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**GENERAL FISHERIES COMMISSION  
FOR THE MEDITERRANEAN  
COMMISSION GÉNÉRALE DES PÊCHES  
POUR LA MÉDITERRANÉE**



**GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN**

**SCIENTIFIC ADVISORY COMMITTEE (SAC)**

**Thirteenth Session**

**Marseille, France, 7-11 February 2010**

**REPORT OF THE FIRST TRANSVERSAL EXPERT MEETING  
ON THE STATUS OF ELASMOBRANCHES  
IN THE MEDITERRANEAN AND BLACK SEA  
Sfax-Tunisia, 20-22 September 2010**

**OPENING, ARRANGEMENT OF THE MEETING AND ADOPTION OF THE AGENDA**

1. The First Expert meeting on the status of Elasmobranches in the Mediterranean and Black Sea was held in the “Institut National des Sciences et Technologies de la Mer (INSTM)”, Sfax (Tunisia), from 20 to 22 September 2010. The meeting was attended by 17 experts from seven GFCM members namely Algeria, France, Greece, Italy, Morocco, Tunisia and Turkey as well as by participants from IUCN and RAC/SPA. The list of participants is given in **Appendix 2** to this report.
2. Mr Bradai, the coordinator of the meeting, thanked the participants for attending the meeting. He further underlined the importance of the purposes to be addressed.
3. Ms Hernandez, GFCM Secretariat, welcomed the participants and thanked, also on behalf of Mr Srour (acting GFCM Executive Secretary), the INSTM for hosting this meeting highlighting the GFCM interest on the issue of Elasmobranches. She recalled the terms of Reference of the Workshop as adopted by the Scientific Advisory Committee during its twelfth session in Budva (Montenegro, January 2009), resuming the mid-term working programs approved during the SAC meeting to establish a framework in which this Workshop would have been undertaken.

4. Mr Nicolás Tonachella, from GFCM Secretariat, was appointed as rapporteur for the meeting.
5. The agenda was adopted without changes (Appendix 1).

## **REVIEW OF THE AVAILABLE INFORMATION ON ELASMOBRANCHES IN THE MEDITERRANEAN AND THE BLACK SEA**

### **Information by national experts**

6. A total of 8 presentations on the available information of elasmobranches in the Mediterranean and the Black Sea were presented. Presentations were also focused on the taxonomy, spatial distribution, critical habitats and status of the species. Titles and related discussion of the presentations are provided below. Abstracts are added as Appendix 1 and the full presentations in PDF format are posted in the meeting page of the GFCM web site.

### **Elasmobranches of the Mediterranean and Black Sea: Status, ecology and biology Bibliographic analysis (by M. N. Bradai, B. Saidi & S. Enajjar)**

#### **Abstract:**

The presentation dealt with a working document elaborated for the workshop that gathered data available on elasmobranches in the Mediterranean and Black Sea through 576 papers. The authors compiled information on taxonomy, distribution, status, statistics, fisheries, bycatch, biologic and ecologic parameters on age and growth, food and feeding habits reproductive biology and stock assessment and conservation measures. This bibliographic analysis highlighted mainly the following points:

- Works were concentrated mainly in the western Mediterranean. Few works concerned endangered species and those of the GFCM priority list.
- Much systematic confusion persists for some species and some others are doubtful
- The IUCN red list shows clearly the vulnerability of elasmobranchs and the lack of data
- A decline in cartilaginous fish species landings has been observed while fishing effort has generally increased.
- The Bycatch has become one of the issues to be considered in any development of fisheries. Elasmobranchs, considered mainly as bycatch, are very sensitive given their particular biological characteristics.
- A standardisation of methods and expression of results on the biology should be generalised in the whole Mediterranean.
- Papers on biologic parameters concern few species primarily in the occidental and central Mediterranean areas

Following the diagnostic of the situation of elasmobranchs in the Mediterranean and Black Sea, research programmes and conservation Priorities for Sharks are as follow: developing research programs on systematic, general biology, ecology and population dynamics for species of concern; identifying and mapping critical habitat; taking action to collect reliable statistics on landings and Bycatch of elasmobranchs; initiating fisheries management strategies for commercially exploited species; developing research programs to reduce elasmobranchs bycatch; developing National Action Plans for sharks.

**The importance of the identification field guide to chondrichthyan species to assess the exploitation rates and the conservation status in the Mediterranean basin (A. J. Abella, M. Barone, C. Mancusi & F. Serena)**

**Abstract:**

Taxonomy is a particular field of science, with legal protocols but there are still controversies regarding the designation of certain species, the attribution of families or cases of synonymy. This applies also for the Mediterranean, in particular for sharks and rays. Considering that many advances in the taxonomic knowledge of sharks, skates and rays in the Mediterranean have been made in recent years, it was considered necessary to proceed to its updating. A new species identification guides for sharks and rays were published with figures and biological information on the different species and paying particular attention on the distinctive characters of each single species useful for species identification. In this note, it is discussed the importance of a proper identification of the species aimed at a more sound assessment of the exploitation status of those species. Such activity is especially important because many of them the analyses of their status of conservation suggest they are threatened or endangered.

