a, 4**	**all stages**
Torpedo torpedo	**stage 4**	**all stages**

Crustaceans	females	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Aristaeomorpha foliacea	**complete scale**	**complete scale**
Aristeus antennatus	**complete scale**	**complete scale**
Nephrops norvegicus	**complete scale**	**stages 1, 2d, 2e, 3**
Parapenaeus longirostris	**complete scale**	**complete scale**
Palinurus elephas	**complete scale**	**complete scale**
	males	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Aristaeomorpha foliacea	**stages 2a, 2b,2e**	**stages 1, 2a, 2b, 2e**
Aristeus antennatus	**stages 2b, 2e**	**stages 2b, 2e**
Nephrops norvegicus	**stages 2a, 2b, 2e, 3**	**all stages**
Parapenaeus longirostris	**all stages**	**all stages**
Palinurus elephas	**all stages**	**all stages**

Cephalopods	females	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Eledone cirrhosa	**complete scale**	**all stages**
Eledone moschata	**stage 3b**	**all stages**
Illex coindetti	**complete scale**	**all stages**
Loligo vulgaris	**stage 3b**	**all stages**
Octopus vulgaris	**complete scale**	**complete scale**
Sepia officinalis	**stage 3b**	**all stages**
Loligo forbesi	**stages 2a, 2b, 3b**	**all stages**
Todaropsis eblanae	**stage 3b**	**all stages**
Todarodes sagittatus	**stage 3b**	**all stages**
	males	
SPECIES	**Missing macroscopic photos**	**Missing microscopic photos**
Eledone cirrhosa	**stage 3b**	**all stages**
Eledone moschata	**complete scale**	**all stages**
Illex coindetti	**complete scale**	**all stages**
Loligo vulgaris	**complete scale**	**all stages**
Octopus vulgaris	**complete scale**	**complete scale**
Sepia officinalis	**complete scale**	**all stages**
Loligo forbesi	**stage 3b**	**all stages**
Todaropsis eblanae	**stage 3b**	**all stages**
Todarodes sagittatus	**stage 3b**	**all stages**