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GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

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DRAFT DOCUMENT ON UPDATING THE SAC REFERENCE FRAME AND ESTABLISHING A MEDIUM-TERM STRATEGIC PLAN FOR THE FUTURE BY J.J. MAGUIRE*

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Executive Summary

The review found that SAC has considerable achievements over the period reviewed. Strengths and weaknesses were identified from the point of view of the author. Not surprisingly, there was a close correspondence between strengths and weaknesses, that is, strength and weaknesses are often the two sides of the same coin. A vision is proposed, based on the implementation of an Ecosystem Approach to Fisheries where *SAC provides useful, reliable, relevant and implementable advice to make improvements under the four components of sustainability through a process that is based on: 1) Objectivity and integrity, 2) Openness and transparency, 3) Quality assurance, 4) Integrated advice – based on an ecosystem approach, 5) Efficiency and flexibility, and 6) National consensus.*

Résumé

La revue conclue que le CSC a de très nombreuses réalisations à son actif depuis sa création. Les forces et les faiblesses, du point de vue de l'auteur, ont été identifiées et c'est sans surprise qu'on constate une étroite correspondance entre les forces et les faiblesses, qui, souvent, sont les deux faces d'une même pièce. Une vision est proposée fondée sur la mise en œuvre d'une Approche Écosystémique des Pêches (AEP) où le *CSC fournit des conseils de gestion qui sont utiles, fiables, pertinents et qu'il est possible de mettre en œuvre afin de faire des progrès sous les quatre composantes de la durabilité grâce à un processus qui est fondé sur : 1) l'objectivité et l'intégrité, 2) l'ouverture et la transparence, 3) le contrôle de la qualité, 4) des conseils intégrés dans le contexte de l'approche écosystémique, 5) sur l'efficacité et la flexibilité, et 6) sur le consensus de pays impliqués.*

Background

At its 11th session in December 2008, the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean (GFCM) endorsed the proposal made by its Coordination Meeting of the Subcommittees (CMSC) to develop "*a a medium term strategic plan for the SAC with possible support of consultants and GFCM task force (coordinators, bureau, etc.)*" . The consultant presented a first draft at the 12th session of the SAC in January 2010 and the present draft takes into account the discussions at SAC 12. The draft was circulated to SAC participants and members in early February and this final report takes into account the written comments sent on the updated draft. The final report will be made available to GFCM 34. The terms of reference for the consultants are in Appendix I.

The consultant attended the meetings of the subcommittees (Stock Assessment (SCSA), Statistics and Information (SCSI), Economics and Social Sciences (SCESS), Marine Environment and Ecosystems (SCMEE)) and the Coordinating Meeting of the Subcommittees in Malaga, Spain during November 30 to December 4, 2009 to get a direct experience of the topics covered and the mode of operations of each subsidiary body. The consultant also participated, in a different capacity, in the 2008 meetings of the working groups on the assessment of demersal and pelagic species in September 2008 in Izmir, Turkey and the second meeting of the SAC working group on basic methods and protocols to undertake assessments with direct methods which was held in Tripoli, Libya in June 2008. Previously, the consultant had prepared a report for and participated in the Ad hoc Meeting of Experts on the Independent Appraisal of the Achievements of the Scientific Advisory Committee in 2003.

This report is based on the accumulated knowledge and experience of the consultant in the operations of SAC and of other advisory processes with which the Consultant has experience (ICCAT, ICES, domestic systems in Canada and in the USA (SAW/SARC, SEDAR, STAR)). The main intent is to help move SAC towards greater efficiency and usefulness.
The report does not cover the activities of the joint GFCM working groups with ICCAT.

SAC creation

The Scientific Advisory Committee was created at GFCM 23 in 1998. GFCM agreed "*that SAC should be in a position to provide independent scientific advice, free of any political consideration, composed of specialists. It was stressed that SAC should give advice on the questions that might be put to it by the Commission"* (GFCM 23, parag. 37). "*The Commission further agreed that SAC should, as far as possible, reach its conclusions by consensus* [...]" (GFCM 23, parag. 38). At the same meeting, GFCM agreed that SAC should establish subsidiary bodies "*taking into account the special needs of Mediterranean fisheries*" (GFCM 23, parag 39) and suggested three subcommittees (stock assessment, data collection, and economic and social sciences). Sub-regional working groups were considered but not agreed upon.

At its first meeting, SAC agreed (SAC 1, parag 33) to "*set up a Sub-Committee to deal with matters related to the marine environment (Sub-Committee for Marine Environment and Ecosystems)*". The current structure of SAC is illustrated in Figure 1.

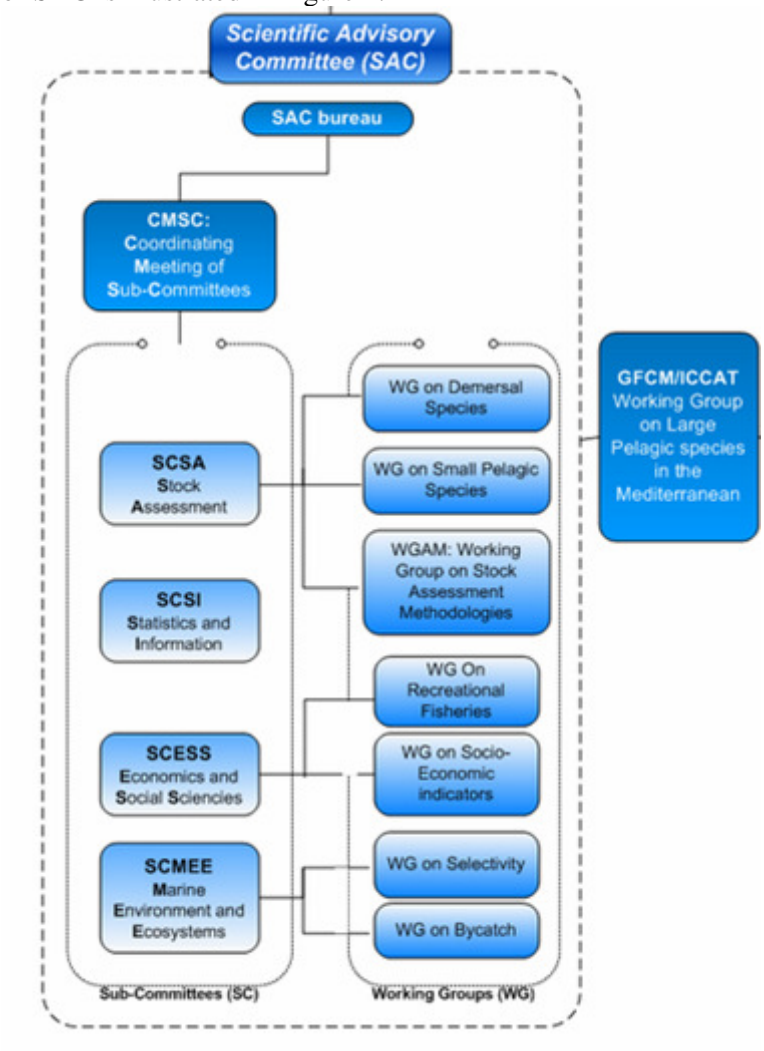


Figure 1: Structure of the Scientific Advisory Committee of the General Fisheries Commission for the Mediterranean (from http://www.gfcm.org/gfcm/about/6/en).

The mandate of SAC (http://www.gfcm.org/gfcm/about/6,2/en) is to
"*Provide independent advice on the technical and scientific bases for decisions concerning fisheries conservation and management, including biological, social and economic aspects, in particular:*

- *assess information provided by Members and relevant fisheries organizations or programmes on catches, fishing efforts, and other data relevant to the conservation and management of fisheries;*

- *formulate advice to the Commission on the conservation and management of fisheries;*
- *identify cooperative research programmes and coordinate their implementation;*
- *undertake such other functions or responsibilities as may be conferred by the Commission.*

And it's structure (also found at http://www.gfcm.org/gfcm/about/6,2/en) is as follows:
SAC operates through five subsidiary bodies:

- *Coordination Meeting of the Sub-Committees (CMSC)*
- *Sub-Committee on Stock Assessment (SCSA)*
- *Sub-Committee on Marine Environment and Ecosystems (SCMEE)*
- *Sub-Committee on Statistics and Information (SCSI)*
- *Sub-Committee on Economic and Social Sciences (SCESS)"*

SAC mode of operation

The first SAC frame of reference was agreed at GFCM 27 in 2002 for 2003 - 2004 and subsequently updated as necessary. Each year, GFCM formally approved the SAC work programme for the following intersessional period.

SAC has a bureau composed of the chairperson and the two vice-chairpersons to handle issues that have to be dealt with intersessionally. SAC itself meets once a year, sufficiently in advance of the Commission to allow time to prepare, distribute and consider its reports and advice. Subcommittees also meet once a year, generally approximately 4 to 6 weeks before the meeting of SAC. Subcommittee meetings are held concurrently in the same location to facilitate exchanges of views on transversal issues. Working Groups are created as needed, including transversal WG to deal with issues concerning more than one subcommittee. The mode of operation of SC and WG has been regularly adjusted to improve efficiency.
The Coordinating Meeting of the Sub Committees (CMSC) was conceived "*as a functional steering group to harmonize disciplinary inputs and outputs from the Sub-Committees and coordinate transversal issues and the preparation of integrated opinions on fisheries management which would be presented to the Committee for discussion. The Committee further emphasized the need to keep the CMSC flexible and responsive, thereby meeting as often as necessary, but reporting formally to SAC with the appropriate format*" (SAC 7, parag. 13).