**Occurrence of the rare angular rough shark, *Oxynotus centrina* (Chondrichthyes: Oxynotidae) in the Greek Seas (V. Kousteni and P. Megalofonou)**

**Abstract:**

Three specimens of a rare shark species, the angular rough shark *Oxynotus centrina* (Linnaeus 1758) were incidentally caught in the Greek Seas. An adult female weighing 5020 g and reaching 790 mm in total length was captured with longline in Korinthiakos Gulf in June of 2010 at depth of 120 m. Two other females weighing 1649 and 1703 g and reaching 533 and 565 mm respectively, were caught with trawl fishery near the island of Psara, in October of 2008 at depth of 130 m. For each specimen morphometric measurements were taken, hepatosomatic and gonadosomatic indices were calculated. The smaller specimens had immature reproductive organs. On the contrary the largest one had mature ovaries with large yellow yolk oocytes and uteri in resting phase, which probably indicates that vitellogenesis does not proceed in parallel with gestation. Hepatosomatic indices ranged from 26.6 to 35.8 and gonadosomatic indices ranged from 0.4 to 8.1. The specimen found in the Korinthiakos Gulf is actually the first record of the species in this region, while it is also the largest angular rough shark ever recorded in the Greek waters and generally in the eastern Mediterranean Sea.

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**Occurrence of *Squalus megalops* in the Mediterranean Sea (S. Marouani, B. Saidi, A. Bouain & M. N. Bradai)****Abstract:**

Two species of the genus *Squalus* occurs in the Gulf of Gabès (southern Tunisia, central Mediterranean): the longnose spurdog *Squalus blainvillei* (Risso, 1827) and a short snout spurdog of the *Squalus megalops-cubensis* group. Morphometrical and meristic data along with genetic analysis (DNA Inter Simple Sequence Repeats markers and molecular Barcoding methods) support the assignation of this short snout spurdog to *Squalus megalops*.

The samples of *Squalus* were collected from the Gulf of Gabès between January and May 2009. Their morphometric characters were taken with dial calipers and they were categorized according to the criteria described and illustrated in Last et al., (2007). All measurements were expressed as a percentage of the total length (TL). All specimens were radiographed to count meristics and to determine the shape of upper jaw skeleton (palatoquadrate cartilages). The structure of the chondrocrania was determinate according to Muñoz-Chápuli and Ramos (1989). The terminal cartilages of claspers, called spur and claw by Leigh-Sharpe (1920), were described. The dermal denticles were obtained from the area anterior to the first dorsal spine, observed and photographed by scanning optic microscopy. For the ISSR analysis, eight primers are used. After PCR and based on the total band presence/absence, we obtained a triangular matrix of inter-individual genetic dissimilarity using the Rogers and Tanimoto's (1960) index, UPGMA cluster analysis of genetic dissimilarity matrix was carried out to construct a dendrogram using the program PHYLIP 3.6. female *S. blainvillei* 96 TL and female *S. megalops* 68.5 TL) were used in the molecular Barcoding method following Last et al., 2007. Both species, *S. Blainvillei* and *S. Megalops*, differed by many morphometric and meristic characters. In the ISSR study, UPGMA cluster analysis of Rogers and Tanimoto's (1960) dissimilarities revealed a clear separation of studied individuals in two clusters as it was shown using morphological ways. From the Barcoding method, we noted that the sequence of the Tunisian specimen of *S. blainvillei* appears as a separate cluster set apart from the other Australasian *Squalus* species and that of the Tunisian specimen of *S. megalops* is included in the *S. megalops* cluster, indicating its close affinity with the Australian *S. megalops*. ISSR and Barcoding ways resolve the ambiguity seen by using the morphological classification and showed the presence of two species of *Squalus* in the Gulf of Gabès (Southern Tunisia) *S. blainvillei* and *S. megalops* wich had a close affinity with the "true" Australian *S. megalops*. This revise will be more strength with further biological studies.

**Clarification of the status of *Dasyatis tortonesei* (A. Saadaoui, B. Saidi, M. N. Bradai)****Abstract:**

*Dasyatis tortonesei* was described by Capapé (1977) based on specimens collected off Tunisian coasts. Parasitological studies in the Gulf of Gabes distinguish monogeneans specific to *Dasyatis pastinaca* and to *D. tortonesei* (Neifer et al., 1998, 2000). However, the species are still confused with the common stingray *D. pastinaca* since the distinctive characters given by Capapé are not easily discernible. Recent observations on the stingrays of the Gulf of Gabès show the presence of *D. pastinaca* and a closely related species which could be *D. tortonesei* described by Capapé. Morphometric measurements, expressed in

percentage of the disc width, neurocranium shape and measurements, and meristic characters (vertebral, pectoral and pelvic-fin ray and tooth row counts) revealed that the two stingrays are distinct species. The statistical comparison of morphometric and meristic characters of the two species gave distinctive characters showing significant differences between *D. pastinaca* and the second species which likely described by Capapé as *D. tortonesei*.

**The Gulf of Gabès: A nursery area for several sharks (B. Saidi, M. N. Bradai & A. Bouain)**

**Abstract:**

Shark nurseries are habitats where females give birth to their young and where juveniles spend their early life history. Hypotheses concerning nurseries suggest that these provide the young a better source of food and protection against predation. Primary nurseries are habitats where parturition occurs and in which the young live for a short time and secondary nurseries are habitats in which juveniles are found after leaving the primary nursery and before reaching maturity. *Mustelus mustelus*, *M. punctulatus*, *Cacharhinus plumbeus* and *C. brevipinna* use the Gulf of Gabès as a year-round primary and secondary nursery, with juveniles remaining in it up to the size at maturity. Adult *M. mustelus* and *M. punctulatus* stay in the area around the year, a behavioural pattern possibly explained by their biology. Although adult *C. plumbeus* appeared during late spring and early summer in the area, adult *C. brevipinna* are too rare. Identification and conservation of essential fish habitat are an important tool to manage shark populations. However, little is known of the spatial distribution of juvenile sharks in nursery areas, and further research is required in this field to delimit nursery areas.

