Subcommittee on Marine Environment and Ecosystems (SCMEE)

Scientific Advisory Committee (SAC)

General Fisheries Commission for the Mediterranean (GFCM)

Málaga, May 10-12, 2004

1) Opening of the meeting

1.1 The fifth meeting of the SCMEE (Subcommittee on Marine Environment and Ecosystems) of the GFCM was held in Málaga, Spain from 10 to 11 May, 2004.

1.2 Twenty scientists from seven countries assisted the SCMEE (Appendix A).

1.3 The agenda of the Subcommittee was adopted (Appendix B) and the list of documents updated. The final list of documents presented during the meeting is attached as Appendix C.

1.4 A. García (IEO) chaired the Session and A. Hawkins (NSCFP, North Sea Commission Fisheries Partnership) acted as Rapporteur.

1.5 The Subcommittee proceeded to the first topic on which the SAC had sought advice.

2) Information on incidental catches of protected species and on the by-catch of large migratory sharks

2.1 Document 1 reviewed several activities which had been initiated to examine the capture of sharks. Recently, STECF (Scientific, Technical and Economic Committee on Fisheries of the EU) had held a meeting on Cartilaginous fishes. FAO had also taken a lead by producing a Catalogue of Sharks of the World, and this would be followed by a Catalogue of Batoids (skates and rays). FAO was also producing a field guide on Sharks and Rays in the Red Sea and in the Mediterranean, this last one with the support of COPEMED. This follows a new cladistic classification. Information will be provided on each species, including details of capture in any fishery and the conservation status.

2.2 A representative informed the SCMEE that a plan of action on sharks in the Mediterranean was adopted last November under the Barcelona convention. Amongst the various activities, is a conference planned for 2005 to assess the conservation status of the main cartilaginous species of fish. Research programs are also being organized for the European Seas and an initiative is being taken by the IUCN.

2.3 The MED-LEM (Mediterranean Large Elasmobranchs Monitoring), a draft project proposal, was described in Document 2. The compilation of data for this proposal began one year ago and is being discussed with FAO and other agencies with a view to their adopting it officially. The proposal is to

establish a common protocol for data collection and to establish a data base recording when fish are caught, whether for fins, skin, jaws or meat, or as a by-catch, and also to record sightings and strandings. A data base has already been set up, although the majority of records are for the basking shark. There has been some on-board monitoring from commercial fleets. The priority is now to present the project to FAO, IUCN and the EU for endorsement and funding.

Recommendation: The SCMEE invites SAC to take into consideration the adoption of the MED-LEM protocols and information system by FAO, IUCN and the EU in the wider perspective of sharing and distributing information on Large Elasmobranchs.

2.4 Document 3 introduced the project for assessing and mitigating the adverse effects of interactions between cetaceans and fisheries being developed by the Secretariat of ACCOBAMS[1] in collaboration with RAC-SPA, GFCM, COPEMED, ADRIAMED and MEDSUDMED. The main issue is that the incidental catches of cetaceans threaten these species. It is a priority to implement conservation measures and to minimize any adverse effects from fisheries. The project is aimed at collecting new data, at mounting an awareness campaign with fishers, and taking pilot actions to assess conservation tools like pingers and acoustic harassment devices (AHDs). A series of objectives have been prepared and detailed Work Plans developed and time-tabled. A budget has also been estimated.

2.5 The Subcommittee concluded that this project was an important one, which would contribute towards minimizing the negative impact of fishing on cetaceans populations. As for the estimated project costs, some participants emphasized that the cost had been underestimated. There might be scope for the manufacturers of pingers and AHD's to contribute to the project costs, if only by supplying hardware at a reduced price. Fisher's associations might also contribute if they could be persuaded that these devices would reduce the cost to them of damage to their nets.

2.6 Document 4 provided information on a series of Action Plans that had been adopted under the Barcelona Convention, over and above the plan already mentioned for Cartilaginous Fishes. There are Action Plans for the Mediterranean Monk Seal and for Marine Turtles and Cetaceans. Two new Action Plans have been adopted for the conservation of Bird species, listed in Annex II to the SPA protocol, and for the conservation of Cartilaginous Fishes. And there is a strategic action program for the Conservation of Biological Diversity, which would address the effects of fishing on non-consumed species, discards, by-catches and ghost fishing. Although, these various Action Plans are not mandatory, they have been adopted by the contracting parties of the Barcelona Convention.