The SCSA has three working groups, one for small pelagics and one for demersals, to review stock assessments prepared before the WG meetings and perform assessments at the meetings through practical sessions, and a working group on stock assessment methodologies. In 2008, it was agreed that "*assessments undertaken with the support of FAO regional projects and/or other international initiatives, such as the Scientific, Technical and Economic Committee for Fisheries, Sub-groups of the Mediterranean (STCF-SGMED), would be presented directly to the SCSA for review"* (SAC 11, parag. 17). This proved too demanding in time at the SC meeting and in 2010, SAC agreed that the SCSA would not review assessments but would instead focus on the consistency of advice and the identification of technical oversights. The SCESS has a working group on recreational fisheries and one on socio-economic indicators. The SCMEE has working groups on selectivity and on by-catch. Except for the assessment working groups of the SCSA, the other WG generally have a transversal nature, that is, they cover issues related to more than one of the subcommittees.

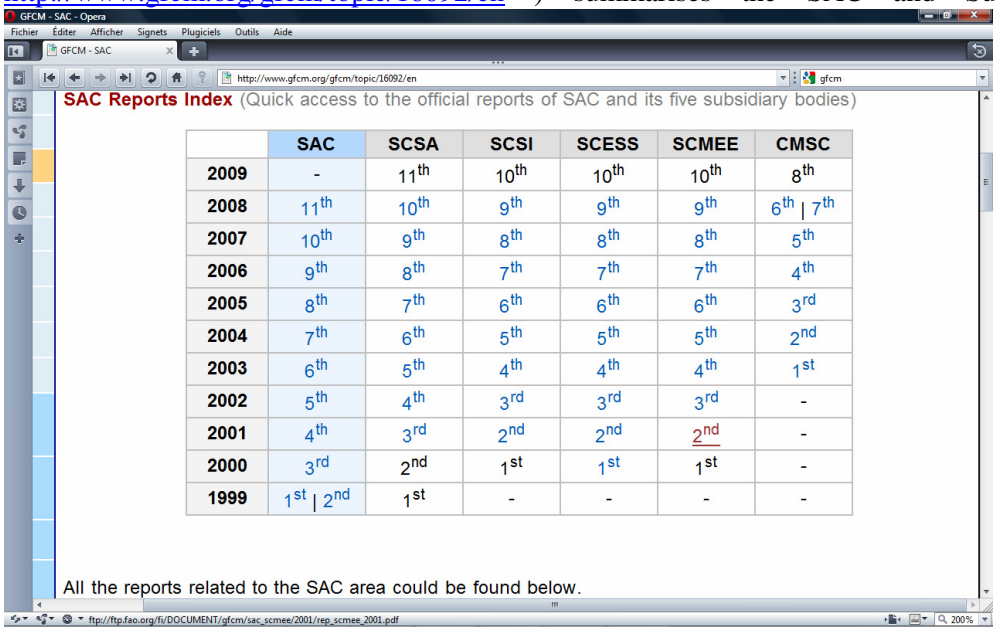
FAO Regional Projects and the European Commission international working group dedicated to the Mediterranean fisheries (STECF-SGMED) make it possible to asses a higher number of stocks and fisheries and to prepare data sets according to needs of the GFCM-SAC Working Group on stock assessment.
Subcommittees and working group are led by coordinators, not chairs. This illustrates the importance given to coordination in the work of SAC's subsidiary bodies.

In 2004, SAC confirmed "*that the Working Groups should be widely open to ensure the greatest participation, while the Sub-Committees could enjoy a more limited participation, especially if a regular attendance of concerned institutes and scientists was ensured*" (SAC 7, parag. 12).

In reviewing the report of the Ad hoc Meeting of Experts on the Independent Appraisal of the Achievements of the Scientific Advisory Committee (1999-2003) "[...] *SAC particularly emphasized the need to foster task-oriented advisory process driven by GFCM objectives and to renew efforts to formulate, whenever possible, multidisciplinary management advice, encompassing multispecies fisheries and in conformity with an ecosystem approach"* (SAC 7, parag. 25).

SAC and all of its subsidiary bodies make every effort to coordinate and collaborate with other organisations in their field of expertise. This has been particularly important in the case of the SCMEEE whose work is regularly enhanced by joint activities with the United Nations Environment Programme Regional Activity Centre for Specially Protected Areas [UNEP RAC/SPA], The World Conservation Union [IUCN], the World Wide Fund for Nature [WWF], ACCOBAMS and the Pelagos Sanctuary.

The first and second meeting of SAC were held in 1999, and there was also a meeting of the SCSA in the same year. The other subcommittees met for the first time in 2000 and the Coordinating Meeting of the Subcommittees met first in 2003. The screen shot below (Figure 2) from the GFCM web site (at http://www.gfcm.org/gfcm/topic/16092/en) summarises the SAC and Subcommittee meetings:



	SAC	SCSA	SCSI	SCESS	SCMEE	CMSC
2009	-	11th	10th	10th	10th	8th
2008	11th	10th	9th	9th	9th	6th | 7th
2007	10th	9th	8th	8th	8th	5th
2006	9th	8th	7th	7th	7th	4th
2005	8th	7th	6th	6th	6th	3rd
2004	7th	6th	5th	5th	5th	2nd
2003	6th	5th	4th	4th	4th	1st
2002	5th	4th	3rd	3rd	3rd	-
2001	4th	3rd	2nd	2nd	2nd	-
2000	3rd	2nd	1st	1st	1st	-
1999	1st | 2nd	1st	-	-	-	-

Figure 2: History of the meetings of SAC and of its subsidiary bodies.

SAC achievements

A brief review of the available documentation shows that SAC was successful in holding productive meetings every year since its creation and that considerable work has been done by SAC itself and by its subsidiary bodies.
Attendance[1] (Figure 3) has been relatively steady with generally around 30 participants from 15 to 20 countries being involved. SAC 1 was the best attended with 42 participants and SAC 8 the least attended with 26 participants. All countries participated in at least one SAC meeting (Table 1): Italy (43), Spain (42), Morocco (37), Greece (25) and Tunisia (23) all sent more than 20 participants in total to the 11 SAC meetings.

[1] Attendance is under-estimated by those numbers because participants from regional projects or from countries not member of GFCM are not included. The same rule was applied for counting participants in the meetings of the Subcommittees.

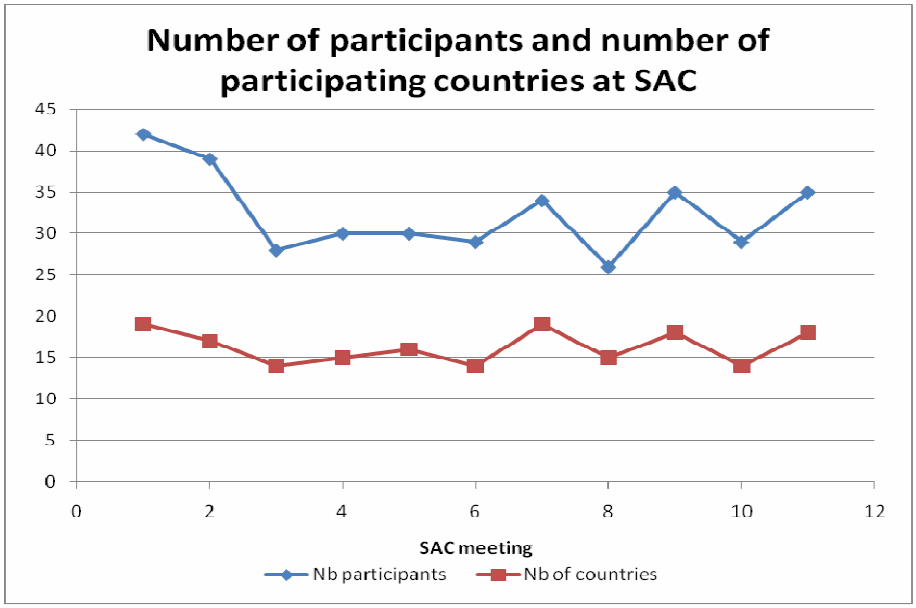


Figure 3: Number of participants and of participating countries in SAC meetings.

Table 1: Number of participants sent by member countries to the 11 SAC meetings.

Albania	15
Algeria	18
Bulgaria	3
Croatia	9
Cyprus	13
EC	18
Egypt	6
France	18
Greece	25
Israel	3
Italy	43
Japan	9
Lebanon	2
Libya	11
Malta	16
Monaco	3
Montenegro	6
Morocco	37
Romania	6
Slovenia	5
Spain	42
Syria	9
Tunisia	23
Turkey	17

Subcommittees

The SCSA benefited from the largest number of participants (Figure 4) with up to 50 participants in its 2005 and 2006 meetings while the SCESS has the smallest number of participants. Note that there was no list of participants in the report of the 2003 meeting of the SCSI.