**RAC/SPA actions and planning to improve the status of elasmobranches in the Mediterranean through cooperation with the GFCM (D. Cebrian)**

**Abstract:**

According to the results of the red list evaluation of fishes by IUCN experts, many species of cartilaginous fishes have a threatened status or need their exploitation to be regulated in the Mediterranean. RAC/SPA engaged elasmobranches experts to verify the status of cartilaginous fish species found in the Mediterranean, worthy to figure in the Annexes II or III of the SPA/BD Protocol of the Barcelona Convention. It further undertook a consultation with an ad-hoc group of experts in 2009. Three species already listed were considered worthy to be kept in their actual listing; other four ones were proposed for listing in Annex II and other 26 were proposed to be added to the annexes. Amendments to the annexes II and III of the SPA/BD Protocol were finally adopted by the Barcelona Convention Parties last year, including most of the proposals. They also requested to update the scientific assessment and further evaluate the status of the following shark species listed in Annex III of the SPA/BD Protocol, with a view to consider at the next Meeting of the Contracting Parties the possible amendment of the SPA/BD Protocol for their inclusion in Annex II.

-Species under substantial evidence raising serious concerns about them: *Isurus oxyrinchus*, *Lamna nasus*, and *Leucoraja melitensis*

-Species with relative uncertainties at present regarding population levels and conservation status: *Sphyrna lewini*, *Sphyrna mokarran*, *Sphyrna zygaena*, *Leucoraja circularis* and *Rhinobatos spp.*

Besides, a review took place in 2009 to assess the implementation of the Action Plan for the Conservation of Cartilaginous Fishes in the Mediterranean Sea (UNEP(DEPI)/MED WG.331/Inf.13). An update of the implementation calendar for 2010-2013 was adopted by the Parties to the Barcelona Convention in 2009.

Furthermore, a regional overview and technical guidelines to improve national legislations and regulations concerning cartilaginous fish conservation and management, as well as guidelines and recommendations for reducing bycatch and incidental catches of cartilaginous fish were prepared. Both the guidelines on bycatch and the above species assessment might be improved through contributions by this meeting.

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**Status of sharks and rays in the Mediterranean and how they are being protected (F. Serena)****Abstract:**

The IUCN Species Survival Commission's Shark Specialist Group (SSG) has recently completed IUCN Red List assessments of all 1,044 known cartilaginous fish species. In 2007 71 of the 86 species in the Mediterranean were assessed – it has the largest percentage of threatened species compared to all other FAO areas: 42% (30 species) of cartilaginous fish are threatened, including 13% Critically Endangered, 11% Endangered, 13% Vulnerable. Another 18% are categorized as Near Threatened, and a quarter (26%) of species are Data Deficient. Only 14% of species were listed as being of Least Concern. Sharks and rays are an important component of all marine ecosystems. Their position in food webs, high catchability in fisheries and their low reproductive rates makes them sensitive indicators of the health of an ecosystem, particularly in multispecies fisheries such as those in the Mediterranean Sea. The unsustainable exploitation of many elasmobranchs species implies a need for a more systematic approach to the assessment of elasmobranchs. We will present actions currently used by Mediterranean countries to protect sharks and also highlight the limited knowledge of the status of many shark populations and the impact on unsustainable fishing effort on sharks and rays. Thanks to FAO 1998 guidelines for an International Plan of Action for the Conservation and Management of Sharks and Rays (IPOA – Sharks), today we have a diverse array of biodiversity conservation and marine resources management activities ongoing. Indeed responsible fishery practices have led to a change in the environmental strategic policy regarding fisheries with strong interest towards protecting the elasmobranch stocks. Our main objective should be an efficient monitoring of the elasmobranchs catches, in particular in such multispecies fisheries where sharks constitute an important fraction of the bycatch. It is expected that the countries that enforce their own Action Plans should guarantee a systematic assessment of the shark catches involved in the fisheries.

**GENERAL DISCUSSION ON EXPERTS PRESENTATIONS**

7. The participants underlined the meaning of the Field Identification Guides (FIG) for Elasmobranchs and emphasized the importance to compare morphological and genetic information (e.g. ELASMOMED project). The group also suggested developing easy methods (e.g. dichotomy guides) based on morphology to identify species on board of vessels.
8. The workshop pointed out the importance of the systematic issue, underlining the necessity to work together with other experts from the Mediterranean and Black Sea area.
9. The meeting recognized the necessity of a large knowledge on the presence of juveniles and gravid females of elasmobranchs species and the importance of collecting additional information on other biological parameters (i.e. size at first maturity). It was

stressed by the experts that such robust arguments are required to state the occurrence of a nursery ground. The workshop pointed out the importance of getting more data to restrict the areas to be protected (e.g. the southern area of the Gulf seems to be more important for sharks and rays compared to the northern one), eventually in order to create MPAs.

10. During the discussion it was stressed the importance of close synergies and collaborations to be undertaken between RAC/SPA and GFCM at regional scale in the upgrading of conservation plans for sharks and rays. It was noted by some participants that it would be desirable to design different binding management measures depending on the area (e.g. some species might be abundant in some areas and be rare in others). Some participants suggested specific regulation case by case by national authorities (some areas can be considered “reservoirs” for sharks in other deficient zones).
11. The group suggested to make the EU’s MEDITS (International Bottom Trawl Survey in the Mediterranean) a whole Mediterranean project (with all the countries from North Africa) in order to obtain a complete view of the Mediterranean and Black sea area. The group proposed to produce a poster with the collaboration of IUCN, FAO-GFCM and UNEP-RAC/SPA to spread around the expert network, stakeholders and everybody can be concerned.
12. The meeting also highlighted the need of data for “data deficient” species (starting with Barcelona Convention annex listing, RAC/SPA List and GFCM Priority species) and reaffirming also to get information on critical areas on a regional scale, proposing for this purpose the possibility of tagging/recapture studies on distribution of the species.

