

October 2009



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



GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

SCIENTIFIC ADVISORY COMMITTEE (SAC)

**Meeting of the Sub-Committees (SCSA, SCESS, SCMEE, SCSI)
Malaga, Spain, 30 November – 3 December 2009**

**REPORT OF THE TRANSVERSAL WORKSHOP ON SELECTIVITY
IMPROVEMENT AND BYCATCH REDUCTION*
Tunis, Tunisia, 23-25 September 2009**

* Available only in English

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OPENING AND ADOPTION OF THE AGENDA

1. The SCMEE/SCSA/SCCESS transversal Workshop on Selectivity improvement and bycatch reduction was held in the “Institut National des Sciences et Technologies de la Mer (mer-INSTM)”, Salammbô, (Tunisia), from 23 to 25 September 2009. The meeting was attended by 25 Experts from six6 GFCM country members namely Algeria, France, Italy, Malta, Morocco and Tunisia, as well as by representatives from GFCM partners. The list of participants is given in Appendix 2 to this report.
2. Mr Ridha Mrabet, General Director of INSTM thanked the participants for attending the meeting. He further presented the programme and achievements by INSTM with regard to the issues to be addressed by the meeting.
3. Mr. Abdellah Srour, GFCM Executive Secretary a.i, thanked, on behalf of Mr Hadjali Salem, Chairperson of GFCM, the INSTM for hosting this meeting and highlighted the GFCM interest on the issue of bycatch and incidental catches of species of conservation concern such as some commercial elasmobranches, in line with its policy toward sustainable fisheries. He also stressed the importance of improvements in selectivity and in bycatch reduction.
4. Mr Bradai, coordinator of the Sub-Committee on Marine Environment and Ecosystems (SCMEE) recalled the terms of Reference of the Workshop as adopted by the Scientific Advisory Committee during its eleventh session (Marrakech, 2008). He introduced the main objectives of the meeting and pointed out the need to progress on issues such as better assessing the status of bycatch and discard related to the Mediterranean and Black sea fisheries; defining a standard protocol for data collection of relevant information on bycatch in the Mediterranean fisheries and updating the available information on studies on mitigation measures for bycatch reduction.
5. Mr Alessandro Lucchetti and Mr Marck Dimech were appointed as rapporteurs for the meeting.
6. The agenda was adopted without changes (**Appendix 1**).

CURRENT STATUS OF BYCATCH AND DISCARD RELATED TO THE MEDITERRANEAN AND BLACK SEA FISHERIES

7. The Chair introduced the agenda items by giving some general information on the bycatch issue.

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Definition of bycatch concept

8. The participants discussed on the terminology of relevance to the issue of bycatch. Reference was made to the ongoing initiative by GFCM to update the glossary of scientific terms. This tool is still in progress and it is expected to be circulated among all participants during the SAC annual session. The meeting also asked to consider the FAO terminology as basic reference for this work.

9. The workshop reviewed different definitions of “bycatch” and recognised that most fishing operations, whether they employ towed or fixed gears, catch organisms that are not the primary target. Presently, there is no international standard definition of bycatch.

10. After discussion of issues and aspects which should be considered when defining the concept of bycatch, the meeting agreed on the following definition :

“The bycatch is the part of the catch taken together with the [authorised] target species. In a broad context, this includes all non-targeted catch including (by-product), discards, illegal and species of conservation concern (GFCM/SAC selectivity workshop 2009)”.

Evaluation of bycatch and fishing mortality for commercial species and threatened species

11. A total of 10 presentations on the status of knowledge of bycatch of species of conservation concern at national level were made and few case studies were presented. Presentations were also focused on the mitigation measures tested for the reduction of both bycatch and juveniles. Summaries and related discussion of the presentations are provided below.

Presentation 1

*Interaction of fishing gears with Loggerhead sea turtle, *Caretta caretta*, in the Gulf of Gabès (Tunisia).* Jribi I., Echwikhi K., Bouain A., Bradai M.N.

Abstract: The presentation reviewed the interaction between fishing activity and *Caretta caretta* in the Gulf of Gabès, which is considering one of the most important foraging area of the Mediterranean sea. It stressed the problem of bycatch in bottom trawl, longlines and in fixed nets targeting sharks. The presentation concluded that mitigation measures are necessary for the conservation of turtle population.

12. The meeting stressed the fact that haul duration in bottom trawls and soak time in fixed nets are very important parameters affecting the turtle mortality. The following action were qualified as of relevance:

- Promoting the reduction of fishing effort through spatial and time closures;
- Reducing the post release mortality through awareness campaigns;
- Collecting biological data to understand the impact of bycatch;
- Developing and implementing national marine turtles management and conservation plan;
- The high of gillnet is an important parameter we have to consider, not only the length;
- Reducing the haul duration and assess the fishing parameters associated to catch and mortality rates;

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- In the longline, studying the effect of different baits and hooks sizes and form on the catch and mortality rates;
- Reducing the soak time in the gillnet fisheries.

Presentation 2

Non-target bycatch in the Maltese longline fishery. Burges E., Dimech M., Darmanin M., Muscat E., Raine H., Schembri P.J.

Abstract: This study was related to non-target bycatch from the Maltese Bluefin Tuna longline fleet. It examines the effect of various environmental and spatiotemporal factors on non-target species catch rates. After the field observations were made, the result of this study pointed out the need for the continual implementation of mitigation measures to minimise the impacts of fishing activities on threatened non-target species in the Mediterranean.

Presentation 2 bis

*First Estimates of Elasmobranch and seaturtle bycatch from the Maltese bluefin tuna (*Thunnus thynnus*) longline fishery).* Dimech M., Burgess E., Caruana R., Darmanin M., Muscat E., Schembri P.J.

Abstract: The presentation focused on the non-target bycatch from the pelagic longline fleet as the cumulative effect of all fishing activities may have a considerable impact on species of conservation concern. The estimated catches for non-target species for the bluefin tuna season are 4500 per year of sea turtles *Caretta caretta* and 500 per year of devil ray (*Mobula mobular*). For the whole pelagic longline period for 2008 which also includes swordfish long-lining the catch estimated were 11,000 for *Caretta caretta* and 2,800 for *Pteroplatytrygon violacea*.