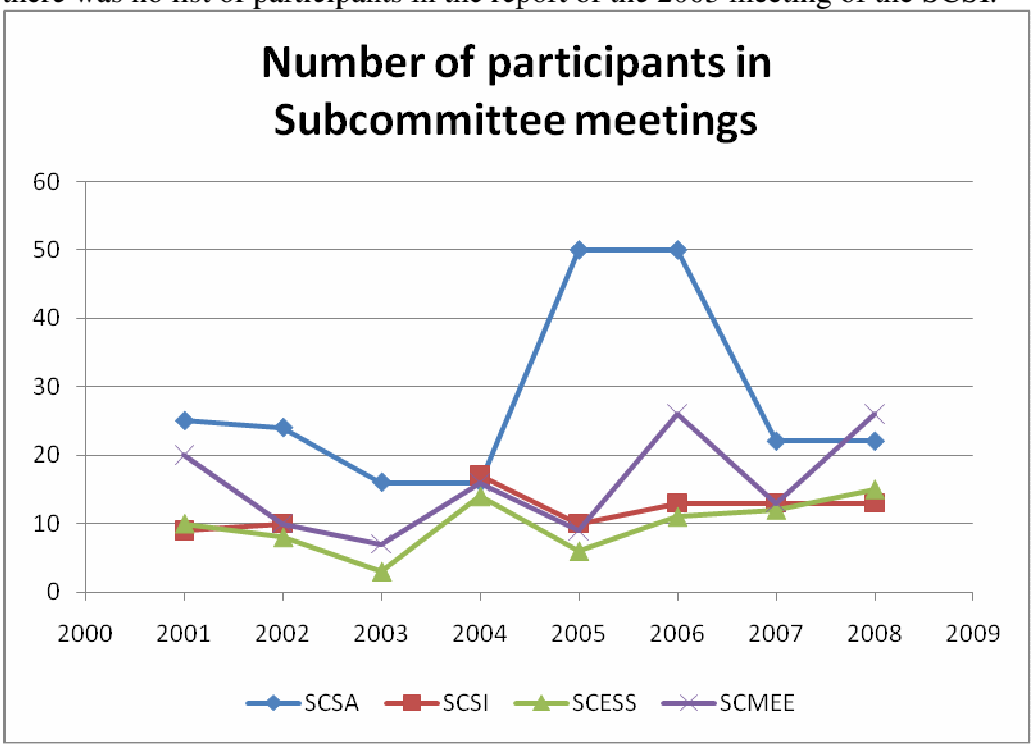


Figure 4: Number of participants in meetings of the Subcommittees.

The SCSA has also the largest number of participating countries, (Figure 5) except in 2004 when the SCSI had the largest number. The SCESS and the the SCMEE had very low participation in the mid 2000s but the situation has improved somewhat in recent years.

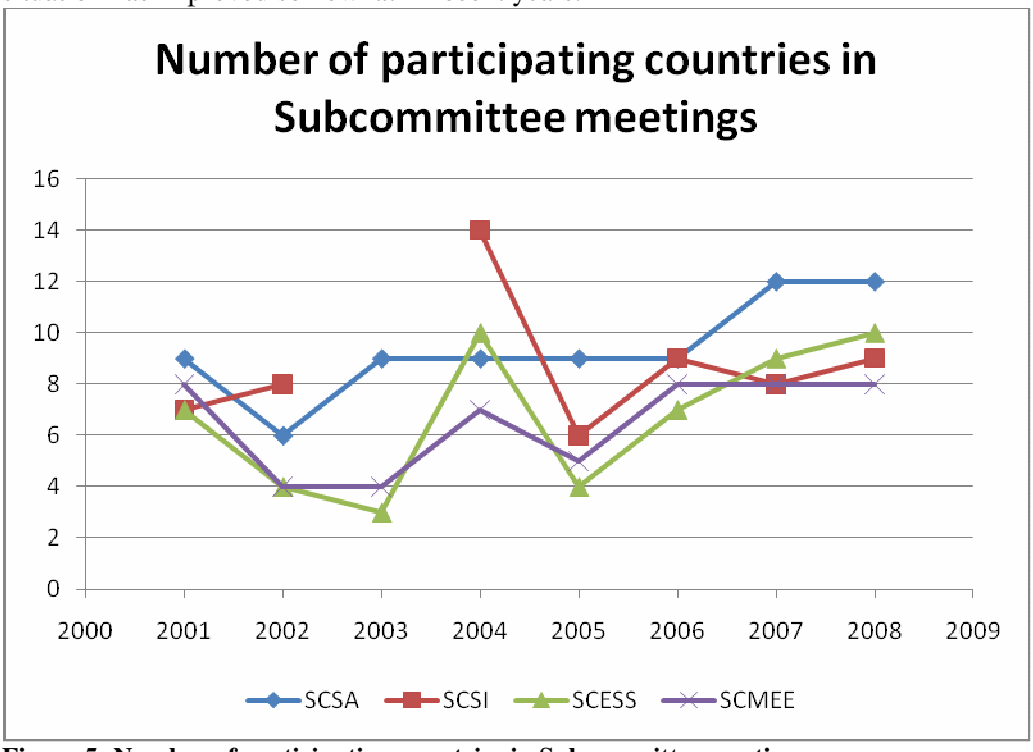


Figure 5: Number of participating countries in Subcommittee meetings.

The following sections summarise selected points for each of the subcommittee based on a review of the SAC reports. This summary is not intended as an exhaustive review of all issues covered by SAC. It is intended to point out a few important issues from the point of view of the consultant. A different consultant might have provided a different summary.

SCSA

In 2001, SAC recommended (SAC 4, parag. 33) "*to GFCM to set up a minimum legal size at length of first maturity as a principle to be applied for all the region, with the precautionary approach*." SAC (SAC 4, parag. 36) identified three shared stocks of hake (Gulf of Lions, Adriatic, Sicily Channel), two of anchovy (Gulf of Lions, Adriatic) one each of sardine, sprat, red mullet, blue whiting and bogue, all in the Adriatic, and three shared stocks of large pelagics. SAC also agreed (SAC 4, parag. 38) that multi-species assessments and ecological approaches in fisheries studies should be encouraged. SAC expressed some disappointment (SAC 4, parag. 43) that GFCM was not functioning *as "other international commissions involved in stock assessment and fisheries management*" [...] recognising that "*little assessments have been made and not much useful recommendations can be done for fisheries management*".

In 2002 SAC recommended that countries interested in Coryphaena hippurus should collaborate to carry out an assessment of this stock and present it to the next GFCM/ICCAT Group for validation and that the species should also be included in the list of shared stocks. SAC (SAC 5, parag. 50) assumed that growth overfishing was occurring and recommended "*to implement temporary closure of the identified hake nursery areas. Trawling effort limitation in space and time could further be useful for the hake and the other species of the fishing assemblages*". SAC also recommended (SAC 5, parag 71) that "*whenever possible, that a number of methods should be applied before results and subsequent management recommendations could be put forward*".

In 2003 (SAC 6, parag. 15) "*The Coordinator informed the Committee that the Sub-Committee had experienced a number of difficulties particularly the decreasing participation in terms of number and level of experts per country and geographical balance*". Work on the identification of biological reference points was continuing. Recognising the environmental influence on stocks, the biological interactions between species, and the multispecies nature of the Mediterranean fisheries, SAC felt (SAC 6, parag. 37) that an ecosystem approach to fisheries was necessary, but considered that EAF was unrealistic in the short term.
In 2004, SAC discussed the results of the SCSA Workshop on Reference points (SAC 7, parag. 33) and endorsed the "traffic-light approach" noting the difficulties of identifying ecosystem indicators. SAC (SAC 7, parag.36) "*emphasized the importance of pursuing research on indicators and reference points, especially in relation to multispecies assessment works*".

In 2005 (SAC 8, parag. 29) SAC recognised the usefulness and importance of trawl survey data and (SAC 8, parag. 30) "*noted that only few pilot multispecies assessments have been performed"* and [...] "*underscored the need to reinforce the coordination between SCSA and SCMEE, especially regarding the inclusion of environmental considerations in stock assessments in line with the ecosystem approach to fisheries*."

In 2006 (SAC 9, parag. 45) a meeting of the Permanent Working Group on Stock Assessment Methodology (PWGAM) was held jointly with a Workshop on Black Sea Assessment of Pelagic and Demersal Fish Stocks. The format of the assessments and related scientific advice was revised (SAC 9, parag. 49) including the mention of different options or scenarios. The implementation of a recommendation to implement a 40 mm square mesh in the codend of bottom trawls (SAC 9, parag. 50) noting "*however the need that it be progressively implemented in order to allow certain countries to complete the gathering of information necessary to evaluate with further study the impact of such a measure on different fisheries and areas, taking into account the multispecies nature of most Mediterranean fisheries as well as local specificities, and to ascertain the short and long-term socioeconomic consequences of this measure*" through joint work between the various SC, including SCESS.