## **REVIEW OF THE AVAILABLE DATA ON BIOLOGY, ECOLOGY, FISHING ACTIVITIES AND POPULATION DYNAMICS**

### **Information by national experts**

13. A total of 7 presentations on the available data on biology, ecology, fishing activities and population dynamics of elasmobranchs in the Mediterranean and the Black Sea were presented. Titles and related discussion of the presentations are provided below.

### **Embryonic diapause for the common guitar fish *Rhinobatos rhinobatos* from the Gulf of Gabès (Central Mediterranean Sea) (S. Enajjar, B. Saïdi, M. N. Bradaï & A. Bouain)** **Abstract:**

The ovarian and gestation cycles of *Rhinobatos rhinobatos*, collected from the gulf of Gabès between 2002 and 2006, run concurrently. The gestation period lasted 10 to 12 months and one reproductive cycle per year occurred. Otherwise, it was noted that the gestation



period seemed to be divided in two phases. The first one lasted approximately 8 to 9 months. During this first period, the diameter and the mass of oocytes evolved slowly; the uterine content was formed only by eggs. The second phase lasted 3 to 4 months during which acceleration in vitellogenesis and in embryonic activity was observed. The ova reached the highest diameter and mass in this second phase and eggs evolved rapidly to embryos and foetuses. The first period can be considered as a phase of embryonic diapause and the second as a period of embryonic development. Diapause will be defined as a pause in the development of fertilized eggs or young embryos. The reason for these diapauses may be environmental. The pause allows embryos to be born when water temperature and conditions for juvenile growth are optimal (Simpfendorfer, 1992). This phenomenon was described for the first time in the Gulf of Gabès, elsewhere, it's signalled for the common guitar fish from the coast of Senegal.

**Elasmoit project - elements for the assessment and protection of elasmobranchs in the Italian seas (M. Barone, C. Mancusi, M. Bottaro, G. Relini & F. Serena)**

**Abstract:**

Taxonomy is a particular field of science, with legal protocols but there are still controversies regarding the designation of certain species, the attribution of families or cases of synonymy. This applies also for the Mediterranean, in particular for sharks and rays. Considering that many advances in the taxonomic knowledge of sharks, skates and rays in the Mediterranean have been made in recent years, it was considered necessary to proceed to its updating. A new species identification guides for sharks and rays were published with figures and biological information on the different species and paying particular attention on the distinctive characters of each single species useful for species identification. In this note, it is discussed the importance of a proper identification of the species aimed at a more sound assessment of the exploitation status of those species. Such activity is especially important because many of them the analyses of their status of conservation suggest they are threatened or endangered.

**The MEDLEM database: 30 years of data collection on large cartilaginous fishes in the Mediterranean basin (R. Baino, M. Barone, C. Mancusi & F. Serena)**

**Abstract:**

Following the previous reports on Medlem (GFCM meeting in Rome 2008 and Tunis 2009) this paper represents a further update of the analyses on the database that, up to now, reports more than 1000 records on Large Elasmobranchs in the Mediterranean. Main species are white shark and basking sharks, while in the last decades other species (i.e. thresher shark, bluntnose six-gill shark, devil ray and shortfin mako) are reported with a greater intensity also due to a higher consciousness on the importance of these species, consequential to the development of monitoring programs of the sea resources. Unfortunately some Mediterranean area are still lacking of information: above all the Eastern Basin, Alboran Sea and the southwestern Mediterranean Sea. From 1800 up to 1870 average recording is 2 specimens/year, then up to 1990 average recording growth to 5 specimens/year, mainly due to bibliographic sources. In the last 20 years the average recording has further increased to 22

specimens/year. The geographical distribution of the main species recorded are represented as well as some consideration on fishing gears and size structure for the area where most data are available, namely Adriatic Sea, Tyrrhenian Sea, Sicily Straits and Balearic Sea.

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**Monitoring pelagic and mid-water trawling fisheries in the northern Adriatic Sea: a focus on the elasmobranch bycatch (M. Bottaro, U. Scacco, A. Mazzola, O. Giovanardi, M. Ruffino & C. M. Fortuna)**

**Abstract:**

In compliance with the EC Regulation No. 812/2004, Italy is monitoring pelagic and mid-water trawling fisheries, in order to assess cetacean accidental catches. Since 2006 a dedicated research programme (BYCATCH), funded by the Italian General Directorate of Fishery and Aquaculture and coordinated by ISPRA and CoNISMa, carries out the scientific monitoring in the northern and central sectors of the Adriatic Sea (GFCM-GSA 17). Taking advantage of this activity, data on elasmobranchs are also recorded. So far a total of 17 species of cartilaginous fishes have been recorded. The most abundant being the *Squalus acanthias*, *Mustelus mustelus*, *Myliobatis aquila*, *Pteromylaeus bovinus*, and *Pteroplatytrygon violacea*. Others recorded species, also worth noting, include the *Alopias vulpinus*, *Carcharinus plumbeus* and *Prionace glauca*. Additional indirect photographic reports allowed to record landings of others large chondrichthyans, like the *Lamna nasus* and *Mobula mobular*. Our study is focused on both ecological and biological aspects. Information is collected on catches distribution, fish size, diet, reproduction and age. Gonadal samples are also routinely collected since the beginning of 2010 in order to carry out microscopic analysis and to provide accurate information on the maturity stages of the caught individuals. Moreover, based on the fishery data, stratified both by depth and area of fishing grounds, the depletion DeLury method has been used to provide raw estimates of abundances. Preliminary results showed some evidence of an impact by pelagic and mid-water trawling on elasmobranchs of different age and sexual maturity, and seem highlighting declining trends in abundance within the investigated bathymetrical strata. This type of data from a long-term monitoring programme are essential to plan management strategies aimed at reducing bycatch elasmobranch mortality.