[1] www.ACCOBAMS.net

2.7 Recommendations referred to above items: There was strong support from the Subcommittee for Regional Programs aimed at monitoring by-catches of all vulnerable or endangered species in the Mediterranean, including the two new initiatives (for Cartilaginous Fishes and Cetaceans). The Subcommittee stressed the importance of coordinating these initiatives, by ensuring that all the funding agencies were aware of them, and by ensuring that the scientific institutes also knew of their existence. Many of those institutes already have relevant programs of their own. They could also ensure that delegates to various meeting of the funding agencies were aware of the initiatives and the institution's support for them. The EU is already funding some fisheries data collection program under the Data Collection Regulation (National Data Collection Programs). Some of the priority species including Large Pelagic Sharks are already included. The EU Data Collection Regulation is currently being revised. The next opportunity to insert new species or new protocols will be in 2006, when recommendations from GFCM, or from EU Member States, through the Working Group dealing with this regulation, can take new proposals forward.

3) Ecosystem based approach to fisheries, and updated information on mapping of essential fish habitats

3.1 Document 5 dealt with the problems of applying the ecosystem approach to fisheries. There has been much discussion of this subject and the concept of the ecosystem approach is firmly embedded in many key international documents. However, this concept remains confusing and has yet to be implemented in practical terms. The ecosystem approach is really a societal concept, rather than a scientific one.

The ecosystem approach has different meanings to different people. To the politicians, it is an attitude or mind-set based on the principle that the broader environment must be considered when fishing is being regulated. To scientists, it is the process of setting and attaining ecosystem objectives, which involves setting indicators and reference points. To stakeholders, it is the goals themselves. The EU has firmly endorsed the ecosystem approach and is trying to apply it as part of a new environmental strategy and also, through the CFP (Common Fisheries Policy). A Marine Strategy, soon to be published, will set out new steps for achieving greater control involving all sectors. A new European Council Regulation 2371 aims at progressive implementation of the ecosystem approach. The new Regional Advisory Councils (RAC) may help to introduce a pragmatic version of the ecosystem approach. They are regionally based and involve stakeholders.

In the Mediterranean, RACs are a less satisfactory vehicle, as the fisheries are more diverse, and many states outside the EU share the same stocks. Here GFCM, through regional projects offers an alternative. The RACs and the GFCM will need the support of scientists. Research priorities have been identified. There is a need for better understanding of marine food webs and the need to set ecosystem objectives, indicators and reference points. A

pragmatic way of implementing the ecosystem approach is needed, which will set clear goals and adopt the necessary management measures.

In discussion two different views developed, there was a general agreement that pilot studies in particular regions were needed to define ecological indicators and indices, and try them out in practice. However, scientists stressed the lack of basic information and stressed the difficulties in setting simple indices.

3.2 Document 6 introduced a case study involving mass-balance modelling of an intensively exploited ecosystem in the NW Mediterranean Sea. The ECOPATH model was able to model the system satisfactorily because there was a clear knowledge of ecosystem structure. The model revealed the adverse impact of overfishing. The next stage will be try to set management objectives and to simulate management strategies.

3.3 Document 7 dealt with the development of a quantitative ecosystem based indicator - in this case, the composite indicator PPR-TL_{catch} – the percentage of the primary production required to sustain fisheries (PPR) and the average trophic level of the catch (TL_{catch}).

This indicator had been compiled for a range of areas. It had required in each case a thorough knowledge of the ecosystem, and in particular, a knowledge of diets and good quality catch data. An estimate had to be made of the transfer efficiency between trophic levels. The indicator had proved to have general applicability. It represented an important step forward in understanding the concept of ecosystem overfishing. The results pointed towards current fishing strategies being unsustainable in a number of areas, including the southern Catalán Sea fishery.

3.4 In discussion, it emerged that it would be difficult to apply the model to a system subjected to continuous stress and change, like an upwelling system. Some pelagic ecosystems may fall within this category, as they can be greatly influenced by environmental change. Nevertheless, the paper provided an example of a generalized ecosystem indicator which might have value for analysing a wide range of fisheries.