In 2007, the increased participation of Eastern Mediterranean scientists in the work of the Sub-Committee and its subsidiary bodies was noted (SAC 10, parag. 29) and new assessment forms were used. The advice was provided in a tabular format. Shared stocks were defined (SAC 10, parag. 40) as "*a group of exploitable*

organisms, distributed over, or migrating across, the maritime boundary between two or more national jurisdiction, or the maritime boundary of a national jurisdiction and the adjacent high seas, whose exploitation is carried out by more than one Country and which can only be managed effectively through cooperation between all concerned States".

In 2008, a synthesis of the information related to the assessments and related management advice by stock and by GSA for the period 2001–2008 demonstrated that assessments were still to be done in several GSAs, in particular in the eastern part of the Mediterranean (SAC 11, parag 40 and appendix D page 47). Sardine in GSA 17 was described as being in "an obvious state of overexploitation" (SAC 11, parag. 42) stressing "the need to take drastic measures." SAC also agreed that "*Unless proven unnecessary by sound scientific evidence, a reduction of at least 10 percent of fishing effort on demersal species shall be applied for all GFCM GSAs as a precautionary measure."*

SCSI

In 2001, SAC agreed (SAC 4, parag 55) that "*For management purposes, data would be collected with reference to a statistical geographical pattern using units of 30' x 30' or multiples of these units, the largest of which would be the Management Unit itself*." SAC also noted (SAC 4, parag. 57) "*that FAO would play a role in overseeing the compatibility of the methodology and outputs of the statistical systems developed in various countries with the requirements of international management bodies. The multidisciplinary approach to the development of these statistical systems was also agreed upon*".

In 2002 (SAC 5, parag. 24) progress was "*achieved with regard to the harmonization of data collection*". SAC recognised (SAC 5, parag. 25) that operations units should "*be flexible, according to users' requirements (at country, regional and international levels)*". SAC recommended (SAC 5, parag. 26) that a "*joint Working Group on Operational Units be established between SCSI and SCESS*".

In 2003, SAC recommended (SAC 6, parag. 56) to "*establish a thematic internal working group on the measure of fishing effort*",that "e*fforts should be made to solve the issue of discrepancies between the national statistical official statistics and those prepared by research institutions"*. SAC recommended also (SAC 6, parag. 60) two pilot studies to test the applicability of the data collection scheme for socio-economic data and resource based data. SAC (SAC 6, parag. 61) "*restated that the set up of data collection by operational units would be a great support to accomplish its mandate and acknowledged that some progress had been made by the Working Group but requested that for future activities on this issue the largest involvement of experts from different sub-regions and from all Sub-Committees be sought and that the pilot studies and the prototype to host the data collected be presented to the Committee as soon as they will be ready*".

In 2005, (SAC 8, parag. 47) SAC noted that a "*comprehensive document on the Operational Unit concept and experience in its application is being finalized and would serve as the basis for the implementation of the concept throughout the Mediterranean*".

In 2006, (SAC 9, parag. 61), SAC "*emphasized the need to pursue the calibration and standardization of the fishing effort, noting that the spatial dimension of fishing effort resulting from fleet behaviours and fisheries dynamics should be considered*", (SAC 9, parag. 62) "*agreed that task 1.1 and task 1.2, components of the matrix (Task 1), should be mandatory for the entire Mediterranean, while the completion of components tasks 1.3, 1.4 and 1.5 would be encouraged for the time being, favouring a gradual approach for implementation*" and recommended (SAC 9, parag. 65) that "*SAC fleet segmentation (Appendix L) should be adopted by GFCM as a resolution*".

In 2007 (SAC 10, parag. 50), SAC "*emphasized that a GFCM Regional Fleet Register would be an essential tool in monitoring fishing capacity and in implementing responsible fisheries management*", suggested (SAC 10, parag. 63) convening a "*Transversal Working Group on bycatch/incidental catches in 2008 (in collaboration with partner organizations) which should also address issues such as pingers, bycatch of iconic species, survival after escapement, mitigating measure*; *the analysis of physical impact on sensitive sea bed and habitat with a particular attention for continental slope bottom and sub-marine meadows; the*

elaboration of an evaluation report on the efficiency of MPAs in the Mediterranean as a tool for the management of fisheries and the conservation of biodiversity; the identification of sensitive habitats for priority species by GSA".

In 2008 (SAC 11, parag. 58) SAC suggested that the Regional Fleet Register (RFR) "*should be made operational by 1 January 2010 and should contain all vessels, boats, ships, or other crafts that are equipped and used for commercial fishing activity in the GFCM area. It also suggested that the RFR information system should include relevant fleet capacity monitoring tools, such as dynamic charts on fleet capacity in terms of tonnage (GT) and power (kW) and other data browsing facilities"*.

SCESS

In 2001 (SAC 4, parag. 20) SAC "*noted the progress made in the building-up of the different data bases related to the social sciences experts and to bibliographical references*, (SAC 4, parag. 27) "*took note of the parameters identified by the Sub-Committee for the definition of the Operational Units (Appendix C2 of the report of the Sub-Committee) and called for further analysis of these parameters,* and (SAC 4, parag. 29) "*stressed the great value of bio-economic analyses in fisheries management in promoting closer collaboration between fisheries biologists, economists and other social scientists. It recommended the expansion of bio-economic analytical work including the more widespread application of bio-economic models that are suitable for the analysis of Mediterranean fisheries*".

In 2002 (SAC 5, parag. 29) noted "t*he extension of the work on economic and social indicators to the Alboran Sea, the Gulf of Gabès, the Adriatic Sea, the Tyrrhenian Sea and the French Mediterranean* and recommended (SAC 5, parag. 32) "*to adopt for the Mediterranean the fleet segmentation being identified*, *the Mediterranean the list of basic economic and social indicators*, *to extend to all GFCM geographical areas the methodology for indicators agreed upon by the Sub-Committee and taking into consideration the segmentation of the Mediterranean fleets*."

In 2003 (SAC 6, parag. 63) SAC " *endorsed the following sociological indicators: age, number of years of active fishing, capital share, education attainment, household structure, social background, and professional experience, for inclusion in the existing list of basic economic indicators of the GFCM information system being promoted by SCSI",* (SAC 6, parag 65) "*expressed the need for increased research related to fish markets, including prices, quality control, processing and labelling as an important step to increase scientific knowledge on socio-economic aspects including national and international marketing policies, distribution systems and aspects related to import/export,* and (SAC 6, parag. 67) "*underscored the importance of the bio-economic models for fisheries management"*.

In 2005 (SAC 8, parag. 57 and 58) recognised "*the importance of market based fisheries research"* and "*acknowledged the growing importance of recreational fisheries in the GFCM area and the need for further studies on the legislative, biological, and economic aspects of this activity*". SAC (SAC 8, parag. 59) "*welcomed the application of the socio-economic indicators to real world management processes. Special notice was paid to the inclusion of recreational fisheries in the workplan of SCESS given the strong potential interactions of these fisheries and commercial capture fisheries and the effects on fisheries management, including stock effects and market impacts*".

In 2006 (SAC 9, parag. 32) "*SAC noted the importance of monitoring the entire production chain from harvest to consumption. The Committee also endorsed the suggestion to complement assessments made by the Sub-Committee on Stock Assessment (SCSA) on a number of species in specific GSAs, with appropriate socio-economic analysis in view of contributing to the formulation of integrated management advice*. SAC also endorsed (SAC 9, parag. 33) the SCESS suggestion that "*the SAC fleet segmentation should be formally adopted as a GFCM Resolution*".

In 2007 (SAC 10, parag. 65) "*the urgent need to develop socio-economic data collection systems as well as mechanisms for homogenizing existing data for the GFCM Task 1, in particular those related to socio-economic variables by fleet segment and those related to the sociological indicators"* was stressed and [...] *The implementation of the Traffic Light method for integrated indicators trends analyses, including the use*

of reference points to assist in the monitoring and the evaluation of fisheries management" was welcomed. A formal definition of recreational fishing, including amateur fishing, sport fishing, tourism fishing, was adopted (SAC 10, parag. 67). SAC endorsed (SAC 10, parag. 68) suggestions to establish "*an ad hoc Transversal Working Group on Recreational Fisheries*"; analyse "*the role of incentive structures and mechanisms in national fisheries"*; analyse "*the impact of market forces on fisheries management, including the use of disaggregated information (prices by species) to analyze their impacts on fishing effort*; *implement case studies on the impact of 40 mm square mesh size, especially in Libya, Morocco, and Tunisia*.
In 2008 (SAC 11, parag. 69) SAC "*agreed that the relevant parameters for the monitoring of the recreational fisheries could be included in Task 1 and SCESS was requested to identify these during the intersession*". SAC noted (SAC 11, parag. 72) "*that the data necessary on fleets and fisheries resources was not always available to be able to properly assess the socio-economic impact resulting from adjusting fleet capacity and that simulations of possible socio-economic impacts could only be obtained for the medium term*".