13. The meeting noted that the amount of catch (in Maltese waters) is very high and there is a reasonable concern. It was stated that probably the number of turtle is increased in this area but the delayed mortality is probably very high due to the ingestion of branchline. In fact the branchline is recognised as one of the main cause of mortality for turtle. Participants agreed on the fact that fishermen have to be provided with the correct instrument (dehooking devices etc) and guideline. Moreover, study on mitigation measures have to be conducted within the participation of fishing industry (new material, costs etc). Participants concluded that study on new materials for branchline (coton etc.) are useful but the costs and the efficacy of this solution do not encourage this kind of studies.

Presentation 3

Elasmobranch bycatch in benthic trawl fishery of the Gulf of Gabés (South-Central Mediterranean sea). Hamdaoui B., Saidi B., Bouain A., Bradai M.N.

Abstract: It is shown that Elasmobranches are being caught by most of the fishing gears used in the Mediterranean Sea. Elasmobranches are present as by catch of landings commercial trawlers fisheries. Trawlers capture all Elasmobranches species but benthic and demersal are the most affected by this gear. The bottom trawl nets were used to capture shrimps and demersal fish but Elasmobranches were landed as bycatch. These studies concluded that trawls are intended to catch more males than females of all species of sharks while on the other hand female rays are being caught more than male rays excluding for Rhinobatos.

14. The meeting stressed the importance of studies on improving selectivity of nets and concluded that bycatch should be evaluated preferably onboard fishing vessels. It was also underlined that regulation and monitoring of fishing in cartilaginous mating areas, spawning and

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nursery grounds should be implemented and that commercial sizes for cartilaginous be urgently defined.

15. The meeting agreed on the relevance to establish a medium term workplan including the organisation during 2010. The specific meeting should be, as convened in Tunis, on elasmobranchs issue (commercial and endangered species). It was agreed that the outline of this program as well as the draft term of reference be prepared by a team composed by Bradai, Dimech and Poisson. This work should be finalised by email and presented to the next Sub-Committee meetings scheduled to be held in Malaga, from 30 November to 3 December 2009.

Presentation 4

Incidental catches of Thresher sharks: Implementation of a survey on trawlers operating in the Gulf of Lions. Poisson F., Sacchi J., Wendling B.

Abstract: This presentation reported on preliminary results of the research project focused on the Incidental catches of Thresher sharks in the Gulf of Lions by pelagic trawlers and the methods for the implementation of a survey on trawlers operation. There are concerns about the Lack of information and about the stock of this species. The goals of the projects are the monitoring of the current landing of thresher sharks, the collection of basic biological parameters (weight, sex, conversion factor), the reconstruction, when possible of the landing time series, the feeding ecology (isotope, Fatty acids, contaminants), the study of the post released survival and migration (smart tags), the incentive and compensatory measures to encourage fishers to release the individuals alive, the guidelines to handle and release sharks at sea, the development and the test of existing or new prototypes of by catch reducing device (BRD).

16. Further this presentation, the participants insisted on the need of developing Guidelines for fishermen to handle and release sharks at sea. Secondly they concluded that is necessary to develop and test Shark Excluder Device in the net, through the transfer in the Mediterranean of the existing technology (e.g. Mexico, etc.). It was also noted that the monitoring of thresher sharks landing would be essential for the assessment of the stock.

Presentation 5.

Selectivity assessment and amelioration in Tunisian king shrimp fisheries. Bdioui M., M'Rabet R.

Abstract: The presentation reported the results of a research project carried out in Tunisian waters which aimed at improving and assessing the selectivity performance of bottom trawl and fixed nets targeting shrimps. The results obtained for the commercial species (hake, red mullet, red sea bream etc.) showed that only with a mesh opening of 52 mm or with a square mesh configuration (48 mm for the red mullet) the L50 seemed to respect the length of first maturity. Two different types of sorting grids were also tested. The nordmore grid seemed to be not useful for the reduction of juvenile bycatch in Tunisian trawlers, while the experimental grid showed promising results, because shrimp were well sorted from the rest of the catch. Concerning the gillnet the increase of mesh opening from 44 mm to 52 mm seemed to allow an increase of the length of first capture in relation to the length of first maturity.

17. The Participants noted a very low selectivity with gillnets, they also noticed that gilling was the main catching process. They suggested improvements of studies on the inter-specific selectivity. They also advised on the standardization of mesh measurement in selectivity studies.

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Actions undertaken to reduce interactions between dolphins and fishing gears (original text in french). Lotfi B.N., Bdioui M., M'Rabet R.

Abstract: This presentation focused on the improvement of an acoustic repulsive device called "dolphin tube". It generates sounds (a few Hz to 400 KHz) interacting with the echolocation system of dolphins, causing "masking" of nets and mainly fish. The use of this tube after its amelioration has confirmed its immediate effect on dolphins which dive and disappears quickly from the fishing zone.

18. After evaluating the effectiveness of available pingers it is shown that the main problems are habituation of dolphin. Moreover, participants suggested that it is very important to consider the damages that can arise from the scaring devices (pinger etc.).

Presentation 7

*Seals-fisheries interactions in the Mediterranean monk seal (*Monachus monachus*): related mortality, mitigating measures and comparison to dolphin-fisheries interactions.* Cebrián D.

Abstract: The frequency of interactions with trammel nets by Mediterranean monk seal (*Monachus monachus*) and dolphins was recorded at the island of Zakynthos, located in the south Ionian Sea, Greece. Monk seals interact in the region mainly with static fishing gear. Interaction of monk seals with trammel nets and related bycatch risk is related to the distance of the net placements to the caves where the seals rest. It was concluded that the setting of static nets in a belt comprising a minimum of 5 nautical miles radius around the location of monk seal caves along autumn and winter, extended to 10 miles around breeding caves would strongly reduce associated mortality through drowning and hostility by fishermen.

19. The meeting pointed out that the bycatch of monk seal is mainly concentrated on juveniles, that the destruction of habitat seemed to be presently a lower problem for the species survival compared to conflict with fisheries and linked seal mortality, and that the closure of specific areas to fishing activity should be the best solution. It was recommended restricting the setting of static nets around the location of monk seal caves, especially of the breeding caves. The restriction should be linked to gear adaptation support measures to artisanal fishers in need of it.