Fishery managers are depending upon scientists to enable them to assess the risks in managing particular fisheries. It is important to develop a set of ecological indices for the Mediterranean fisheries. The Subcommittee considered that the best way to achieve this is by focusing on pilot projects, based on particular fisheries, where the necessary detailed information can be acquired and various operational tools evaluated.

Recommendation: The Subcommittee recommended that the development of ecosystem based management tools is best achieved through a projects on a sub-regional scale. (see recommendation section 7).

3.5 Document 8 presented a summary of the main information available on the diversity, structure and functioning of Mediterranean deep sea ecosystems and the impact of fishing upon them. A final version of this paper will be available for the next SAC meeting. Much of the deeper part of the Mediterranean is in international waters. The deep Mediterranean is quite young compared to the other main ocean basins and is markedly oligotrophic, especially the eastern basin, and dependent on inputs from the pelagic ecosystems above. The Mediterranean basins are therefore not so independent as other deep sea ecosystems. The main threat, especially to sessile organisms is from trawling for deep sea prawns. Discards from the near surface fisheries may favour scavenging species in the deep sea. Pollution may also pose problems for the Mediterranean deep sea, and climate change might affect the quality and quantity of food reaching the deep sea. There are a number of extreme environments in the Mediterranean including mud volcanoes and deep sea regions exist with chemosynthetic communities giving rise to high biodiversity. Brine pools at depths greater than 3000 m have particular communities. There are also deep sea coral mounds and sea mounts which may require protection.

There is a shift towards deeper fisheries in the Mediterranean as fleets expand and move away from the exploitation of existing resources. However, the deep sea resources show low biomass and low diversity of commercial species and organisms show a conservative ecological strategy of low growth rates and low metabolic rate. These resources cannot sustain heavy fisheries.

Recommendations: Current scientific advice does not support any expansion in the range of depths at which fishing takes place. There is a strong opinion from some scientists from the NW Mediterranean that fishing at depths greater than 1000m should not take place, based on a precautionary approach. The Subcommittee recommends that SAC should analyze the conservation benefits to be gained from setting limits to the depths at which fishing takes place and balance these against the cost to fishermen.

Mapping of fish habitats

3.6 Several papers were presented on the mapping of fish habitats. Document 9 provided information on the spawning grounds of European anchovy in the Sicilian Channel. The authors had studied the effects of the general surface circulation on the spawning of anchovy. There was a clear correlation between anchovy egg distribution and the path of Atlantic Ionian stream (AIS). The AIS path is variable from one year to another and changing hydrographic conditions greatly influence the success of spawning.

3.7 Document 10 presented the mapping of sardine spawning grounds off the Spanish Mediterranean coasts using the pump egg sampling system CUFES. This sampling method offers a means for continuous sampling from a vessel. Although the system proved to be useful for mapping spawning grounds due

to a fixed depth at sampling, it does not provide a true estimate of egg abundance. The study revealed a spawning anomaly in the northern waters possibly caused by unknown environmental factors.

3.8 Document 11 characterized the bluefin tuna spawning habitat in the Balearic Sea in relation to the key hydrographic features. Bluefin spawning is associated primarily with a temperature regime, but it is greatly affected by the circulation pattern, and its associated frontal and gyral structures, which may play an important role in larval survival.

3.9 Document 12 reports on the MedSudMed expert consultation on "small pelagic fish species: stock identification and oceanographic processes influencing their abundance and distribution" hosted by INSTM, Salammbô, Tunisia in October 2003. Researchers brought together during the meeting highlighted the main gaps in the knowledge on this issue (spatial distribution and migration of adults, transport of eggs and larvae, and relationships with abiotic factors). They agreed on a series of activities to be conducted in the framework of MedSudMed and on the development of a database managing information resulting from echo-surveys and ichtyoplankton surveys. As a follow up to the expert consultation, joint surveys at sea should be conducted in the near future, based on a common protocol that was discussed between the participating institutes.

3.10 Such mapping studies were considered by the Subcommittee to be important for relating the distribution and spawning of fish to changes in the environment, which is a key aspect of the ecosystem approach.