SCMEE

In 2001 (SAC 4, parag. 45) SAC "*noted the increasing importance of adopting an ecosystem-based fisheries management approach. It agreed that the focus of the SCMEE would remain the study and analysis of the impact of fisheries on the ecosystem and environment as well as the influence of environmental factors on fisheries including those caused by other activities on fish habitat and water quality that could affect fish nurseries, migration, recruitment, etc.* SAC (SAC 4, parag. 47) "*recommended to the GFCM the organization of an Ad hoc Working Group to analyse the feasibility of the ecosystem-based management approach to fisheries in Mediterranean waters*." SAC (SAC 4, parag. 36) "*agreed that closer liaison and cooperation should be established with sister organizations dealing with sharks in the Mediterranean, particularly with the Regional Activity Centre for Specially Protected Areas (RAC/SPA) networks*".

In 2003 (SAC 5, parag 50) SAC endorsed the recommendations "*to monitor closely and implement the new developments on ecosystem approach to fisheries (EAF)"*, that *multidisciplinary research integrating hydrological, geological and biological aspects should be undertaken to ascertain the effects of trawlers on bottom sediments;* to "c*ontinue research on separator grids for escape of small fish in trawl gears and also square mesh bearing in mind the multi-species character of Mediterranean fisheries, the need to protect biodiversity and improve the livelihoods of fisheries communities"*.

In 2004 (SAC 7, parag 41) SAC "*acknowledged the difficulties of implementing EAF in the Mediterranean and stressed the need to renew efforts on this issue*".

In 2005 (SAC 8, parag. 30) "*SAC noted that only few pilot multispecies assessments have been performed and that neither the list of shared stocks nor the list of priority species has been modified. SAC further underscored the need to reinforce the coordination between SCSA and SCMEE, especially regarding the inclusion of environmental considerations in stock assessments in line with the ecosystem approach to fisheries"*. SAC (SAC 8, parag. 37) "*acknowledged that the use of classical fish stock assessments remains an element of the EAF"* and (SAC 8, parag. 41) "*expressed the wish for closer coordination between SCMEE and SCSA regarding the introduction of mitigation measures as they might have a significant influence on catch per unit effort (CPUE) and on biological aspects of target species*".

In 2006 (SAC 9, parag. 41) "*SAC noted the slow progress in defining methodologies for the EAF and recommended to further develop case studies in particular through integrating socio-economic parameters and aspects related to the ecosystem functioning"*.

In 2007 (SAC 10, parag. 63) endorsed the suggestions from SCMEE of "*convening the Commission for the Transversal Working Group on bycatch/incidental catches in 2008 (in collaboration with partner organizations) which should also address issues such as pingers, bycatch of iconic species, survival after escapement, mitigating measure"*; the "*elaboration of an evaluation report on the efficiency of MPAs in the Mediterranean as a tool for the management of fisheries and the conservation of biodiversity;"*and the *"identification of sensitive habitats for priority species by GSA*".

In 2008 (SAC 11, parag. 50) SAC "*agreed that SCMEE should be strengthened in terms of participation and technical contributions by Members. In addition, it suggested that this sub-committee should focus more on issues directly related to the interaction between fisheries and the marine environment and its ecosystems, such as sensitive habitats and the deep sea areas and their protection through fisheries restricted areas (FRAs) and marine protected areas (MPAs). Close collaboration with partner organizations should be maintained on issues such as discards and bycatch of species of conservation concern*".

Analysis

Uptake of SAC advice

The role, influence and importance of the work of SAC and its subsidiary bodies can be evaluated, at least partially, based on the decisions made by GFCM following SAC advice. GFCM provides a compendium of GFCM decisions on its web site (http://www.gfcm.org/gfcm/topic/16100/en).

GFCM has adopted eight recommendations on conservation and management measures since the creation of SAC while it had adopted only two (in 1997 and 1976) prior to the creation of SAC. Similarly, GFCM has adopted 3 recommendations on data and information reporting since the creation of SAC and none before the creation of SAC. In addition, GFCM has adopted seven resolutions since the creation of SAC and four before the creation of SAC (three in 1980 and one in 1995).

Based on SAC advice, GFCM adopted conservation and management recommendations on 1) the establishment of a Fisheries Restricted Area in the Gulf of Lions to protect spawning aggregations and deep sea sensitive habitats, 2) the minimum mesh size in the codend of demersal trawl nets 3) the mesh size of trawl nets exploiting demersal resources, 4) the management of certain fisheries exploiting demersal and small pelagic, 5) the establishment of a closed season for the dolphin fish fisheries using Fishing Aggregation Devices (FADs), 6) the establishment of fisheries restricted areas in order to protect the deep sea sensitive habitats, 7) the management of certain fisheries exploiting demersal and deepwater species , and 8) the management of selected demersal and small pelagic species.

On data and information reporting, based on SAC advice, GFCM adopted recommendations on 1) the implementation of the GFCM Task 1 statistical matrix and repealing resolution GFCM/31/2007/1, and 2) the establishment of the GFCM regional fleet register.

GFCM also adopted resolutions on 1) the management of demersal fisheries in the GFCM area, 2) the establishment of Geographical Sub-Areas in the GFCM area, 3) reporting on the implementation of GFCM management measures, 4) 40mm square mesh size in codend of trawlnets exploiting demersal resources, 5) the Pelagos sanctuary for the conservation of marine mammals, 6) Data confidentiality policy and procedures.

SAC has been successful in helping the Commission make appropriate management decisions in the Mediterranean fisheries management context. While the number of fisheries management decisions may appear small, it should be considered in the context of the Mediterranean where, except for bluefin tuna, fisheries are managed by effort control and technical measures rather than catch control and where, except for large pelagics, most of the fishing takes place within territorial waters.

Importantly, SAC motivated, and with the help of the FAO Regional projects, made possible a substantial increase in the collection of data and information from the fisheries, including bottom trawl and acoustic surveys. While progress in data collection remains to be made in several countries, the amount of data and information collected has improved substantially.

Scientific and technical considerations

SAC appears to have considered the issues seen as important by other fisheries scientific organisations at about the same time. This includes the precautionary approach, including the use of reference points and the

traffic light methods, and the ecosystem approach to fisheries, international plans of actions on sharks, capacity, etc.

While SAC did consider the precautionary approach (PA) and the use of reference point, holding a few workshops on the topic, SAC does not seem to have adopted a comprehensive framework for the formulation of its advice. This is not necessarily a negative point however. The implementation of the PA with reference points, as done in ICES and other fora, implies a command and control approach that may not be appropriate for the management of Mediterranean fisheries. It also implies cause and effect relationships between biomass, fishing mortality, and recruitment which may be more complex in reality than assumed in most single species models. In the end, therefore, SAC has probably spared itself serious aggravations by NOT formally adopting and implementing the precautionary approach with reference points.

SAC is using most single species assessment methods currently available, and some (Aladym and composite models) have been developed in the GFCM area. The data available to do the assessments, however, vary considerably from one assessment to the other. Some assessments are based on relatively complete catch at age information and use fishery independent stock size indices. Other assessments are based on a few length frequencies unlikely to be representative of the whole fishery, and of unknown representativeness with respect to the biological stock unit. It should therefore be expected that the reliability, consistency and usefulness of the single species assessment results will vary considerably from one assessment to the next.

The potential variability in assessments is illustrated by the differences between the 2008 and 2009 assessments for sardine in GSA 17. The 2008 assessment led to advising severe fishing restrictions, while the 2009 assessment suggest that the stock is not overexploited. Similarly, the 2008 assessment of Mullus barbatus in GSA06 illustrated the potential problems in over interpreting the results of "per recruit" analyses based on Length Cohort Analysis (LCA). For this species, the LCA showed fishing mortality to be about twice FMAX implying serious overexploitation, but an age-based analysis using Extended Survivor Analysis (XSA) showed SSB twice the average for the period of the assessment, strongly indicating that recruitment overfishing was not occurring. This latter example supports the SAC recommendation to use more than one assessment method on the same data set.

SAC has consistently recognised the importance of identifying appropriate biological units, but little progress seems to have been possible. Doing assessments on incomplete biological units, as may have been the case in the 2008 GSA 17 sardine assessment referred to above, is likely to provide misleading results. Migration in or out of the area covered by the assessment would be misinterpreted e.g. in terms of fishing mortality. It should be possible to identify biological units by looking at all available information on catch location seasonally, the location of spawning and nursery areas and taking into account bottom topography and water currents.

There appears to be a perception amongst Mediterranean fisheries scientists that the resources are overexploited and that fishing mortality needs to be reduced, although there seems to be few reliable time series of data to support this view. Mediterranean fisheries scientists are probably correct that growth overfishing is occurring, but moderate growth overfishing is a choice that is available to fisheries managers. It is recruitment overfishing that must be avoided at all cost, and the "per recruit" analyses which are at the basis of the growth overfishing diagnosis provide no information, by themselves, on the risk of recruitment overfishing.

Process

SAC is one of the few international fisheries science organisation covering both the natural and social sciences and SAC is probably the organisation that has made the most efforts to collect and use social and economic data. Unfortunately, the number of social scientists is disproportionately small compared to that of natural scientists (at least in government institutions) and past participation in meetings of SCESS has been at times limited. A different approach, where social scientists interact more directly with natural scientists could prove more efficient and more useful.

