



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



Scientific Advisory Committee (SAC)

Report of the Subregional Technical Workshop on Fisheries Multiannual Management Plans for the Western, Central and Eastern Mediterranean

7–10 October 2013, Tunis, Tunisia

EXECUTIVE SUMMARY

The Subregional Technical Workshop on Fisheries Multiannual Management Plans for the Western, Central and Eastern Mediterranean (Tunis, Tunisia, on 7–10 October 2013) was part of an action within the GFCM Framework Programme (FWP), addressing the following fisheries: i) small pelagics fisheries in the Alborán Sea; ii) *Parapeneus longirostris* (deep-water rose shrimp) and associated species in the Strait of Sicily; iii) deep water red shrimps in central-eastern Mediterranean areas and iv) the fisheries of eel in the Mediterranean. For these case studies, the objectives of the workshop were: i) to assess the technical feasibility of the GFCM guidelines for the development of multiannual management plans, ii) to identify issues and needs for the management of each case study and iii) to progress towards the preparation of documents and strategies supporting management plans – to be revised within the GFCM decision-making mechanism (i.e. working groups, subcommittees, SAC and Commission).

For the case studies of Alborán Sea small pelagics, Strait of Sicily rose shrimp and central and eastern Mediterranean deep water red shrimp the Workshop adopted a “*Proposed minimum structure, criteria and measures for a management plan*” which contains the skeleton of a management plan, a series of optional management tools and measures, indicators and reference points for these resources and a list of research priorities. For the eel case study, the Workshop proposed to promote the preparation of GFCM guidelines for the management of eel, while at the same time to improve the assessment of eel and re-launch the GFCM ICES EIFAAC WG on eel. For all case studies, information on the status of fisheries collected and presented during the workshop will form the basis of a comprehensive background technical document to be prepared by the GFCM Secretariat.

OPENING AND ARRANGEMENT OF THE MEETING

1. The Subregional Technical Workshop on Fisheries Multiannual Management Plans for the Western, Central and Eastern Mediterranean was held in Tunis, Tunisia, on 7–10 October 2013. It was organized by the GFCM and hosted by the Tunisian Ministry of Agriculture. The agenda is provided in Appendix A and the list of participants is included as Appendix B.

2. Mr Miguel Bernal, from the GFCM Secretariat welcomed the participants and thanked Tunisia on behalf of the GFCM for hosting the meeting and for the warm welcome received. He then gave the floor to Mr Mohamed Hmani, Director of the Conservation of fish resources at the Ministry of Agriculture (DGPA) of Tunisia.

3. Mr Hmani welcomed the participants and reiterated the strong involvement of his country in promoting the sustainable exploitation of fish resources. He praised the efforts deployed by GFCM to lay the foundations for a sustainable exploitation of the resources through modern management methods and expressed the full support of his country to this approach. He finally wished all the participants a fruitful meeting and an enjoyable stay in Tunisia.

4. Mr Bernal explained that the meeting was part of an action within the GFCM Framework Programme (FWP), which included management plans for selected case studies in the Mediterranean and Black Sea. He informed that the small pelagic fishery in the Adriatic Sea had been discussed in a previous meeting, while turbot and small pelagics in the Black Sea were expected to be examined in another meeting due to take place at the beginning of 2014. He then explained that the case studies to be discussed at this meeting were: i) small pelagics fisheries in the Alborán Sea; ii) *Parapeneus longirostris* and associated species in the Strait of Sicily; iii) deep water red shrimps (giant red shrimp and blue and red shrimp) in central-eastern Mediterranean areas and iv) the fisheries of eel in the Mediterranean. For these case studies, the objectives of the workshop were: to assess the technical feasibility of the GFCM guidelines for the development of multiannual management plans, to identify issues and needs for the management of each case study and to progress towards the preparation of documents and strategies supporting management plans –to be revised within the GFCM decision-making mechanism (i.e. working groups, subcommittees, SAC and Commission).

INTRODUCTION OF THE GFCM GUIDELINES ON MANAGEMENT PLANS, FISHING CAPACITY AND PRECAUTIONARY MEASURES

5. Mr Marcelo Vasconcellos, from the GFCM Secretariat, gave an overview of three GFCM management guidelines of relevance to the workshop: i) Guidelines on a general management framework and presentation of scientific information for multiannual management plans for sustainable fisheries in the GFCM area (discussed and approved at the 36th session of the Commission, 2012); ii) Guidelines on the management of fishing capacity in the GFCM area (Resolution GFCM/37/2013/2) and iii) Guidelines on precautionary conservation measures pending the development and adoption of GFCM multiannual management plans for relevant fisheries at sub-regional levels in the GFCM area (discussed and approved at the 37th session of the Commission, 2013).