**Elasmobranches species caught by demersal trawl fisheries in Gulf of Antalya, eastern Mediterranean. (M. C. Deval, İ. Saygu, O. Guven & G. Özgen)**

**Abstract:**

Commercial bottom trawl fishing in Gulf of Antalya is carried out in different depth zones (from 30 m to 600 m). In this study, 18 elasmobranches species (9 rays, 9 sharks) were registered as bycatch and discards resulting of 40 tows done similar to the commercial bottom trawl fishing, between September 2009 and August 2010 as monthly. These species are: *Raja clavata*, *Raja radula*, *Raja miraletus*, *Raja oxyrinchus*, *Dasyatis pastinaca*, *Gymnura altavela*, *Pteroplatytrygon violacea*, *Rhinobatus rhinobatus*, *Torpedo marmorata*, *Mustelus mustelus*, *Centrophorus granulosus*, *Squalus blainvillei*, *Scyliorhinus canicula*, *Galeus melastomus*, *Etmopterus spinax*, *Dalatias licha*, *Oxynotus centrina* and *Heptranchias perlo*. Our presentation has important and first results as the length-weight analysis, catch by unit effort (kg/h, number/h), and sex and size distribution according to depths of all ray species in the Gulf of Antalya (eastern Mediterranean).

**Elasmobranch du Maroc (I. Tai)****Abstract:**

Cette étude vise à dresser un inventaire des espèces de raies et de requins capturés le long des côtes marocaines et particulièrement en méditerranée. Les données de base proviennent à la fois des statistiques de débarquement et des campagnes de prospection par chalutage de fond. En effet, ce groupe d'espèce représente une part très importante dans la communauté benthique. Au Maroc ces ressources sont capturées accessoirement par les unités de pêche qui ciblent soit les espèces benthiques à haute valeur commerciale, soit l'espadon. Leur exploitation a connu une nette progression ces dernières années. Cette hausse des prises témoigne de l'intérêt croissant envers la pêche dirigée des élastombranches attribuables à l'émergence de marchés.

**Elasmobranch d'Algérie (C. Hamida)****Abstract:**

La pêche des élastombranches en Algérie est fortement accidentelle, elle est souvent le résultat de capture fortuite qui provienne de différents types d'engins de pêche utilisés en Algérie : la senne, le chalut, le trémail (dont l'unité de base est la nappe) et le palangre. Les requins rencontrés en Algérie sont recensés régulièrement depuis 1996, la liste actuelle reste non limitative. La liste exhaustive fait apparaître trente et une espèces appartenant aux douze familles suivantes: Hexanchidae, Cethorinidae, Sphyrnidae, Odontaspidae, Alopiidae, Lamnidae, Carcharhinidae, Triakidae, Scyliorhinidae, Squalidae, Oxynotidae, Echinorhinidae. La liste de la famille des Rajidae en Algérie reste incomplète, 15 espèces sont recensées sur les 17 signalés dans le bassin méditerranéen. Le caractère migratoire des élastombranches, nous amène à renforcer la coopération méditerranéenne, pour une meilleure connaissance des espèces afin d'assurer leur conservation et leur gestion à long terme.

**GENERAL DISCUSSION ON EXPERTS PRESENTATIONS**

14. The Workshop encouraged the GFCM to enhance the MEDLEM project and recommended the network of experts to contribute to this important initiative in order to gather as many data as possible.
15. According to the participants of the Workshop, the framework of BYCATCH programme (carrying out by the Italian government body of ISPRA) could be extended in a more regional scale to the whole Mediterranean and Black Sea, with the support of regional projects as those from GFCM. The group emphasized the need of a strong training campaign of identification of elasmobranch species in a mid-term period and the convenience of well trained observers on board.

16. Some of the participants highlighted the need of collaborative work with all the members to study the status of sharks and rays, considered as migratory group of fishes.

**IDENTIFICATION OF APPROPRIATE METHODOLOGIES AND APPROACHES TO ASSESS THE STOCKS OF SELECTED COMMERCIAL SPECIES AND REQUIRED ACTIONS FOR THE FOLLOWING YEARS**

17. The participants discussed on appropriate methodologies and approaches to assess the elasmobranchs stocks in the Mediterranean and Black Seas. One presentation and following speeches from the experts introduced the current methods being recently used worldwide highlighting pros and cons of them and advising to not focus only in one model for the stock assessment of sharks.

**Elasmobranchs stock assessment methods, a review (N. Tonachella & P. Hernandez)**  
**Abstract:**

The document reports the available methods utilized to assess the stock of cartilaginous fishes. It summarizes the main models of stock assessment used for sharks and rays, such as the common used Surplus Production Models, the Yield per Recruit Model, the peculiar Delay-Difference Model, and also the more complex Age-structured Models with a list of examples of application in literature. The review also presents the Ecological Risk Assessment as a smart tool to evaluate the vulnerability of elasmobranchs with lack of data.