A general conclusion from these studies is that some pelagic species respond markedly to changes in oceanographic conditions, and are therefore vulnerable to the effects of climate change. Environmental features can be considered an important driving force, and these must be taken into account when considering area closures. Moreover, recruitment variation in the cases presented is linked to hydrographic variability, and is important for the models used in the management of the fisheries.

3.11 Document 13 presented general information on the exploitation of marine resources along the coast of Algeria.

4) Information on driftnet and surface gillnet fisheries broken down by main basin and geographical sub-areas.

4.1 Important new information was presented, in document 14 dealing with the impact on biodiversity of the large scale driftnet fleet operating in the Alboran Sea. The results of the study are currently in press in a refereed journal and the relevant information is presented in tabular form in Appendix D. The study had confirmed that a large scale driftnet fleet is operating on both sides of the Strait of Gibraltar. The study had also looked at by-catches within this fishery and raised these to a fleet level. Other than

swordfish, the catches had included short-beaked common dolphins, striped dolphins, loggerhead turtles, blue sharks, short-fin makos, thresher sharks and sunfish. From the estimated population levels, the take rates of threatened species of dolphins were between 10-12%, which were not considered sustainable.

Recommendation: Concern was expressed by the Subcommittee over these concrete findings. It is alleged that there are other large scale driftnet fisheries operating in other parts of the Mediterranean. Their impact on biodiversity and on threatened or endangered species causes the SCMEE concern. The SCMEE invites the SAC to address the issue.

5) Impact of surface and bottom longline fisheries on non-commercial fish species, birds and turtles

5.1 The issue of whether endangered species were caught as a by-catch or in a directed fishery was considered important. If they were by-catches, fishers might be prepared to cooperate in the development of measures to reduce them. In the case of some sharks, this could be done by attaching the hook with a weaker monofilament trace, rather than a steel wire.

Although no papers were presented addressing this issue, in discussion it was stressed that surface longlines were a perfectly valid method for catching some large pelagic fish. There was a need to look closely at measures to prevent threatened or endangered species being caught. Projects were already underway to modify hooks (use of circle hooks), to separate the bait from the hook, and to shoot or haul line through protective tubes. It was suggested that sound producing devices might be scare away turtles and perhaps birds. Any results regarding such experiments will be welcome by the SCMEE.

6) Geographical occurrence, seasonality, extent and effects of mucilaginous algal blooms

6.1 COPEMED (Document 15) described a regional training course on harmful algal blooms held in the INSTM at Salammbô, Tunisia under UNESCO-IOC. The course looked at species identification and monitoring programs. Participants were from the North African countries and all had some prior experience. Theoretical and practical lessons were given. Morocco and Tunisia were the only countries currently running monitoring programs in relation to shellfish harvesting.

A working group has been established to promote a regional network on this topic.

6.2 Document 16 described the formation and the distribution of mucilaginous aggregates in the Tyrrhenian and Adriatic Seas. There are two most common kinds of aggregates; benthic filamentous algae and pelagic mucilages formed by planktonic matters from different sources. Benthic algae can cover wide

areas of rocky seabeds. They have a seasonal development from spring to summer when a thick blanket may form. The extent is different from year to year. Two species of chrysophites and one phaeophyte are the main algae responsible. They can set on *Posidonia* meadows or on gorgonians causing necrosis of polyps. Meteorologically calm conditions further their spread. Pelagic mucilages are more common in the Northern Adriatic, where the aggregates can be meters long and can form an almost continuous false bottom layer at the pycnoclines. They can rise up to the surface or sediment to the bottom entrapping suspended matter. The material has its origin in marine plankton and consists mainly of polysaccharides. Diatoms and dinoflagellates contribute to the formation of the aggregates. The efficiency of microbial degradation is a relevant factor for the accumulation of the material. A depletion of phosphorous may result in bacteria no longer be able to degrade organic matter. The circulation pattern and an increase of the water residence time favour the aggregation processes. The aggregates may have an impact on the seabed if they sediment out, creating patches of anoxia. They may also clog fishing nets and have an adverse effect upon mussel farms. However, since they form as a result of natural processes, they cannot be controlled by man. The extent to which the fishing fleet is affected depends on the duration and extent. The trend in climatic changes seems to affect the frequency of occurrence of mucilage events.