While the number of fishery scientists in the natural sciences is higher than for the social sciences, the number of highly trained stock assessment scientists and data analysts is also relatively limited and peer review is often "polite". Assessments peer review processes elsewhere are considerably more challenging and extensive with access to data by reviewers who do alternate analyses. But these peer review processes are also more demanding - it is not rare that several days are spent in reviewing / analysing a few or even a single assessment. It is not clear that SAC can afford such processes, nor that they are necessary or appropriate for the situation in the Mediterranean.

With the current number of assessments reviewed in the SAC system and the process used to review them, in-depth peer review is unlikely to occur in the near future. But this is not necessarily unfortunate: if the analyses and assessments are done by well trained and competent analysts, they are likely to be correct to start with and extensive in-depth peer review may not be an absolute necessity.

SAC recognises that its advice should be multidisciplinary (taking account of social and economic implications), based on multispecies assessments (taking account of multispecies and technical interactions) in an ecosystem context. SAC, however, has encountered problems when trying to complete multispecies assessment and formulating multidisciplinary advice. The risk assessment / management version of the ecosystem approach to fisheries might provide an appropriate framework for the integration of existing knowledge from the various disciplines in an efficient and useful decision making framework.

The implicit sequential process currently in use where the biological stock assessment and formulation of advice precedes the social and economic analyses may be limiting the number of options that could be found to be sustainable and useful. A different process for the review of analyses and the formulation of management advice, and one that has been implicitly acknowledged in several SAC comments summarised in the SAC achievement section, would imply having multidisciplinary teams doing the analyses and formulating the first draft of the management advice.

SAC strengths and weaknesses

Strengths and weaknesses are discussed together in this section because, not unexpectedly, weaknesses and strengths are often closely related.

SAC has a well established structure with four standing subcommittees (SCSA, SCSI, SCESS, SCMEE) that have the flexibility of establishing working groups, study groups or workshops as required. Such a structure is helpful in achieving progress in each discipline and progress has indeed been achieved. While SAC's structure is relatively flexible, the existence of four standing subcommittees, each with their own subsidiary bodies, may be an impediment to the provision of the multidisciplinary advice that would be most useful to the management system. As noted above, SAC is one of the few, if not the only body that could provide such integrated advice[2].

Generally, SAC provides fisheries management advice based on work done in the SCSA only a few weeks before. Because the SCs meet simultaneously, this implies that it is not physically possible to include the likely social and economic consequences of implementing the advice. It is likely that fisheries management advice from SAC would be more readily accepted and implemented if various scenarios were presented, including the likely social and economic consequences of each. Multidisciplinary advice on multispecies fisheries cannot be built sequentially with single species assessment done first, then, combined into multispecies assessments that would be passed on to social scientists and economists to evaluate the consequences of the management measures envisaged. Fisheries on multispecies assemblages should be assessed as a whole, trying to identify if variability in the abundance of the various species is due to fishing or to other factors, either human made (habitat destruction) or to natural variability. When considering potential management measures, the consequences have to be evaluated for all species, and also for their social and economic consequences, which will imply making compromises.

[2] The Scientific Technical and Economic Committee on Fisheries (STECF) of the European Union might be able to provide such advice, but many biological stock assessments are done upstream in the ICES process.

Doing multidisciplinary assessments of multispecies fisheries would be most efficiently done through the convening of integrated multidisciplinary teams of analysts taking into account all the species exploited by the fisheries being affected by the intended new management measures. The various disciplines would interact in these teams to provide the biological, economic and social consequences of various fisheries management scenarios. Multidisciplinary advice on multispecies fisheries has a higher likelihood to be relevant to fisheries management decision makers. SAC has demonstrated its flexibility in convening various working group, workshops etc. and in adjusting their working procedures and it could easily implement such multidisciplinary working groups on an experimental basis in areas where data, information and human resources are available to do so.

SAC is one of the few organisations where they could be attempted. Paragraph 36 of the report of SAC 1 states: "*The Committee believed that the role of the ad hoc working groups would be of high importance to the Scientific Advisory Committee itself. The Committee was in agreement that the Scientific Advisory Committee and its subsidiary bodies should adopt a problem-solving approach and therefore have a flexible structure at the level of the ad hoc working groups. The Committee recommended that some links be established between the Sub-Committees in order to avoid duplication of work. Joint activities between ad hoc working groups should also be envisaged. The Committee agreed that ad hoc working groups should report to the relevant Sub- Committee of competence. Under some circumstances, and according to the nature of the information required, the ad hoc working groups might report direct to the Scientific Advisory Committee.*"

SAC should set up multidisciplinary teams to complete multidisciplinary assessments of multispecies fisheries[3] in a few pilot areas using the risk assessment / management approach to the implementation of the Ecosystem Approach to Fisheries as described by the FAO and implemented by Australia (http://www.fisheries-esd.com/c/home/index.cfm?CFID=7473476&CFTOKEN=39171261) .
If this proves feasible, an alternative to the standing subcommittees would be to apply the flexibility one step up, that is standing subcommittees would be abolished and ad hoc working groups reporting directly to SAC would be created on an ad hoc basis in a problem-solving approach. But this should await the proof of concept that this approach can work in the Mediterranean.

SAC formally approves the work program of its subsidiary bodies and the Commission approves the work program of the SAC. Working scientists are often closer to emerging issues, and they can propose items in the work program to address these issues. SAC has occasionally removed items from the proposed work programme but most of the time, the majority of activities proposed by the subsidiary bodies is approved by SAC and by the Commission. This results in a heavy and increasing workload. Some agenda items remain on the work programme for a few years before being dropped without substantial progress having been achieved. SAC workload is excessive given available resources and the SAC work programme should be developed in a more top down approach by the SAC Executive Committee. Only those items where contributors have been identified and have agreed to prepare analyses would be included in the work programme. Some form of bottom up feedback should be retained, however, to help GFCM keep pace with scientific development.

It is a strength of SAC that the GFCM Secretariat is closely involved in its work. This ensures that the work of SAC is relevant to the Commission and that the advice can be used. The GFCM Secretariat also provides the institutional memory essential to the appropriate functioning of a body like SAC.

As indicated above in the SAC Achievements section, all countries have participated in at least one SAC meeting. However, the number of countries participating in any single meeting of SAC, but particularly in the meeting of its subsidiary bodies is generally insufficient to be described as representing a widely accepted consensus. The advice from SAC would be stronger if all or a great majority of countries had participated and agreed its formulation. When SAC advice is intended to apply to all GFCM members, such

[3] Assessment of multispecies fisheries would not necessarily be based on traditional assessment techniques. They would take into account the performance of the fishery (large decrease in the number of boats because it is no longer profitable to fish) or old length frequencies showing a much wider size composition either in commercial catches or in surveys. Such information might be found to be more convincing than "per recruit" analyses.

advice should be formulated and agreed by consensus of all SAC members. In some fora, members of Scientific Advisory processes are compensated for expenses incurred for their work in formulating the advice. SAC could consider such a process, and if implemented through web conferences, this might not be too expensive.

SAC can count on a core of very dedicated scientists who have consistently participated in its meetings. Along with the Secretariat, they provide the institutional memory of SAC. There are, however, only a few GFCM scientists fully trained in the whole suite of modern stock assessment and data analysis techniques. This is both a curse and a blessing because most existing stock assessment techniques are for single species assessments which might be of little use for the assessment of demersal fisheries in the Mediterranean. Because single species assessment techniques may not be the most useful in the Mediterranean, and because the data to use these traditional single species techniques are not uniformly available across the Mediterranean, it might be more useful to train scientists in data analysis rather than in stock assessment techniques. In this way, scientists can use whatever data are available and use or develop appropriate analysis techniques that are more relevant to the Mediterranean multispecies context.

The information available to assess stocks in the North Atlantic is considerably more complete and for a much longer time period than is the case for the great majority of stocks in the Mediterranean. Yet, most of the age-based stock assessments in the North Atlantic show considerable so-called retrospective patterns where biomass estimates for a given year vary substantially depending on the number of years included in the analysis. There is no doubt that if those assessment methods were applied in the Mediterranean on stocks where there is generally less information available, the results would be highly uncertain. It is therefore this consultant's strong belief that traditional stock assessment techniques have little chance of being useful to help SAC formulate relevant and useful advice. SAC should instead thrive to develop its own multidisciplinary approaches to assess multispecies fisheries based on the data and information that are currently available.

The robustness of SAC advice has not been evaluated. Some assessments are based on relatively limited data and guidelines have not been established to help decide when data are too few to provide reliable advice. In addition, when the assessment covers only part of a larger biological unit, the results may not be reliable as illustrated by the large differences between the 2008 and 2009 stock assessments of some pelagic fish in the Adriatic Sea. As indicated above, the establishment of relevant biological units should be a priority for SA and the robustness of past SAC advice should be evaluated, including retrospective analyses where possible.
SAC did provide training in stock assessments and associated methods, including multispecies assessments. The multispecies assessment method taught (Multispecies Virtual Population Analysis – MSVPA), however, was developed in the North Sea and requires considerable amounts of data, including consumption estimates of the main predators. There are very few areas in the Mediterranean, if any, where the data would be sufficient to use.