Presentation 8

*Study on mesh size and bycatch in Algeria (original text in French).*Algérie. Bouaicha M.

Abstract: This presentation described the characteristics of Algerian fishery (fishing areas, species, fishing gears, etc.) reporting the principal technical measures included in the Algerian legislation (mesh openings, gear dimensions etc.). It also summarised the problems of bycatch in different fisheries and it concluded that the increase in mesh opening, in mesh configuration and finally the definition of bigger Minimum landing Size would be useful for the reduction of the bycatch.

20. The participants emphasized the importance of cooperation among COPEMED countries on fishing technology issues. Moreover, technical parameters or net designs would be reported in a common way in order to standardise the terminology: e.g. the term "Mesh opening" should refer to the internal dimension of the mesh. The participants finally raised the importance of testing new mitigation measures in Algerian waters.

Presentation 9

*Study on bycatch and discards in trawl and driftnet fisheries in the Mediterranean coast of Morocco (original text in French).*êêMéditerranée Elouamari N.

Abstract: The presentation described the driftnet fisheries for swordfish in Morocco, including for the characteristics of the fishing vessels and the gear used. It also reported that the bycatch resulting

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from this fishing activity is mostly composed by sharks and other elasmobranches, turtles and marine mammals. Moreover it analysed the bottom trawl bycatch which is mainly composed of non commercial demersal species or undersized commercial species.

21. It was concluded that Moroccan data on bycatch confirms the results obtained in the Mediterranean by other authors. Participants agreed on the point that driftnet should be replaced with more selective fishing techniques by the way of specific program of implementation. It was suggested that research projects on cetacean bycatch could be carried out in collaboration with ACCOBAMS.

Presentation 10

Estimation of bycatch and discards (original text in French), Benchoucha S., Idrissi M.

Abstract: This presentation was focused on the methodology to estimate bycatch and discards in multispecific fisheries and reviewed the main data needed for this purpose. It also reported information on the global Bycatch and discards over the world with the main factors causing the bycatch and discards. It presented the methodology used in Japan for assessing Bycatch and discards.

22. Further this presentation, the group noted that bycatch should be evaluated only through observation onboard professional boats, especially in mixed-fisheries where it is often difficult to define a target species. The participants suggested a detailed description of technical parameters of the nets and riggings.

Follow up on recent biology and population dynamics studies for species of conservation concern

Presentation 11

Overview on the knowledge of elasmobranches fishes in Tunisia. Saidi B., Kadri H., Enajjar S., Marouani S., Bradai M.N.

Abstract: Presentation showed the results of a research project focused on elasmobranches issue. The study incorporated the taxonomic group, including studies on biology, ecology, systematic and fisheries. The program focuses mainly on the Gulf of Gabes region which seemed to be very important for this group. These data will be helpful for eventual elaboration of a National Action Plan for the conservation and management of these vulnerable species.

23. The meeting acknowledged the effort made by Tunisian scientists to improve the knowledge on Elasmobranches. The importance to undertake stock assessment for selected Elasmobranches of commercial interest was stressed. It was also recognised that reinforcement of research on age and growth of elasmobranches was important in particular with support of the FAO regional projects. Participants agreed on selecting some species to include in the GFCM list of priority species (e.g. *Mustelus mustelus*, *Mustelus punctulatus*, *Carcharhinus plumbeus*, *Alopias vulpinus*, *Rhinobatos rhinobatos*, *Rh. cemiculus*, *Raja clavata*, *Squalus blainvillei*).

24. The meeting encouraged research on biology and status of the exploitation of rare shark in the Gulf of Gabès. The workshop concluded that there is a problem to identify juveniles of elasmobranches thus they concluded that there is the need to implement research on that point (guidelines etc). Participants also stated that there is a problem to study in the auctions elasmobranches which are often landed gutted. The study of sharks on board is of highly importance.

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Presentation 12

Outcome of the third Mediterranean Conference on Marine Turtle. Bradai M. N.

25. Mr Bradai presented some results of the third Mediterranean Conference on Marine Turtles (Tunisia, October 2008). He informed the meeting about the discussions on the issue related to the bycatch of marine turtles and about the Suggestions provided by the conference which can be summarised as follows: There is the need for a shared strategy on the regional level, with the several actors having clearly defined roles. Firstly, scientists should provide additional information to fill gaps. In this respect, it would be important that scientists provide relevant data to GFCM.

Definition of a standard protocol for data collection of relevant information on bycatch in the Mediterranean fisheries

26. Mr Bradai presented a summary of a paper on the MEDLEM database application as a tool for storing and sharing data about bycatch, Sightings and stranding of large cartilaginous fishes in the Mediterranean basin (by Serena and all). The meeting noted the importance of this tool and remarked the few data submitted to the database. The full paper could be found and uploaded through GFCM website through the following link: <http://www.gfcm.org/gfcm/topic/17101website>.

27. The meeting further discussed extensively the issue of data collection on species of conservation concern. It suggested that a protocol should be developed to collect and promote the collection of basic data on species of conservation concern. The protocol should be in line with existing protocols for specific groups of species. The aim of the protocol is to collect data which can then be fed into existing databases. The data collection is notably aiming to characterise and assess captures of species of conservation concern including unwanted species and size classes and to propose mitigation measures for the environmental sustainability of Mediterranean Fisheries.

28. The meeting identified the key elements to establish such protocol of data collection:

- The groups of species that are a priority on which to collect basic data include:
 - 1) Elasmobranches
 - 2) Sea turtles
 - 3) Marine mammals
 - 4) Sea birds
- The data is required by operational unit in order to fit into the GFCM Task I data matrix. The basic data with the highest priority which is currently lacking from many Mediterranean countries and has been classified as priority one includes:
 - 1) Catche in weight¹
 - 2) Catche in number
 - 3) Effort²

(By species or group of species when data on species is not available)

¹ At present only this information is proposed for Task I

² According to the GFCM definition

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29. Data which is also very important but which is more difficult to collect by species has been classified as priority two and includes:

- 1) Individual Length
- 2) Individual Weight
- 3) Sex
- 4) Individual marks (marine mammals)
- 5) Sexual maturity
- 6) Observed Mortality
- 7) Spatial distribution (e.g catch location)
- 8) Temporal distribution

30. For detailed data which requires a more intensive sampling the meeting suggested that

- For Elasmobranches the MEDLEM Protocol is considered.
- For Marine Mammals the ACCOBAMS protocol is considered for cetaceans while a new protocol has to be developed for monk seals.
- For Sea turtles there are currently many existing protocols; however a unified protocol should be developed based on the existing ones.
- For Seabirds there are currently many existing protocols; however a unified protocol should be developed based on the existing.