7) Species assemblages where trophic and biological links are well identified with a view of progressively implementing an ecosystem approach to fisheries

7.1 There were no specific presentations on this subject, yet previous papers presented under item 3 were very relevant for the discussion. The Subcommittee considered it important to apply the ECOPATH model to a number of ecosystems in the Mediterranean, including the eastern Mediterranean, where oligotrophic conditions are more pronounced. Models from different areas would allow comparisons to be made between heavily exploited and less exploited areas. ECOPATH was considered an initial step towards ecosystem analysis because it has been widely applied and is well supported. The key data required include well-defined biological groupings, knowledge of biomasses, trophic information, and data on catches by fleet and catch composition.

Following analysis using ECOPATH, dynamic simulations could be carried out using the ECOSIM to investigate various management strategies.

Suitable areas might include the Catalán Sea (GSA 06), Balearic Sea (GSA 05), the Adriatic Sea (GSA 17-18), the Alborán Sea (GSA 01), the Gulf of Gabes (GSA 14) as heavily exploited examples, while the Libyan waters (GSA 21) offer the opportunity for investigating less exploited areas.

Recommendation: The SCMEE recommends the SAC to consider organizing an ECOPATH training course, essential to promote this approach focusing on key studies in pilot areas.

8) Effects of fishing gear on marine ecosystems.

8.1 A paper was provided (Document 17) on the use of sort grids to reduce juvenile hake catches, but due to lack of travel funding, the expert was not able to attend the SCMEE. Discussion was deferred because of the lack of expertise on this subject by the participants. The SCMEE highlights the need for funding to permit specialists in this and other relevant subject to attend.

9) Other matters

9.1 A participant informed the SCMEE on the initiative by IUCN and the Federation of European Aquaculture Producers to establish a Mediterranean group of experts to provide advice on best management practices to minimize the impact of aquaculture on the environment. Impact assessment is required in many countries for aquaculture developments, but is often done for individual projects. A more strategic approach is required.

9.2 The GFCM Secretary provided information on the Workshop on Illegal, Unreported and Unregulated (IUU) fishing in the Mediterranean to be held in Rome, Italy on June 23 and 26, 2004.

10) CLOSURE OF THE MEETING

10.1 The SCMEE adopted the report and listed a series of recommendations to the SAC that are included in Appendix E. The chairman closed the session at 12:00 in May 12, 2004.

APPENDIX A

PARTICIPANTS LIST

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APPENDIX B

AGENDA

May 10, 2004

Opening words

Participant's presentation

Adoption of the agenda

1) **Information on incidental catches of protected species and on the by-catch of large migratory sharks**

Presentations:

FAO Plan of Action to implement IPOA-Sharks *by F. Serena and C. Mancusi*

an updating presented during the IUCN SSC Shark Specialist Group Mediterranean Region Red List Workshop - San Marino 29th September 2003).

MEDLEM PROGRAM (MEDiterranean Large Elasmobranchs Monitoring), a proposal *by F. Serena and C. Mancusi*

Draft project on mitigating the adverse effects of interactions between cetaceans and fisheries *by C. Rais*

Actions and measures developed in the framework of the Barcelona Convention to mitigate the effects of incidental or intentional captures in fisheries on Mediterranean endangered or threatened species *by S. El Asmi.*

Coffee break

2) **Topics on the ecosystem based approach to fisheries, and updated information on mapping of essential fish habitats**

Presentations:

Report of the IUCN Fisheries Working Group on the Ecosystem Approach *by T. Hawkins*

Mass-balance modelling of an intensively exploited ecosystem in the NW Mediterranean Sea by *M. Coll , I. Palomera , S. Tudela , F. Sardà*

Developing an operational reference framework for fisheries management based on the composite indicator PPR-Tlcatch by *S. Tudela , M. Coll and I. Palomera*

The Mediterranean deep-sea ecosystems: an overview of their diversity, structure, functioning and fishing impacts *by S. Tudela and F. Simard*

Lunch break

Coupling phenomena between the hydrographic circulation in the Strait of Sicily and the reproductive strategy of the European anchovy Engraulis encrasicolus: effects on distribution patterns of spawning grounds *by B. Patti,, A. Cuttitta, A. Bonanno, G. Basilone, G. Buscaino, C. Patti, J. García Lafuente, A. García and S. Mazzola*