18. Following up the discussion, the meeting debated about the setting of a list of priority species in terms of conservation urgency or data abundance according to the programme of work on elasmobranchs species proposed by the SAC meeting (Montenegro, January 2009) and endorsed by the GFCM Commission (Athens, Greece, 12-17 April 2010). For this purpose, all the experts proposed the creation of a provisional list of seven species chosen following the stated criteria. The species, belonging to both pelagic and demersal cartilaginous fishes were: *Prionace glauca*, *Raja clavata*, *Squalus acanthias*, *Squalus blainvillei*, *Rhinobatos cemiculus*, *Rhinobatos rhinobatos*, *Scyliorhinus canicula*. In order to better resume the characteristics of each species and to choice those to be further studied in the next step of the process (during the growth determination course and the stock assessment valid method to apply to cartilaginous fish in Mediterranean and Black Sea), the meeting drew on the basis of the meeting working document, a table with the basic information available and needed (see Appendix 3).
19. The group reviewed the ongoing programmes on elasmobranchs in the Mediterranean and Black Sea. The table in Appendix 4 presents the nine existing programmes at present. The IFREMER representative introduced the International Research Staff Exchange Scheme (IRSES) belonging to the programme “Marie Curie Actions” of the European Commission. The group suggested the use of these kinds of programmes as a

mean to facilitate the experts' exchanges and networking activities among member countries.

**ANALYSE APPROPRIATE MITIGATION METHODS FOR BY-CATCH REDUCTION** Mitigation measures and technologies developed outside the Mediterranean and currently used and employed by the regional fisheries management organizations

**General Discussion**

20. The IFREMER representative presented briefly a document prepared in the context of the Indian Ocean, in order to review all possible methods that could help the Reunion longline fishery to maintain catch target species level while simultaneously reduce interactions with undersized target species and the Threatened, Endangered and Protected (TEP) species (sharks, sea turtles, sea birds and marine mammals) and reduce their mortality after release. The document suggests practical mitigation options, mainly based on international experience that fishery managers should consider for the future. The mitigation options and measures are ranked and assessed qualitatively against a series of criteria. Some options could be implemented in a short term while others required more research to fully develop.
21. The participants suggested preparing a similar document adapted to the Mediterranean Sea. Among all the presented technical measures, the group in particular subscribed to the approach consisting in a special involvement of fishing industry (e.g. by training and disseminating information on the bycatch; implementation of an observer license for fishermen; setting a fishing effort limit; improving the log book system). The tables in Appendix 5 and 6 summarize the measures to mitigate bycatch and the time needed for the measures to be applied.
22. The participants discussed on the fact that there is no research on avoiding shark catches in Mediterranean and Black sea at present time, nevertheless, some measures applied to manage targeted stocks can be applied to reduce shark by-catch. The participants underlined the importance of further studies on this matter and stressed the fact that any solution would need to be considered carefully, on a case-by-case basis.
23. The group noted the paucity of ongoing studies in the Mediterranean and Black sea about this matter and encouraged to start working to apply methods examined outside the GFCM area. It was concluded to start with some of the well-known reduction methods as pilot studies to be applied in the short-term in particular concerned areas of the Mediterranean and Black sea.

## GENERAL CONCLUSIONS AND RECOMMENDATIONS

24. The meeting made the following general conclusions:

- The Scientific contributions have provided new insights and valuable information on the research being carried out in the different countries comprising some aspects of biology, taxonomy, fisheries and ecology of the species.
- There is still a remarkable lack of knowledge on biology and ecology of the elasmobranches in the Mediterranean and Black Sea, in particular on those species considered endangered by the IUCN Red List. Further studies should be focused on the species with less information available to date.
- A standardized protocol should be developed and adopted to promote the collection of basic data on elasmobranches species in the Mediterranean and Black Sea. FAO catch data only report official landings and therefore bycatch returned to the sea is not included. Existing protocols such as GFCM Task 1 and MEDLEM should be encouraged by the countries as a tool to gather this lack of information.
- After critical analysis of the literature and taking into account new published data on the systematic of elasmobranches, 86 species of elasmobranches were considered to occur in the Mediterranean Sea (49 sharks and 37 batoids). However, much confusion persists for some species and some others are doubtful. These species need more systematic revision.
- Only 11 species (about 12 % of the Mediterranean elasmobranches fauna) were the subject of age and growth studies (20 references in total). Data are scarce. The organization of a training course on age reading and growth parameters of the main elasmobranches species seems to be very urgent to enhance research on this field. Growth parameters are necessary for stock assessment studies.
- For the first Stock assessment meeting and the age readings training course foreseen to be held in 2011, seven species have been selected for consideration according to various criteria (existing data on age and growth, abundance, conservation status, economic value, knowledge of biological parameters). The selected species are *Prionace glauca*, *Raja clavata*, *Squalus acanthias*, *Squalus blainvillei*, *Rhinobatos cemiculus*, *Rhinobatos rhinobatos*, *Scyliorhinus canicula*.
- Different Stock Assessment methods have been discussed and the group decided to adopt various approaches: global as well as analytical models. A request for involvement with other RFMOs outside the Mediterranean, such as ICES and or ICCAT, has been proposed.
- The importance of protecting nurseries for elasmobranches has been highlighted with the objective of preserving breeding females and juveniles from the impact of fisheries. In the meeting three known critical areas have been put forward: one in the Gulf of Gabès (Tunisia), one in the gulf of Boncuk (Turkey) and one in the North Tyrrhenian Sea (Italy). Some other areas exist, but more research is needed for a clear

definition (for reference see the Work-Shop on Critical Habitat of Mediterranean Predators (CHOMP) of the 39th CIESM Congress where some areas of interest were marked).