Update the available information on studies on mitigation measures for bycatch reduction

Presentation 13

Turtle Excluder Devices (Teds) experience in the Adriatic sea. Lucchetti A., Sala A.

Abstract: This presentation showed the results of test with TED carried out in the Adriatic Sea. Four types of TEDs were tested with the aim of finding the best solution in order to minimize the losses of target species meanwhile providing benefits to fishermen. All TEDs were placed in a predetermined position of the trawl nets so as to allow captured sea turtles to escape. The best results were obtained with super-shooter TED. TEDs seemed to reduce the amount of discard in the codend catch leading to an improvement of fish quality and to a reduction of the sorting time. However, there might be a risk in increasing the losses of large commercial flat species. No evident increase in drag or chain polish or twisting of the codend was detected in the net fitted with the TEDs. Some preliminary results on tests carried out with a super-shooter TED mounted on a pelagic trawl net were also showed. Promising results were obtained with the exclusion of debris.

31. Participants agreed that probably the reduction of haul duration should produce better results; however they also considered that this is not a practical solution in most of fisheries. The meeting encouraged the improvement of knowledge through the economic implications of the mitigation measures (loss of large specimens). Collaboration within the fishing industry is considered a crucial asset.

Presentation 14

Effet de la nature de l'appât sur les captures accidentelles des tortues marines aux palangres de surface. Echwikhi K., Jribi I., Bouain A., Bradai M.N.

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Abstract: This presentation reported the effect of type of bait on the interaction of loggerhead turtles with pelagic longline. Results provided by this study indicate that it is possible to mitigate turtle interactions in longline fishery by manipulating bait type. Moreover it is possible to reduce bycatch of marine turtles based on the sensory behaviour not only of turtles but also of the target species. The solution consists mainly in the use of stingray as bait instead of mackerel.

32. Participants highlighted the need of implementing studies on the influence of bait type and on the effect of different depth setting of the main line of a longline. For these, the studies participants suggested to consider the experience carried out by WWF in the “Smart Gear” competition.

Presentation 15

Draft Guidelines for reducing bycatch of seabirds in the Mediterranean region. Cebrian D.

Abstract: The presentation showed that seabirds have become increasingly dependent on their association with fisheries for individual survival and breeding success. A risk assessment of seabird-fishery interactions for the Mediterranean region was undertaken and shows that shearwaters are the species most at risk, and that longline fisheries represent the most immediate threat, although mortality probably occurs in trawling fisheries as well. Participant recommends a combination of measures, because considerable testing has shown that a suite of measures is the best way in most cases. The document which presented at the meeting provided the state of the art on the issue. Author suggested operating longline fishing with fast sinking gear by adding extra weight to the main line. Weighted lines alone may not be so effective in some circumstances and should not be promoted as a stand-alone mitigation measure.

33. It was concluded that night setting of longline can strongly reduce the amount of sea bird bycatch. For the same reason bird scaring-lines and warp scarers should be used in longline and trolling lines respectively. Moreover the deck-lights should be turned off and that illumination (especially, on deck) should be limited to those lights necessary for navigation and for health & safety standards. Avoiding practices which attract seabirds should be very useful.

Socio-economic implications (estimation of revenue evolution, cost adaptation and social effect)

34. The meeting noted with regret that no socio-economic studies were presented during the meeting, recognised the importance of such kind of studies and strongly recommended more implication of specialists in the future activities.

Conclusions and recommendations

35. The meeting made the following general conclusions:

- There is a large variability in bycatch between different areas and gears in the Mediterranean;
- Many mitigation measures have been developed outside the Mediterranean and adopted by the relevant RFMOs;

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- There is a comparative delay in the Mediterranean Region in implementing mitigation measures with regard to other RFMOs and a need to provide more information on the effect of mitigation measures on the fishery including economic and biological factors;
- There is a lack of pilot projects to implement mitigation measures;
- Some fisheries in the Mediterranean are still using drift nets, with studies showing catches of endangered species and species of conservation concern;
- There is a lack of aggregated knowledge on the biology and fishery of elasmobranches in many parts of the Mediterranean;
- There is a need of a common strategy to reduce the effect of fisheries on sea turtles, marine mammals and seabird bycatch;
- There is a lack of data being collected and submitted according to existing protocols to feed databases such as the MEDLEM;

There is a need of Recommendations

- The group recommends that more participation and contributions from scientists working on species of conservation concern from sub-regions of the Mediterranean.

36. The Workshop further made the following recommendations:

- A draft definition as presented in the paragraph 10 is proposed for adoption by SAC and for its inclusion in the SAC glossary;
- More studies should be conducted on the characterisation of bycatch of species of conservation concern in areas of the Mediterranean especially in areas with a limited amount of data such as for the Eastern Mediterranean where only the study on seals and dolphins interactions with nets was presented during the meeting;
- The importance of testing, in close collaboration with the fishing industry, of mitigation measures and technologies that have been developed outside the Mediterranean and that are currently used and employed by Regional Fisheries Management Organisations RFMOs;
- When mitigation measures are tested more studies should be conducted not only on species of conservation concern but also on what effect such mitigation measures would have on target species and other species of economical value;
- Developing shared pilot projects to implement mitigation measures in Mediterranean fisheries;
- The driftnet should not be used and should be replaced by other alternative gears in the Mediterranean;
- More information, education campaigns and training workshops should be conducted to inform the fishing industry on regulations on species of conservation concern and current practices to reduce the mortality of such species;

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- Setup a medium term year work plan to identify and fill gaps in the current knowledge that exist in elasmobranchs fisheries, in order to assess and manage the Mediterranean stocks. This program should include the organisation of a specific expert meeting on the elasmobranchs during 2010 (see the paragraph 15 of this report);
- Develop and initiate a regional strategy to reduce sea turtles, marine mammals and seabird bycatch;
- Launch a program aiming to the collection of basic data on species of conservation concern as referred in the paragraphs 28 to 31 of this report.