Mapping of sardine (*Sardina pilchardus*) spawning grounds off the Spanish Mediterranean coasts by means of the CUFES and plankton hauls by *García, A., J. Quintanilla, J.M. Rodríguez and F. Alemany*

Characterization of the bluefin tuna spawning habitat off the Balearic archipelago in relation to key hydrographic features and associated environmental conditions. *by García, A., F. Alemany, P. Velez-Belchí, J.L. López Jurado, D. Cortés, J.M. de la Serna, C. González Pola, J.M. Rodríguez, J. Jansá and T. Ramírez*

Summary of the MedSudMed expert consultation on small pelagic fish species: stock identification and oceanographic processes influencing their abundance and distribution. *Presentation by T. Bahri*

L'Exploitation durable et la protection des ressources halieutiques en Algérie (The safeguarding of aquacoles in Algeria) by *H. Farouk*

3) **Protection measures applicable to driftnet and surface gillnet fisheries broken down by main basin and geographical sub-areas**.

Presentations:

Description and biodiversity impact of the large-scale driftnet fleet operating in the Alboran Sea (SW Mediterranean) *by S. Tudela*

4) Impact of surface and bottom longline fisheries on non-commercial fish species, birds and turtles

Group Discussion

5) Geographical occurrence, seasonality, extent and effects of mucilaginous algal blooms

Presentations:

COPEMED Report on Training Course on Harmful Algal Blooms *by P. Hernandez*

Mucilaginous aggregates in the Tyrrhenian and Adriatic seas *by M. Giani*

May 11, 2004

6) Species assemblages where trophic and biological links are well identified with a view of progressively implementing an ecosystem approach to fisheries

Group Discussion

7) effects of fishing gear on the marine ecosystems.

Group Discussion

Presentations:

- Commercial application of a sort grid to reduce juvenile hake (Merluccius merluccius, L.) catches in the western Mediterranean demersal trawl fishery

  by F. Sardà, F. Sardà-Palomera and B. Molí

- "Sampling strategies to evaluate the response of benthic communities and sediment considering different levels of fishing activity (RESPONSE EU project) " *by Recasens, L., Demestre, M., De Biasi, A., Schroeder, A. and Kaiser, M*

8) Other matters

- Information on the Mediterranean Group of Experts on Sustainable Aquaculture (IUCN-FEAP)
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9) Adoption of the report

May 12, 2004

9) Adoption of the report (continued)

APPENDIX C:
LIST OF DOCUMENTS

Reference	Title	Presented by:
1	FAO Plan of Action to implement IPOA-Sharks	F. Serena
2	MEDLEM PROGRAM (MEDiterranean Large Elasmobranchs Monitoring), a proposal	F. Serena
3	Draft project on mitigating the adverse effects of interactions between cetaceans and fisheries	C. Rais
4	Actions and measures developed in the framework of the Barcelona Convention to mitigate the effects of incidental or intentional captures in fisheries on Mediterranean endangered or threatened species	S. El Asmi
5	Report of the IUCN Fisheries Working Group on the Ecosystem Approach	T. Hawkins
6	Mass-balance modelling of an intensively exploited ecosystem in the NW Mediterranean Sea	S. Tudela
7	Developing an operational reference framework for fisheries management based on a two dimensional indicator on ecosystem impact	S. Tudela
8	The Mediterranean deep-sea ecosystems: an overview of their diversity, structure, functioning and fishing impacts	S. Tudela
9	Spawning grounds of the European anchovy Engraulis encrasicolus in the Strait of Sicily (G.S.A. 16) and relations with hydrographic surface circulation	S. Mazzola
10	Mapping of sardine (Sardina pilchardus) spawning grounds off the Spanish Mediterranean coasts by means of the CUFES and plankton hauls	A.García,
11	Characterization of the bluefin tuna spawning habitat off the Balearic archipelago in relation to key hydrographic features and associated environmental conditions.	A.García,
12	Summary of the MedSudMed expert consultation on small pelagic fish species: stock identification and oceanographic processes influencing their abundance and distribution	T. Bahri
13	L'Exploitation durable et la protection des ressources halieutiques en Algérie (The safeguarding of aquacoles in Algeria)	H. Farouk
14	Description and biodiversity impact of the large-scale driftnet fleet operating in the Alboran Sea (SW Mediterranean)	S. Tudela
15	Report on Training Course on Harmful Algal Blooms	P. Hernandez
16	Mucilaginous aggregates in the Tyrrhenian and Adriatic seas	M. Giani
17	Commercial application of a sort grid to reduce juvenile hake (Merluccius merluccius, L.) catches in the western Mediterranean demersal trawl fishery	No presentation