- The recent inclusion of species in the amendment of Annexes II and III of the SPA/BD Protocol, as informed by the RAC/SPA representative, is an important step toward the conservation of elasmobranchs in the Mediterranean.
- After an overview and discussion on the practices and technical measures for bycatch reduction the group remarked the scarcity of test studies in the Mediterranean. Some measures applied to manage targeted stocks that have been applied outside the Mediterranean can be tested to prevent and reduce bycatch in the region.
- The group noticed that some simple measures proved to be worldwide effective (ban of wire tracers, nylon snoods, large circle hooks, De-hooker and line cutter devices and the complete equipment for turtle handling and release, mandatory onboard longliner, fleet communication program, handling and release good practices through informative campaigns) can be directly applied to the Mediterranean and Black sea without delay.
- All the participants agree to create a network of experts on elasmobranchs of the region that also could interact with group of experts in other areas of the world under the umbrella of the GFCM.
- A good stock assessment is essential to constantly update the Red List that IUCN-SSG annually produces.

25. The Workshop agreed on the following recommendations:

- Preparation of a draft of Proposal of practical options for mitigating bycatch for purse seiners, pelagic longline gears and trawlers in Mediterranean and Black Sea.
- Identifying and mapping critical areas (nurseries) at the national or regional level.
- Launch pilot studies on measures to reduce bycatch by fishing gears and fishing strategies adaptation and/or fishing areas exclusion. Some GFCM GSAs have been proposed as appropriate for development of pilot small scale implementation based on the the present experts knowledge of the fisheries acting and on the species occurring in those areas ;

For the following areas the meeting suggested to adopt the use of circle hooks and nylon snoods in part of the longline fleets to verify the reduction of the pelagic species bycatch:

- GSA 1 (Northern Alboran Sea); GSA 2 (Alboran Island) and GSA 3 (Southern Alboran Sea)
- GSA 5 (Balearic Islands)
- GSA 14 (Gulf of Gabès)



For the following areas the meeting agreed to propose applying fishing area closures of nursery grounds to trawling operation (considering this measure as the only real effective against the bycatch of elasmobranchs juveniles in critical areas):

- GSA 22 (Aegean Sea)
- GSA 14 (Gulf of Gabès)
- GSA 9 (North Tyrrhenian Sea)
- Initiate fisheries management strategies for commercially exploited species included in Annex III of the SPA/BD Protocol of the Barcelona Convention.
- Developing National legislation and National Action Plans for the conservation of elasmobranchs as recommended by the IPOA Sharks, as well as other action plans such as those of UNEP RAC/SPA.
- Include the bycatch data on the Task 1 data gathering under the standard GFCM protocol.
- Encourage for a more active participation of the GFCM countries in this type of workshops.
- Creation of a network of expert at regional scale for information exchanges in terms of scientific knowledge as well as for the research of funding sources (Regional Projects, EU Initiatives like Marie Curie, among others) on a coordinated Regional basis.
- Develop research programs on systematic, general biology, ecology and population dynamics for species of concern.
- The group stressed the importance of completing the Synopsis of sharks and scheduling the batoids of the world Synopsis, (at the moment in process of edition by the FAO publications Service), to allow the preparation of appropriate Field Identification Guides.

## **ADOPTION OF THE REPORT/RECOMMENDATIONS**

26. The Conclusions and Recommendations were adopted by the Workshop on 22nd of September 2010. The whole report was adopted after revisions and amendments by electronic correspondence within the next two weeks.

**Appendix 1****Agenda**

- 1. Opening, arrangement of the meeting and adoption of the Agenda**
- 2. Review of the available information on Elasmobranches in the Mediterranean and the Black Sea (Taxonomy, Spatial distribution, Critical habitats and Status of the species)**
- 3. Review of the available data and information on Biology, Ecology, Fishing Activities and Population Dynamics**
- 4. Identification of appropriate methodologies and approaches to assess the stocks of selected commercial species and required action for the following years. Consideration of establishing a regional network of expert dealing with this issue.**
- 5. Analyse appropriate mitigation methods for bycatch reduction. It is proposed take into account mitigation measures and technologies that have been developed outside the Mediterranean and that are currently used and employed by the Regional Fisheries Management Organizations.**
- 6 Any other matter (follow up of The medium working programme to improve Knowledge and assess the status of elasmobranches in the Mediterranean and the Black Sea)**
- 7 Conclusions and recommendations**
- 8 Adoption of the report**

## Appendix 2

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## Appendix 3

The following table summarizes the basic information available and needed for the proposed list of elasmobranches species.

Species name	IUCN status (red list 2007)	Distribution and relative abundance	Comercial value (yes/no)	Age and growth; biological parameters	Catch statistics
<i>Prionace glauca</i>	VU	Whole Mediterranean	YES	YES (VB growth param. & L50)	YES ( some countries)
<i>Raja clavata</i>	NT	Whole Mediterr.& Black Sea	YES	YES (VB growth param. & L50)	YES ( some countries)
<i>Squalus acanthias</i>	EN/ VU (Black sea)	Whole Mediterr.& Black Sea	YES	YES (VB growth param & L at 1 <sup>st</sup> maturity) in Black sea	YES ( some countries)
<i>Squalus blainvillei</i>	DD	Whole Mediterranean	YES	YES (VB growth param. & L50)	YES ( some countries)
<i>Rhinobatos cemiculus</i>	EN	South/East Medit.	YES	YES (VB growth param. & L50)	YES (some Southern countries, e.g. Tunisia)
<i>Rhinobatos rhinobatos</i>	EN	Whole Mediterranean	YES	YES (VB growth parameters)	YES ( some countries)
<i>Scyliorhinus canicula</i>	LC	Whole Mediterranean	Large specimens	YES (L50)	YES ( some countries)