37. The Workshop also formulated the following specific advice related to management purposes following state of the art scientific studies:

- The implementation of the following mitigation measures to reduce captures and mortality of species of conservation concern;
 - 1) Fishermen should be equipped with de-hooking devices to remove the sea turtles which are incidentally caught by longlines;
 - 2) Guidelines such as the ones which are being developed by RAC/SPA should be produced and widely published and distributed in order to reduce sea turtles, marine mammals and seabird bycatch;
 - 3) To reduce seabird bycatch, implement the following mitigation measures:
 - Night-setting for longlines;
 - Bird-scaring lines and warp scarers for longlines and trolling lines respectively;
 - Integrated and external line weights for longlines;
 - Offal/discard management;
 - Bait conditioning for longlines.
 - 4) To reduce monk seal bycatch, restrict the setting of static nets in a belt comprising a minimum of 5 nautical miles radius around the location of monk seal caves along autumn and winter, extended to 10 miles around breeding caves. The restriction should be linked to gear adaptation support measures to artisanal fishers in need of it.

Adoption of the report

38. The Conclusions and recommendations were adopted by the Workshop on 25 of September 2009. The whole report was adopted by E-mail on October, 20 2009.

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Appendix 1

Agenda

Opening, arrangement of the meeting and adoption of the agenda

Current status of bycatch and discard related to the Mediterranean and black sea fisheries

- Definitions of terms and concepts of relevance to the issue of bycatch and selectivity (unwanted species, bycatch, selectivity, discard, illegal catch, ghost fishing, etc.);
- Evaluation of bycatch and fishing mortality for commercial species and threatened species;
- Follow up on recent biology and population dynamics studies for species of conservation concern;
- Methods for assessing impacts at the population level for species of conservation concern (elasmobranches, marine turtles, birds, and cetaceans);

Definition of a standard protocol for data collection of relevant information on bycatch in the Mediterranean fisheries

Update the available information on studies on mitigation measures for bycatch reduction

Socio-economic implications (estimation of revenue evolution, cost adaptation and social effect)

Any other matters

Conclusions and recommendations

Adoption of the report

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Appendix 2

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Appendix 3

Summaries of the presentations made by the participants

Presentation 1.

*Interaction of fishing gears with Loggerhead sea turtle, *Caretta caretta*, in the Gulf of Gabès (Tunisia).* Jribi I., Echwikhi K., Bradai M.N., Bouain A.

Les tortues marines sont menacées par plusieurs activités humaines et leurs populations se trouvent menacées d'extinction dans différentes régions du monde. Parmi les activités qui pèsent le plus et qui semblent être les plus menaçantes, l'activité pêche engendre des captures accidentelles non négligeables et une mortalité assez élevée. Pour évaluer cette menace dans la région du golfe de Gabès (Tunisie), une zone d'alimentation et d'hivernage en Méditerranée, des études des interactions au chalut benthique, Palangres de surface et de fond et filets maillants ont été entreprises depuis 2001.

Les taux de captures engendrés sont relativement importants pour tous les engins de pêche, toutefois, la mortalité induite par les filets maillants ciblant les requins est de loin la plus élevée. Des solutions d'améliorations des engins de pêche pour réduire l'interaction avec des tortues marines, et ainsi la mortalité, sont très urgentes pour protéger les populations de ces reptiles menacés.

Presentation 2.

Non-target bycatch in the Maltese longline fishery. Burges E., Dimech M., Darmanin M., Muscat E., Raine H., Schembri P.J.

Non-target bycatch is increasingly becoming a major issue in capture fisheries since the cumulative effect of all fishing activities may have a considerable impact on vulnerable populations especially for long lived species such as elasmobranchs and sea turtles. Pelagic long-lining for bluefin tuna is one of the most important fisheries in the Mediterranean, with considerable bycatches of non-target species. Here we present estimated catches for non-target species for the whole fishing fleet based on direct observations on board commercial pelagic longline vessels in 2008 and 2009. The number of days sampled were 83 and 29 fishing days in 2008 and 2009 respectively. Data on the total effort of the fleet in number of fishing days during the respective years was obtained from the logbooks for vessels over 12 m and from sales vouchers for vessels less than 12 m of each vessel from the fleet. The estimated catches by the fleet indicate high catch numbers in both years for the sea turtle *Caretta caretta* (mean ca. 4500 per year) and for the pelagic sting ray *Pteroplatytrygon violacea* (mean ca. 2400 per year). High catch rates were also recorded for the manta ray (*Mobula mobular*) (mean ca. 500 per year). These catches are based on the bluefin tuna season which comprises only 3 months. When the catches were estimated for the whole pelagic longline period in 2008 which also includes swordfish long-lining the catch estimates were ca. 11,000 in 2008 for *Caretta caretta* and 2,800 for *Pteroplatytrygon violacea*. These numbers are considerably high when one considers the small artisanal nature of the fleet with only about 90 operational vessels ranging from 10 – 24 m in length. These figures are still very preliminary since more replicate sampling and more replicate years are required to have better estimates. However the estimated catches give an insight to the problem of bycatches in the longline fleet and solutions have to be found in order to reduce this bycatch.

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Presentation 2 bis.

First Estimates of Elasmobranch and seaturtle bycatch from the Maltese bluefin tuna (Thunnus thynnus longline fisher). Dimech M., Burgess E., Caruana R., Darmanin M., Muscat E., Schembri P.J.

The Bluefin Tuna longline fishery is one of the most important pelagic fisheries in the Mediterranean but recently there has been increasing concern about the catches of non-target species. This study presents an assessment of the non-target bycatch from the Maltese Bluefin Tuna longline fleet and examines the effect of various environmental and spatiotemporal factors on non-target species catch rates. Field observations were made during 85 fishing days. In terms of number, Bluefin Tuna comprised a relatively small portion of the total catch while the Loggerhead Turtle (*Caretta caretta*) was the predominant bycatch species. Catch Per Unit Effort (CPUE) was calculated in terms of weight (kg/1000hooks/hr) and number (no/1000hooks/hr) for all the species caught. General Linear Mixed Models (GLMMs) were applied to examine the effect of environmental and spatiotemporal variables on non-target bycatch CPUE. The model for CPUE (number) was not found to be significant. Date, lunar cycle, species and longitude were found to be significantly correlated with CPUE (weight). The results of this study suggests the need for the continual implementation of mitigation measures to minimise the impacts of fishing activities on threatened non-target species in the Mediterranean.