APPENDIX D

INFORMATION ON THE ALBORAN SEA DRIFNET FISHERY

Source for Tables 1 to 5 presented here:

Tudela, S., Kai Kai, A., Maynou, F., El Andalossi, M. and Guglielmi, P. (2004, in press). Driftnet fishing and biodiversity conservation: the case study of the large-scale Moroccan driftnet fleet operating in the Alboran Sea (SW Mediterranean). ***Biological Conservation***

1. Characteristics of the Moroccan fleet using large-scale driftnets in the Mediterranean (Alboran Sea), Straits of Gibraltar and adjacent Atlantic waters.

Table 1. Average gear length and size of the active driftnet fleet identified and sampled in Moroccan ports (Mediterranean and adjacent Atlantic waters). The moment of the survey is indicated. Most of the fleet used driftnets all year round, subject to suitable weather conditions.

	Number of active driftnet boats	Mean net length (km ± S.D.)	Mean engine power (hp ± S.D.)
Al Hoceima (Jan 2003)	28	6.88 ± 3.0	149.28 ± 41.3
Tangiers (Jan 2003)	77	8.05 ± 1.7	190.64 ± 100.6
Tangiers (Aug 2003)	53 [a]	5.86 ± 2.5	115.24 ± 76.8
Tangiers (Total)	130	7.15 ± 2.3	159.90 ± 98.6
Nador (Aug 2003)	19	6.57 ± 1.0	127.78 ± 34.9
Larache (Jun 2003 [b])	± 30	8-10	-
Asilah (Jun 2003 [b])	± 10	4.8-10	-

[a] only the new active units, not using driftnets during the previous Jan 2003 survey, are reported
[b] exploratory survey

Table 2. Total catches achieved by 5 boats based in Al Hoceima monitored on a daily basis during the period of sampling Dec 2002/Jan 2003 to Sep 2003 relative to the set of target and by-catch species selected for this study. Data from 369 fishing operations –all of them carried out in the Mediterranean Sea- have been pooled.

Species	n
Swordfish[1] (*Xiphias gladius*)	2990
Dolphins (*D. delphis* and *S. coeruleoalba*)	237
Loggerhead turtle (*Caretta caretta*)	46
Blue shark (*Prionace glauca*)	498
Shortfin mako (*Isurus oxyrinchus*)	542
Thresher shark (*Alopias vulpinus*)	464
Sunfish[2] (*Mola mola*)	508

[1]including a small number (about 4%) of billfishes
[2]sunfish catches are slightly underreported for one of the boats

2. Catch rates of swordfish and selected by-catch species in the Alboran Sea.

Table 3. Catch rate estimates (CPUE) for swordfish and selected by-catch species achieved by the fleet from Al Hoceima. Two different scenarios are presented for pelagic sharks ('low' and 'high'), attributable to 1) a purely by-catch capture pattern (approx. 2/5 of the fleet) and 2) a target fishing pattern (approx. 3/5 of the fleet), as revealed by GLM statistical analyses.

	Period	Capture per fishing operation (N/fishing operation)	Capture per km net set (N/km)
Xiphias gladius[1]	Dec-Sep	8.102	0.810
Caretta caretta[1]	Dec-May	0.211	0.026
Dolphins[1, 2]	Dec-Sep	0.642	0.060
Prionace glauca	Dec-Sep	0.872	0.117
Prionace glauca	Dec-Sep	1.594	0.121
Isurus	Dec-Sep	0.608	0.059
Isurus	Dec-Sep	1.909	0.145
Alopias vulpinus	Dec-Sep	0.728	0.092
Alopias vulpinus	Dec-Sep	1.528	0.117

[1]Catch rates shown are just for comparative purposes, since GLM analyses revealed a strong seasonality; in the case of loggerhead turtle, rates are only estimated for the annual period concentrating the bulk of by-catches[2] both species (*D. delphis* and *S. coeruleoalba*) pooled

3. Dolphin and pelagic sharks by-catch estimates in the Mediterranean (Alboran Sea), Straits of Gibraltar and adjacent Atlantic waters.