SAC has agreed on a comprehensive set of Geographical Sub-Areas (GSA) and has provided stock assessments and management advice for several species in various GSAs, but it is not clear that GSAs do actually correspond to distinct biological units. The recognition, at the end of the 19th century, that fishery resources exploited off the coasts of countries bordering the North Sea were part of large biological units that covered the entire North Sea or more led to the creation of the International Council of the Sea (ICES) in 1902. Scientist in the ICES area, recognised that it was not possible to understand the changes in abundance of the fishery resource off their coast by analysing only their own data - they had to share their data and analyse them jointly. SAC does recognise this problem and some work has been done on the identification of biological units, but too many assessments continue to be done with data that do not cover the entire biological unit. The results of such assessments are unlikely to be reliable and could be seriously misleading and the identification of relevant biological units in the Mediterranean should be one of the highest priority of SAC.

Stock assessments going through the SAC process may have been initially done in a single institute in one country, collaboratively between several institutes in one or more country, sometimes with the help of FAO Regional Projects, in practical sessions at the meetings of the working groups on demersal and small pelagic

species, or in other international groups such as the Subgroup on the Mediterranean Sea (SGMED) of the EC –STECF. In the past, stock assessments could be submitted for review at the WG or at the SCSA. Depending on where the assessment was initially completed and where it was submitted for review, stock assessments might have been reviewed only once or in other cases, three or four times. The process to review stock assessments is regularly reviewed and updated in SAC. Eventually, a policy should be adopted to ensure that all assessments are subjected to appropriate review.

SAC is fortunate that most fisheries in the Mediterranean are not managed by Total Allowable Catches. In areas where TAC is the predominant management tool and where TACs are adjusted every year based on scientific advice, fisheries scientists spend all their time updating stock assessments and do not have time to enhance the biological understanding of the resources, how they interact with one another and how they interact with their environment. In addition, in those areas, fishery scientists, collectively, have limited credibility with the fishery sector who often disagrees with the diagnosis of the fishery scientists. The TAC management system leads to antagonistic relationships between fishery scientists and the fishing industry. The fishing industry should be natural allies of the fishery scientists helping them understand how the system functions.

SAC frame of reference

This section suggests an update to the frame of reference in GFCM 27 for the 2003 and 2004 period (reproduced here as Appendix 3) consistent with the recommendations above and the strategic vision below:
SAC is requested to establish an Executive Committee, with a composition similar to that of the Coordinating Meeting of the Subcommittees, with the aim to improve the linkages among the various disciplines active in SAC and National focal points of GFCM Members.

1. Management of fisheries

SAC is requested:

1.1. To identify biological stock units based on spawning areas, juvenile rearing areas, as well as meristic, morphometric and genetic studies, taking into account the major bathymetric and hydrographic features and to link them to the geographical sub-areas as well as the operational units involved for the priority species.

1.2. To organise, calling on expertise outside of the GFCM areas if needed, a workshop to identify the best way to implement an ecosystem approach (EAF) to fisheries and identify pilot areas where case studies could be conducted. The EAF as understood by the FAO and as implemented in Australia (http://www.environment.gov.au/coasts/fisheries/publications/guidelines.html) uses existing knowledge and expertise, taking into account the bio-ecological, social, economic and institutional components of sustainability. It may be an efficient way of providing multidisciplinary advice for the management of multispecies fisheries based on existing knowledge and expertise.
Implementing an EAF is expected to also cover the environmental protection aspects of the SAC mandate, including the collection of information on by-catches of protected species etc.

1.3. To initiate an in-depth reflection on the management measures, approaches and process that would allow progress under the four component of sustainability (bio-ecological, social, economic and institutional).
1.4. To evaluate, through an external peer review, the variability and reliability of stock assessments made since 1999.

1.5. To participate actively in the Joint GFCM/ICCAT Working Group on tuna farming.

1.6. To participate actively in the Joint EIFAC/GFCM Working Group on management of sturgeon.

Strategic vision

In the early 2000s, the consultant attended a Dialogue meeting between the fishing industry, fishery administrators and fishery scientists organised by COPEMED in Madrid. At that meeting, it was clear that fishing industry participants and representative from the southern shores of the Mediterranean held the view that fisheries science and management had the potential to be helpful to them while, generally speaking,

those of the northern shores who had been exposed to more extensive traditional fisheries management based on allowable catches considered that fisheries science and management was more likely to hurt rather than help them.

The state of play in the GFCM area is that fisheries science and fisheries management can help the fishing industry. In order to do so, fishery scientists and fishery managers must be perceived as helping the fishing industry. They should not be perceived as enemies. Implementing an ecosystem approach to fisheries as understood by FAO and as implemented in Australia's risk assessment / management framework has the potential of allowing all parties interested in fisheries management to work cooperatively towards improving the sustainability of the fisheries they are involved in.

The EAF is based on the modern concept of sustainability which is multidimensional with at least four components: 1) bio-ecological, 2) social, 3) economic, and 4) institutional. The bio-ecological component includes the conservation of the target species, but also the protection of associated species and ecosystem functions. The social component deals mostly with an equitable distribution of the benefits from the fishery, while the economic component aims at the long term profitability of the fishery. The institutional component is often seen as the key component in achieving sustainability, but it is generally recognised that a balance has to be struck between the four components and that no single component should be given absolute prominence. In this context, it should be noted that achieving a balance in a multispecies context will generally imply that some stocks could be overexploited, some fully exploited and some underexploited.

The proposed vision could therefore be: *SAC provides useful, reliable, relevant and implementable advice to make improvements under the four components of sustainability through a process that is based on: 1) Objectivity and integrity, 2) Openness and transparency, 3) Quality assurance, 4) Integrated advice – based on an ecosystem approach, 5) Efficiency and flexibility, and 6) National consensus."*[4]

Implementing this vision is going to be a challenge. It is not absolutely guaranteed that it will be possible to provide useful integrated multidisciplinary advice on multispecies fisheries. To this consultant's knowledge, there are no ready models to follow, but applying the Australian approach to the implementation of the EAF might help SAC develop its own model. The most efficient way to do so would probably be through a pilot project in a specific area with the help of an Australian with extensive experience in implementing the approach. Implementing the EAF in this way implies using existing knowledge and involving all interested parties in the process. But it also implies that the objectives of fisheries management have been identified and agreed. This has proven difficult in some cases.

The difficulty of providing reliable advice cannot be assessed until the reliability of past SAC advice has been evaluated. However, based on the consultant's experience in other advisory systems, it should be expected that the reliability of single species advice could be low. This is partly because multispecies interactions and natural fluctuations are not taken into account, but it is also linked to the inherent variability of the systems and of the data.

Providing relevant advice should be straightforward if SAC responds to requests for advice formulated by the Commission. But the biggest difficulty might be in providing advice that would make improvements under the four components of sustainability. Here again, it is not absolutely clear that this is possible, and SAC would be breaking new grounds if it managed to do so.

SAC advice is largely based on objectivity and integrity, the SAC process is also relatively open and transparent, but the mechanisms for quality assurance are not fully established, as discussed at length in the report, the advice is not integrated nor based on an ecosystem approach, and it is not based on national consensus. The SAC process is relatively flexible, but its efficiency is unknown. The first step in quality assurance would be to evaluate the reliability of past assessment and advice. Subsequent steps would aim at ensuring that the assessments are done correctly to start with, and if they are used in an open and transparent EAF process, it is likely that any flaws in the assessments would be identified early in the process.

[4] Based on http://www.ices.dk/iceswork/acom.asp

Implementing the risk based EAF process is also likely to increase the efficiency of the decision making process.

In summary then, SAC is in a very good position to implement this vision: the SAC process is already based on integrity and objectivity and it is also already open and transparent. Quality assurance, however, could be more formal and systematic. While SAC has made several attempts at providing integrated advice, success has been limited, and implementing the version of the ecosystem approach to fisheries suggested earlier in this report has a good probability of leading to integrated advice. The SAC process is also already flexible and several changes to procedures have been implemented as needed. The efficiency of the SAC process could be improved, however, by, among other things creating multidisciplinary teams to address specific issues, and by adopting a clear policy on what stock assessments are reviewed where and when. If SAC decides that national consensus is a desirable quality for its advice, several mechanisms could be found to implement it.

Appendix 1:

Terms of reference for the consultant

Ce travail constitue une réponse à la requête du SAC, approuvée par la Commission, qui s'est prononcée en faveur de la formulation d'un plan stratégique à moyen terme pour le CSC avec l'appui possible de consultants et de groupe de soutien (coordonnateurs, bureau du CSC, etc.)[5].

Sous la supervision générale et technique du Secrétaire Exécutif de la CGPM et en étroite collaboration avec le président du SAC, le consultant effectuera sa mission en deux phases:

a) dans une première phase du 30 novembre au 4 décembre 2009 (réunions des Sous-comités du SAC, Malaga, Espagne), le consultant :

- Passera en revue et analysera la documentation pertinente concernant: la création du SAC et son cadre de référence mis a jour en 2004, son mode opératoire (objectifs, structure, procédures), les activités et résultats scientifiques - y compris les principaux thèmes examinés par ses organes subsidiaires (SCSA, SCESS, SCMEE et SCSI) :évaluation des stocks (méthodologie de l'évaluation et d'aide à la fourniture d'avis scientifique, points de référence, espèces prioritaires et stocks partagés, …) ; indicateurs sociaux économiques; Statistiques (Informations disponibles, définitions et implémentation progressive des outils de suivi des activités de pêche tels que GSA, Tache 1, ...); approche écosystémique et les différents avis scientifiques émis par le SAC et leurs portées (MPAs, FRAs, contrôle de l'effort de pêche…)..