Presentation 3.

Elasmobranch bycatch in benthic trawl fishery of the Gulf of Gabès (South-Central Mediterranean sea. Hamdaoui B., Saidi B., Bouain A., Bradai M.N.

Biological characteristics (low fecundity, late maturity and slow growth rates) make elasmobranches vulnerable to fishing pressure. The results have shown the importance of elasmobranches bycatch in the Gulf of Gabès trawl fishery. Trawl affects mostly demersal elasmobranches species, mainly Dasyatidae, Myliobatidae, Triakidae and Rajidae.

Specimens caught for the major species of elasmobranches were mainly juveniles. Trawls catch more males than females of all species of sharks but for batoids they catch more females than males.

The bycatch of elasmobranches is growing in Tunisia as a result of the increase in the fishing activities, and the sustainability of the elasmobranches populations in Tunisian coasts is a matter of concern.

Considering the high diversity and the large number of species caught and the important biomass landed by bottom trawl in the Gulf of Gabès, this gear affect elasmobranches biodiversity and abundance in the Gulf of Gabès.

Presentation 4.

Incidental catches of Thresher sharks: Implementation of a survey on trawlers operating in the Gulf of Lions. Poisson F., Sacchi J., Wendling B.

In the Mediterranean Sea, two thresher shark species occur; the common thresher shark (*Alopias vulpinus*) and the bigeye thresher (*Alopias superciliosus*) are both coastal and epipelagic. These two species feed mostly on small schooling fishes, including mackerels, bluefishes, clupeids also squids and octopuses. These species are caught in Mediterranean Sea by industrial and semi industrial longline fisheries and by artisanal gillnet fisheries and in France, thresher sharks are caught

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incidentally mainly by the trawlers targeting small pelagic operating in the Gulf of Lions landed mainly in two harbours (Sète and Port La Nouvelle).

A shark specialist group held a regional IUCN (International Union for Conservation of Nature) red list workshop in 2003 to assess 71 chondrichthyan fishes and stated that the common thresher shark was considered Vulnerable while the lack of records on the bigeye thresher prevented an assessment. The later has been poorly documented and is considered scarce or rare.

Official catch data available only from 2002 to 2007 for these species in the Mediterranean Sea showed a dramatic decrease from 2003 to 2007 respectively from 15.5 to 5.7 tonnes.

In close collaboration with the fishing industry, we recently started implementing a study to (1) monitor the current landing of thresher sharks, (2) collect basic biological parameters (weight and sex) and (3) reconstruct if possible the landing time series (4) interview the skippers.

The preliminary analyses showed that the landings dropped from 9.5 to 5.0 tonnes between 2006 and 2008 (the catch for 2009 in August was around 3.6 t) and that the major catches occurred between April and September with a recurrent peak in July. 139 individual weights were recorded at the auction ranging from 74 to 300 kg with an average weight of 163.1 kg (SD: 37.5). The retail prices within this period have fluctuated between 3.01 and 6.81 euros per kg. This resource has generated between 22,000 to 37,000 euros a year.

Presentation 5.

Selectivity assessment and amelioration in Tunisian king shrimp fisheries. Bdioui M., M'Rabet R.

La pêche crevettière est effectuée en Tunisie au chalut crevettier et aux filets trémails. Elle capture une grande variété d'espèces accessoires et notamment des petits poissons de grande valeur (rougets). La présente étude a pour objectifs de déterminer et d'améliorer la sélectivité de ces engins. Les essais réalisés ont permis d'obtenir par la méthode de la double poche, les courbes et paramètres de sélectivité de trois maillages (48, 52, 60 mm) pour les principales espèces (merlu, pageot, rouget de vase, bogue) pour le cas du chalut crevettier Tunisien et le chalut Méditerranéen type Italien. Pour ces deux engins, les L50 obtenues pour ces espèces avec la maille de 40 mm sont inférieures à leurs tailles de première maturité sexuelle. Elles ne deviennent supérieures à celles-ci qu'avec une augmentation de maillage (à 52 mm pour le rouget de vase) ou l'utilisation de mailles carrées (de 48 mm pour le rouget). La mise au point d'un chalut sélectif à crevettes combinant grille et nappe de guidage a apporté des résultats plus satisfaisants que le dispositif sélectif canadien NORDMORE, permettant l'élimination d'une proportion élevée de poissons immatures et une augmentation des rendements horaires.

En ce qui concerne les filets trémails, les filets de 44 mm de maillage n'ont pas prouvé de sélectivité pour la majorité des espèces, en l'occurrence la crevette royale, la sole et la seiche. Une augmentation du maillage à 52mm induit une nette augmentation des longueurs optimales de sélection par rapport à la taille de première maturité sexuelle.

Presentation 6.

Actions réalisées pour réduire le degré des interactions entre les dauphins et les filets de pêche. Lotfi B.N., Bdioui M., M'Rabet R.

This presentation deals with the improvement of an acoustic repulsive called "dolphin tube". It generates sounds (a few Hz to 400 KHz) interacting with the echolocation system of dolphins, causing "masking" of nets and mainly fish. The use of this tube after its amelioration has confirmed its immediate effect on dolphins which dive and disappears quickly from the fishing zone.

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Presentation 7.

Seals-fisheries interactions in the Mediterranean monk seal (Monachus monachus): related mortality, mitigating measures and comparison to dolphin-fisheries interactions. Cebrián D.

The frequency of interactions with trammel nets by Mediterranean monk seals (*Monachus monachus*) and dolphins was recorded at the island of Zakynthos, located in the south Ionian Sea, Greece.

Monk seals interact in the region mainly with static fishing gear. Zakynthos fishers endured an overall damage rate of 4.96% caused by monk seals out of 1632 net settings. Dolphins caused an overall damage rate of 6.19%. This rate is similar to the one attributed to seals, but the level of damage to each net was more severe.