Table 4. Estimates (in number of individuals) of the annual catch of dolphins and pelagic sharks by drifnetters from Alhoceima and Nador (fishing area: Alboran Sea; left) and Tangiers (fishing area: Straits of Gibraltar and adjacent Atlantic waters; right) based on the ratio method (Cochran, 1977; Hobbs and Jones, 1993) and using the daily catch per boat (*N/fishing operation*) as a measure of catch per unit effort (CPUE). Estimates for the 8-month sampling period have been extrapolated to a 12-month period. Category 'dolphins' includes equal proportion (50%) of *Delphinus delphis* and *Stenella coeruleoalba*. Estimates for the Tangiers fleet rely on the assumption of same catch rates as in the Central Alboran Sea.

	Alboran Sea		Straits and adjacent Atlantic	
	total catch	95% CI	total catch	95% CI
Dolphins	3,646.88	536.81	13,358.30	1,768.61
Prionace glauca	7,562.09	822.62	26,110.16	4,274.05
Isurus	8,186.94	1,047.67	26,944.76	6,712.94
Alopias	7,186.82	803.71	24,441.69	4,116.95

4. Take rates by the driftnet fleet on the dolphin populations occurring in the Alboran Sea.

Table 5. Take rates by the driftnet fleet on the dolphin populations occurring in the Alboran Sea. Population sizes are from Forcada (1996).

	Population size	annual by-catch	Take rate (%)
D. delphis	14,736	1,823	12,3
S. coeruleoalba	17,728	1,823	10,2

APPENDIX E

LIST OF RECOMMENDATIONS

1) General Recommendations regarding item 2 (Information on incidental catches of protected species and on the by-catch of large migratory sharks)

- The SCMEE invites SAC to take into consideration the adoption of the MED-LEM protocols and information system by FAO, IUCN and the EU in perspective of sharing and distributing the information on Large Elasmobranchs.
- There was strong support from the Subcommittee for Regional Programs aimed at monitoring by-catches of all vulnerable or endangered species in the Mediterranean, including the two new initiatives (for Cartilaginous Fishes and Cetaceans). The Subcommittee stressed the importance of coordinating these initiatives, by ensuring that all the funding agencies were aware of them, and by ensuring that the scientific institutes also knew of their existence. Many of those institutes already have relevant programs of their own. They could also ensure that delegates to various meeting of the funding agencies were aware of the initiatives and the institution's support for them. The EU is already funding some fisheries data collection program under the Data Collection Regulation (National Data Collection Programs). Some of the priority species including Large Pelagic Sharks are already included. The EU Data Collection Regulation is currently being revised. The next opportunity to insert new species or new protocols will be in 2006, when recommendations from GFCM, or from EU Member States, through the Working Group dealing with this regulation, can take new proposals forward.

2) Recommendation regarding item 3 and 7 (Ecosystem based approach to fisheries and updated information on the mapping of fish habitats)(Species assemblages where trophic and biological links are well identified with a view of progressively implementing an ecosystem approach to fisheries)

- The Subcommittee recommended that the development of ecosystem based management tools is best achieved through a projects on a sub-regional scale.
- Current scientific advice does not support any expansion in the range of depths at which fishing takes place. There is a strong opinion from some scientists from the NW Mediterranean that fishing at depths greater than 1000m should not take place, based on a precautionary approach. The Subcommittee recommends that SAC should analyze the conservation benefits to be gained from setting limits to the depths at which fishing takes place and balances these against the cost to fishermen.
- The SCMEE recommends the SAC to consider organizing an ECOPATH training course, essential to promote this approach focusing on key studies in pilot areas.

3) Recommendation regarding item 4 (Information on driftnets and surface gillnet fisheries broken by main basin and geographical subareas.

- Concern was expressed by the Subcommittee over the concrete findings of Document 14. It is alleged that there are other large scale driftnet fisheries operating in other parts of the Mediterranean. Their impact on biodiversity and on threatened or endangered species causes the SCMEE concern. The SCMEE invites the SAC to address the issue.