## Appendix 4

Acronyme	Species	Country	Gear/Fishery	Scale	Period	Fundings	Organisation	Aims /Research areas
<b>Elasmoit</b>	Pelagic species	Italy	Trawlers, purse seine, artisanal fisheries	National	2009-2010	National Environment Ministry		Catch statistics; basic biological parameters; ecology
<b>MEDLEM</b>	Large specimen	Italy	Artisanal in particular	International	Permanent	Voluntary basis		International database; biological parameters; historical references
<b>IUCN</b>	Red list	International	all	International	Permanent	International		Assesment and Conservation status
<b>Field guide</b>	All species	International	all	International	In progress	FAO /Rac-spa		Taxonomy; Catch statistics; Conservation
<b>BYCATCH programme (ISPRA)</b>	Pelagic species	Italy	Longline, purse seine	National	2008-2010 Cont'	National Envrt ministry		Catch statistics; basic biological parameters; bycatch
<b>RAC/SPA Action plan</b>	Species listed in annexes 2 Barcelona conv.	21 Countries + EU	All fisheries	International	2010-2013	International +EU	UNEP RACSPA	Conservation
<b>Alop</b>	<i>Alopias sp.</i>	France	Trawler/Net/recreational	National	2010-2012	EU local council Fishery industry	Ifremer, IRD	Catch statistics; basic biological parameters; ecology; post release survival; genetics; bycatch
<b>DCF</b>	All fish (commercialised & BC)	EU	All gears	International	From 1994	EU	National research Institutions	Assessment
<b>ELASMOMED</b>	All cartilaginous fish	International	All gears	International	From 2003			

## Appendix 5

The following table ranks the measures against 6 criteria (Patterson and Tudman, 2009), the ranking system used is explained in the table caption.

Measures	Ability to reduce interactions	Ability to minimise level of discarding	Ability to improve survivorship	Technical feasibility to detect a response	Level of industry support	Impact on currently collected data	Groups affected by the measure
Spatial/temporal closure	++	NA	NA	++ LT	-	0	ALL
Circle hooks	++	++	++	++	++	0	ALL
Corrodible hooks	0	0	++	NA	-	0	ALL
Bait restriction / artificial bait	++	++	++	++	NA	0	ALL
Sleeping hook	0	++	++	+	NA	0	SHK,UNS
Reduction in soak time	++	++	++	NA	-	0	ALL
No Wire tracer <sup>1</sup>	0	++	++	NA	++	0	SHK,ST, MM
Rare earth metal	++	++	0	++	--	0	SHK,SB, ST,UNS, MM
Best handling practices (sea turtles)	0	0	++	++	++	0	ST
Handling and release equipment	0	0	++	++	++	0	ALL
No Lightstick and gear debris	++	++	0	++	--	0	SHK,ST, UNS
Offal and leftover bait management	++	++	0	++	++	0	SHK,MM
Fleet communication programmes	++	++	0	0	++	++	ALL
Training and information dissemination	0	0	0	0	++	++	ALL
Improvement of the logbook data	0	0	0	++	+	++	ALL
observer license for fishermen	0	0	0	0	UK	++	0

Measure options and rankings against criteria for sea turtles, sharks, seabirds, marine mammals.

++: very positive; +: positive; 0: no effect; - -: very negative; - : negative; UK effect unknown; LT: long term; NA: not applicable or impossible to reply. SHK: Sharks/rays; SB: Seabird; ST: Sea turtles; UNS: Unwanted sized target species; MM: Marine mammals (Source : Poisson, 2010<sup>1</sup>)

## Appendix 6

The following table is a timeframe for implementing the measures identified, it provides general recommendations about the options that could be implemented immediately versus those that required more research. A: measure able to be implemented without further analysis; B: The uncertainty of the measure can be reduced in a relatively short time through complementary tests; C: measure which requires more research to fully develop; D: the measure needs international enforcement (Source : Poisson, 2010<sup>1</sup> ).

<b>Measures</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Spatial/temporal closure</b>	<b>X</b>			<b>X</b>
<b>Fishing effort limit</b>	<b>X</b>			<b>X</b>
<b>Improvement of the logbook system</b>	<b>X</b>			<b>X</b>
<b>Training and information dissemination</b>	<b>X</b>			
<b>Observer license for fishermen</b>	<b>X</b>			
<b>Fleet communication programme</b>	<b>X</b>			
<b>Offal and leftover bait management</b>	<b>X</b>			
<b>Best handling practices (sea turtles)</b>	<b>X</b>			
<b>Best handling practices (sharks, seabirds, marine mammals)</b>			<b>X</b>	
<b>Handling and release equipment</b>	<b>X</b>			
<b>Circle hooks</b>		<b>X</b>		
<b>Corrodible hooks</b>	<b>X</b>			
<b>No lightstick and gear debris</b>	<b>X</b>			
<b>Bait restriction/artificial bait</b>		<b>X</b>		
<b>Reduction in soak time</b>		<b>X</b>		
<b>No Wire tracer<sup>1</sup></b>	<b>X</b>			<b>X</b>
<b>Sleeping hook</b>			<b>X</b>	
<b>Rare earth metal</b>			<b>X</b>	

<sup>1</sup> Poisson F., 2010. Development and sustainability of a monofilament swordfish longline fishery in the Southwestern Indian Ocean: A case study in Réunion Island (France) from 1994 to 2008. 150 p.. Department of Fisheries, Faculty of agriculture University of Kinki, Osaka, Japan.