Interaction of monk seals with trammel nets and related bycatch risk is related to the distance of the net placements to the caves where the seals rest. Damage becomes very low at distances along the coast higher than 5 nautical miles from the caves, and insignificant for distances higher than 10 nm.

It might be possible to strongly reduce the level of this interaction, the main drive to extinction through bycatch and killing by fishers, by management of coastal fisheries based on this result. Conservation actions for the seals could consider this knowledge as a tool to properly design MPAs or to create static net restricted Important Seal Areas, with marine boundaries according to the tolerable level of interaction with nets accepted by managers.

Fish obtained by the seals from the predated nets during the study would reach as a maximum 20.81 Kg/month. Such catch would hardly provide 1 Kg fish/seal to the seal population monitored. Hence, we disagree with the hypothesis that monk seals in the Mediterranean search for nets as a reaction to a depletion in the fishing shoals.

Presentation 8.

Etude de maillage et des espèces accessoires en Algérie. Bouaicha M.

La question des prises accessoires est une question sensible par rapport à la thématique « Erosion de la Biodiversité marine » dans la région méditerranéenne en général, et la côte algérienne n'échappe pas à ce phénomène, certes en moindre importance, mais dans l'état actuel des connaissances il est difficile d'évaluer avec précision le niveau de raréfaction de plusieurs catégories d'espèces le long de la côte algérienne. Ces espèces figurent parmi les plus vulnérables dans la région méditerranéenne et la plupart de ces espèces figurent dans les listes rouges ou en danger de disparition en Méditerranée, dans ce contexte ce modeste travail consiste à mettre en lumière la situation de maillage des engins de pêche et les espèces accessoires vulnérable dans la pêche algérienne.

Presentation 9.

Etude des captures accessoires et des rejets de la pêche au chalutage et au filet maillant dérivant en méditerranée marocaine. Elouamari N.

La quasi-totalité des engins de pêche utilisés en Méditerranée marocaine présente un certain nombre de captures accessoires et de rejets des espèces commercialisables ou non commercialisables. Deux activités de pêche sont présumées responsables de plus importantes captures accessoires : la pêche chalutière, qui génère les plus grandes quantités de rejets en mer, et la pêche au Filet Maillant Dérivant (FMD) dont les captures accessoires sont constitués, en plus des espèces commercialisables, des espèces dont la pêche est strictement interdite, notamment les cétacés.

Les prises accessoires réalisées par la pêche au FMD, présentant une valeur commerciale, sont constituées essentiellement du melva, listao et de certaines espèces de requins. Toutefois, les prises

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accidentelles en espèces protégées, notamment les cétacés et les tortues marines, sont encore mal connues.

Les rejets des chalutiers sont constitués essentiellement des espèces non commercialisables à savoir les groupes écologiques benthiques, et secondairement par des espèces commercialisables mais à valeur économique très faible en raison de la taille non réglementaire.

Presentation 10.

Estimation du bycatch et des rejets. Benchoucha S., Idrissi M.

La pêche crevettière est connue à travers le monde comme «la reine des pêcheries à rejets en mer». Pour chaque 10 tonnes de crevettes capturées, 90 tonnes de poissons sont rejetées en mer, morts ou mourants. De ce fait, l'évaluation des rejets en mer des espèces non cibles et des petites tailles des espèces cibles, occasionnés par cette pêche et par les autres pêcheries, est une nécessité. La réduction des rejets en mer constitue l'un des principaux objectifs des études de sélectivité, menée à travers le monde entier.

Presentation 11.

Overview on the knowledge of elasmobranch fishes in Tunisia. Saidi B., Kadri H., Enajjar S., Marouani S., Bradai M.N.

Taking into account the vulnerability of many species of the elasmobranch fishes and in the frame of implementation of the IPOA-shark and the Action Plan for conservation of the cartilaginous fishes in the Mediterranean Sea, the INSTM launched since 2002 a research program related to this taxonomic group, including studies on biology, ecology, systematic and fisheries. The program focuses mainly on the Gulf of Gabès region which seems to be very important for this group.

33 sharks and 29 rays representing about 19% of the Tunisian ichthyofauna were recorded. Among them 26 sharks and 21 rays occurred in the Gulf of Gabès.

A mean of 2000 MT were landed a year (2% of annual national landing). About 70% of Tunisian elasmobranch production is landed in the Gulf of Gabès. In this area, all species are captured as bycatch throughout the year, whereas 3 sharks (*Mustelus mustelus*, *M. punctulatus*, *carcharhinus plumbeus*) and 2 rays (*Rhinobatos rhinobatos*, *R. cemiculus*) are targeted during spring-summer.

Basic information on reproductive biology and ecology (size at maturity, fecundity, reproductive cycle, feeding, and nurseries) will be presented.

These data will be helpful for eventual elaboration of a National Action Plan for the conservation and management of these vulnerable species.

Presentation 12.

Mr Bradai presented the results of the third **Mediterranean Conference on Marine Turtles**.

Main results of the Conference are presented in the Book of abstract which was available to the meeting.

In this paper the conference highlights were presented with a focus on the Workshop 2: Sea turtle bycatch in the Mediterranean: how to fill the gaps and how to move forward (Coordinator: P. Casale)

This workshop had about 50 participants and began with a presentation by M. Bradai who introduced the GFCM and the results of the last meeting on bycatch on 15-16 September in Rome. A second presentation by M. Parga reported the recent results of a project to test changes in longline gear for reducing turtle capture, such as different bait, circle hooks, and deep hooks.

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Then the participants discussed on the gaps in the process of implementing conservation measures to reduce the impact of the fisheries on turtles in the Mediterranean. There was a general consensus about the many suggestions provided that can be summarised as follows. There is the need for a shared strategy on the regional level, with the several actors having clearly defined roles. Firstly, scientists should provide additional information to fill gaps, for instance in biology and distribution, should provide clear suggestions ready to be implemented, and should communicate results to media other than the strictly scientific ones, so to raise the interest of the general public, as well as of decision makers and stakeholders. In this respect, it would be important that scientists provide data to RFMOs like GFCM at a constant basis, since GFCM may be an important actor for sea turtles conservation in the region. The general public can play an important role of market change if a certification system of fishery products that doesn't impact sea turtles is developed. The illegal or unreported fishing effort should be reduced. To investigate and implement conservation measures, the involvement of fishermen associations and individual fishermen is fundamental. NGOs can play a major role towards the implementation of available measures, with their capacity of public awareness and contacts with decision makers. In this respect, public bodies involved in sea turtle conservation should be informed by scientist, NGOs, etc. about the available measures, and the participation at Conference like the one on marine turtles in the Mediterranean should be pursued. In this respect, also the results of specific workshops like this could help and should be communicated.