  (La documentation sera rendue accessible à travers les liens internet (e.g : GFCM, AdriaMed, Copemed, EastMed web-pages et par l'envoi de documentations complémentaires par le Secrétariat de la CGPM par voie de DHL).

- Produira une ébauche de rapport de synthèse, incluant, (de son point de vue):

  i) L'analyse des réalisations du SAC pour la période 1997-2008 y compris en ce qui concerne l'implication des pays membres dans les activités intersession et la participation aux réunions;

  ii) l'identification des éléments/paramètres principaux de force et faiblesse du SAC et suggestions pour en améliorer le fonctionnement et la manière de servir en ce qui concerne la formulation d'avis effectifs d'aménagement des pêches a l'intention de la Commission.

  iii) une proposition de mise à jour du cadre de référence pour le CSC / SAC et une vison stratégique pour le futur.

b) Deuxième phase, présentation du rapport intérimaire à la 12ième session du CSC du 25 au 29 janvier 2010 et finalisation du rapport (10 mars 2010) en vue de le rendre disponible à la 34ième session de la CGPM.

[5] Paragraphe 20 du rapport de la 11ème session (Marrakech, décembre 2008)

Appendix 2

Reference Framework for SAC (from GFCM 27 appendix H)

REFERENCE FRAMEWORK FOR THE MANDATE OF THE SCIENTIFIC ADVISORY COMMITTEE (SAC) FOR THE INTERSESSIONAL PERIODS 2003 AND 2004

SAC is requested to strengthen the critical role of Coordinators of subcommittees with the aim to improve the linkages among subcommittees and National focal points of GFCM Members.

1. Management of fisheries

SAC is requested:

1.1. To update the list of shared stocks identifying also the geographical sub-areas as well as the operational units involved. For this purpose SAC should make use both of the knowledge on stock units and of the spatial distribution of operational unit activities as well as of the mixed nature of some fisheries. Deepening both the knowledge and the list of shared stocks should not necessarily extend the list of priority species, so far agreed, for which scientific assessment and advice has to be provided.

1.2. To update, at sub-regional level and by geographical sub-areas, the inventory of operational units generating catches of shared stocks. To this end, SAC is also requested to monitor and fine tune, as necessary, the fleet segmentation, as adopted in principle (Appendix E of the report of the 5th Session of SAC). Whenever possible, description of Operational units should report the share, by weight and value, of priority species as well as of other important species, their fishing regime, trends in catches and landings, discard estimates.

1.3. To continue its ongoing works of reviewing and debating stock assessment methods with the aim both to widen the use of common agreed standards and methodologies and to continue to improve the scientific quality of submitted assessments. To compare, and comment, as relevant, the outcomes and recommendations arising both from stock assessment methods and from other fisheries assessment tools mainly based on economic and social matters. Evaluations coming from bio-economic models should also be used for comparison. To this end, SAC should implement some case studies where both approaches are applicable.

1.4. To initiate an in-depth reflexion on conservation reference points (safe biological limits, precautionary reference points) that could be routinely used in the Mediterranean to establish a precautionary approach. SAC is also requested to highlight gaps in the current scientific knowledge and research and monitoring needs to set up such a framework.

1.5. To update evaluation for priority demersal and small pelagic species, by using the most recent data sets collected both by direct and indirect methods. SAC is requested to give priority to assessment of stocks in those geographical sub-areas not yet concerned by the 2001 and 2002 SAC assessments.
However, SAC should feel free both to extend the list of priority species and to accept for consideration stock assessments of species not included in the current list of priority species.
SAC is requested to explore different outputs consequent to different management scenarios for fisheries where there is evidence of overfishing. In the light of the above outputs SAC is requested to evaluate the appropriateness of present management measures and should propose new or alternative conservation measures whenever necessary. In this regard, the GFCM invites SAC also to take into account both the knowledge of nursery and reproductive areas (geographic co-ordinates) and the outcomes of experiments aiming to improve the exploitation pattern. SAC advices should highlight different management options in terms of risk to be avoided, expected improvements and cost/benefit both in biological and socio-economic terms. List of priority species:

Merluccius merluccius, Micromesistius poutassou, Merlangius merlangus, Mullus barbatus, Mullus surmuletus, Pagellus erythrinus, Psetta maxima, Engraulis encrasicolus, Sardina pichardus, Sardinella aurita, Sprattus sprattus, Trachurus trachurus, Trachurus mediterraneus, Thunnus thynnus, Thunnus alalunga, Xiphias gladius, Coryphaena hippurus, Aristeomorpha foliacea, Aristeus antennatus, Parapenaeus longirostris, Nephrops norvegicus, Eledone cirrhos, Prionace glauca, Isurus oxyrhinchus, Lamna nassus and Acipenser sturio.

1.6. To participate actively in the Joint GFCM/ICCAT Working Group on tuna farming.

1.7. To participate actively in the Joint EIFAC/GFCM Working Group on management of sturgeon.

2. Environmental protection

(1) Continue updating information on incidental catches of protected species and on by catch of large migratory sharks.

(2) With a view to progressively implement an ecosystem approach to fisheries, update information on mapping essential fish habitats.

(3) Provide an overview of driftnet and surface gillnet fisheries in the Mediterranean, broken down by main basin and geographical sub-areas. Essential points to report on are: fishing effort (Number and size of vessels, size of gears, duration of fishing), technical characteristics (mesh sizes, rigging, marking, control of drift), measures for environmental protection (prevention of gear loss, acoustic alarms) and research programmes in course for this type of fisheries, in particular those aiming to investigate by-catch.

(4) Provide an overview of surface and bottom longline fisheries in the Mediterranean, broken down by main basin. Describe interaction with non-commercial fish, birds and turtles. Report on measures taken to make more efficient use of baits and to prevent bird and turtle mortality.

(5) Report on the geographical occurrence, seasonality, extent and effects of mucilaginous algae blooms.

(6) With a view to progressively implement ecosystem-approach to fisheries, describe a few simple but clear species assemblages where trophic and other biological links are well identified.

Appendix 3

: Terms of Reference for the Coordinating Meeting of the Sub Committees (from GFCM 29 appendix E).

Terms of reference
of the Coordinating Meeting of the Sub-Committees (CMSC)
and of the Coordinators of the Sub-Committees

1. Membership and *Modus operandi* of the CMSC

The CMSC will comprise the Chair and the two Vice-Chairpersons of the Scientific Advisory Committee (SAC), the Executive Secretary and the Deputy Executive Secretary of GFCM, the Coordinators of the Sub-Committees (SCSA, SCESS, SCIS and SCMEE) and the Coordinator(s) of cross-sectoral Working Groups[4].

In addition to the assistance of the GFCM Secretariat, the CMSC will be supported in its work by the relevant FAO technical officers, including the Coordinators/Directors of the FAO Regional projects. Pursuant to Rule X (6) of the Rules of Procedure, the procedures of the CMSC shall be governed *mutatis mutandis* by the Rule of Procedures of the Commission.

2. CMSC Mandate

- Propose and/or update elements of the Reference Framework for the mandate of SAC for the intersessional period and plan the distribution of activities among Sub-Committees;
- promote the organization of and the participation in interdisciplinary or cross-sectional working groups answering directly to SAC;
- examine the reports of the interdisciplinary or cross-sectional working groups and Sub-Committees and prepare proposals for an integrated Programme of Work of SAC;
- collate draft recommendations of subsidiary bodies and formulate, as appropriate, multidisciplinary advice on fisheries management for examination by SAC;
- function as editing committee for the selection of scientific and technical documents to be published in the GFCM *Studies and Reviews* series;
- conduct any other task specifically requested by the Commission or SAC or approved by consensus by the members of the CMSC.

3. Mandate of the Coordinators of the Sub-Committees

- Maintain an updated list of the National Focal Points and experts participating in related networks, providing full contact details, and ensure the distribution of related information;
- encourage the participation of experts in Sub-Committee activities and their scientific and technical contributions;
- organize, in close liaison with the CMSC, the activities of the Sub-Committee in such a way that issues raised by GFCM and/or SAC are addressed;
- coordinate intersessional activities, notably the organization of Sub-Committee meetings and, as appropriate, in collaboration with the facilitator, those of the Working group(s), including preparation of the annotated provisional agenda and/or terms of reference;
- supervise the drafting of meeting reports, including the presentation of attached appendixes/reference documents;
- liaise with scientific and technical bodies of other international/regional organizations dealing with topics of common interest;
- represent the Sub-Committee at meetings of the CMSC , in particular for preparing work and advice for SAC.

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[4] "Cross sectoral" or "Transversal" ad hoc Working Groups are those Working Groups reporting directly to SAC, such as the Joint GFCM/ICCAT Working Group on Large Pelagic Species.