Presentation 13.

Serena F., Bradai M.N., Mancusi C., Barone M.

Starting from the 2000 the MedLem program provides an updated source of information on large cartilaginous fishes for national and international organizations involved in the management and the conservation of these fish in the Mediterranean Sea. Moreover, from the 2007 the MedLem Database Application has been freely accessible at the website: <http://www.arpat.toscana.it/progetti/medlem>. The program has the objective of recording data on bycatch, sighting, stranding or bibliographic references and allows the search for species, country and gear.

A total of 1224 records have been registered so far. 17 research institutes, from corresponding countries, participate in the MedLem program. The greater proportion of data comes from Italy followed by Croatia and Spain. About 50% are records of the basking shark (*Cetorhinus maximus*), representing in prospective an important source of information for the distribution, behavior and biology of these species.

This paper is also presented with the aim of continuing the discussion that is going on in this workshop concerning the data collection of bycatch for the cartilaginous fish.

Only after a preliminary analysis of data coming from the MedLem Database it may be possible to go further in the investigation of the bycatch. This could be done carrying out a proper monitoring program based on on-board observations, but pointing to the likely scale and concentrating the effort on few fisheries operating in a certain period in a certain area.

Presentation 14.

Turtle excluder Devices (TEDs) experience in the Adriatic Sea Lucchetti A., Sala A.

Concerns about the conservation of marine turtles in the Mediterranean lead to the development of different types of turtle bycatch reducer devices (TEDs) designed for the Italian demersal trawl fisheries. At the moment there are a variety of hard TED designs available to the fisherman but generally it is very difficult to introduce a new technical solution, taking into account that

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innovations can be easily accepted by professional fishermen only if the economic losses are negligible. Thus in order to effectively implement TEDs, there is a need to minimize the losses of target species meanwhile providing benefits to fishermen. All TEDs were placed in a predetermined position of the trawl nets so as to allow captured sea turtles to escape. In all tests the TEDs were arranged on the extension piece of the bottom trawl net. Moreover an additional cover (mesh opening about 48 mm) was joined under the TED opening in order to collect the escapees. The main results are resumed as follow. The best results were obtained with super-shooter TED. TEDs could probably represent a suitable solution in bottom trawl and mid-water fisheries but only when properly matched to fishing conditions (i.e. TED angle, construction materials, floatation, position and size of the exit hole, webbing flap etc.). The introduction of TEDs may reduce turtle mortality by avoiding the multiple submergences of a turtle. TEDs could reduce the amount of discard in the codend catch leading to an improvement of fish quality and to a reduction of the sorting time. However, there might be a risk in increasing the losses of large commercial flat species such as turbot (*Psetta maxima*), flounder (*Scophthalmus rhombus*) and angler fish (*Lophius spp*). No evident increase in drag or chain polish or twisting of the codend was detected in the net fitted with the TEDs. Our results demonstrate that TEDs can function effectively in the Mediterranean Sea, and can be used to selectively target commercial species in a mixed demersal fishery. Some preliminary results on tests carried out with a super-shooter TED mounted on a pelagic trawl net were also showed. TED seems to allow the exclusion of debris and also of large animals. This is not a great economic problem given that the target species of this fishing activity are anchovies and sardines which are very small.

Presentation 15.

Effet de la nature de l'appât sur les captures accidentelles des tortues marines aux palangres de surface. Echwikhi K., Jribi I., Bouain A., Bradai M.N.

Les tortues marines sont des espèces migratrices menacées d'extinction. Durant leur migration, elles s'affrontent à plusieurs menaces dont l'interaction avec les engins de pêche qui engendre des captures accidentelles très importantes menaçant les populations à travers le monde entier.

Parmi ces engins de pêche, les palangres de surface provoquent des captures non négligeables en Méditerranée. Le taux de capture a été estimé dans la région sud du golfe de Gabès (Tunisie) à 0,806 tortues/1000 hameçons.

Dans le but d'étudier l'effet de l'appât sur la réduction des captures accidentelles aux hameçons dans la région du golfe de Gabès, nous avons comparé entre l'utilisation du maquereau *Scomber scombrus* et celle de la pastenague *Dasyatis sp*, couramment utilisés comme appâts dans la région.

Les résultats montrent que l'utilisation de *dasyatis sp* comme appât réduit remarquablement les captures accidentelles des tortues marines et améliore les captures des espèces cibles (*Carcharhinus plumbeus* et *Xiphias gladius*). Faut-il recommander son utilisation surtout que les espèces ciblées, accessoires et utilisées comme appâts sont menacées ou dont l'exploitation doit être réglementée ?

Presentation 16.

Draft Guidelines for reducing by catch of seabirds in the Mediterranean region. Cebrian M.D.

Scientific evidence points to bycatch as the main cause for population decline in many seabird species around the world. Seabirds have become increasingly dependent on their association with fisheries for individual survival and breeding success. In so doing, they are augmenting the risk that they become injured and/or die and that their populations decrease as a result. Mediterranean fisheries, where they have been investigated, have been found to cause seabird bycatch in relevant numbers.

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A risk assessment of seabird-fishery interactions for the Mediterranean region was undertaken and shows that shearwaters (*Calonectris diomedea*, *Puffinus mauretanicus* and *P. yelkouan*) are the species most at risk, and that longline fisheries represent the most immediate threat, although mortality probably occurs in trawling fisheries as well. Shearwaters are also the species of highest (global and regional) conservation concern. Other species and other fisheries are also of concern and should be addressed.

Several mitigation measures have been developed in various fisheries around the world and have proven to be effective in reducing bycatch to negligible levels. Best practice recommends a combination of measures, because considerable testing has shown that a suite of measures is the best way in most cases. The document presented at the meeting provided the state of the art on the issue.