6. Participants expressed concern on the difficulties of having joint validated assessments of shared resources. They asked about the possibility to advance towards management plans for case studies other than those discussed in this meeting and raised the issue of the availability of financial means to implement management plans for different fisheries across the Mediterranean.

7. The GFCM Secretariat clarified that the FWP would enable to take specific actions to address needs and requirements from countries in relation to strategic objectives, provided that donors and funds were available. It was also underlined that there was no contradiction between the development of national and regional management plans as long as compliance with GFCM regulations was ensured. In this respect, it was also highlighted that stakeholders should be involved in the process of development of management plans.

8. The Secretariat also recalled that a specific action on red coral was planned in Brussels by December 2014 and that there would be room in the FWP to include future actions for other species.

9. In relation to the lack of validated assessment for some stocks, the Secretariat highlighted that a precautionary management plan, including necessary actions to improve knowledge on the status of the stocks could still be developed in order to prevent the risk of endangering the stocks and the fisheries.

10. Mr Henri Farrugio, SAC Chairperson, added that many stocks were either fully or overexploited and that action should be taken in order to ensure their conservation, also given that a lot of information on national and on shared stocks was already available in most cases.

STATUS OF SELECTED FISHERIES IN THE MEDITERRANEAN

Introduction: status of Mediterranean stocks and recommendations from the SAC

11. The SAC Chairperson gave an overview of the current status of exploited Mediterranean marine resources for both demersal species and small pelagics, based on the recent stock assessments.

He underlined in particular that many Mediterranean fisheries targeting demersal species were based on the exploitation of juveniles and that most of the recruits never reached the age of first reproduction. Generally speaking, a large percentage of the stocks was therefore overexploited with high pressure on small sizes (growth overexploitation). This situation could not be sustained for long, and he thus stressed the need to implement multiannual management plans which consider both a reduction of fishing pressure and an improvement of the protection of juveniles, for example through marine protected areas (Fisheries Restricted Areas).

12. In the ensuing discussion, several comments focused on non-anthropogenic impacts on the state of resources, such as pollution or climate change, which would have different effects on fish species, depending on their distribution and biology. In this respect, France mentioned, as an example, the case of sardine in the Gulf of Lion, where environmental induced control on mortality has a central impact on the status of the stock and therefore monitoring and control of mortality is the main focus of management plans.

13. In this respect, Mr Fabio Fiorentino, invited expert, agreed that there were both anthropogenic and non-anthropogenic effects on stock abundance and distribution, creating a complex system of effects. He concluded that management plans at Mediterranean level should therefore address both the fishing effects and other anthropogenic and non-anthropogenic effects.

Western Mediterranean: small pelagics

14. The GFCM Secretariat presented a summary of the status of small pelagics fisheries in the Alboran Sea, focusing in particular on the level of catches for the main target and associated species, fleets and scientific information such as stock assessment and advice from SAC. The fleet operating in the Alborán Sea is diverse, purse seiners being the only segment operating in Spain while accompanied by polyvalent vessels (Morocco) and pelagic trawlers (Algeria) in the southern part of the Alborán Sea. The fleet operates on the coastal area, within national waters. Current catches mainly consist of sardine, horse mackerel, anchovy and mackerel in all countries, and a number of other accompanying species whose proportion varies between countries. Anchovy catches showed a large peak in the early 1980s but their current order of magnitude is lower than in the past. Catches have been declining in Spain in recent years, accompanied by a reduction of the fleet, while they have been stable in Morocco and have shown an important increase for sardine in Algeria, with a parallel increase in the size of the fleet. Only sardine and anchovy stocks are being currently assessed, all recent stock assessments being considered as preliminary or exploratory. Both single country assessments and joint assessments of sardines and anchovies point out to a situation of full exploitation of the stocks.

15. The GFCM Secretariat also introduced the existing management frameworks for the area, at the international, regional and national levels, based on the questionnaires sent to national focal points and other available background information. It was noted that a range of management measures for small pelagic fisheries were already adopted by countries in the Alboran Sea, some of them already harmonized sub-regionally, such as minimum sizes. The management of fishing capacity was regarded as an important measure to be harmonized in the future in order to level management efforts to prevent overfishing. The presentation also highlighted the lack of a consensus among countries with regard to the need for a joint sub-regional management plan for small pelagics in the Alboran Sea, which was partly due to the lack of sound scientific evidence on stocks boundaries and also to the coastal nature of the fishery. The views of the countries focused instead on improving management through the implementation of national management plans. The Secretariat introduced a tentative list of issues to be addressed by national management plans, which included: i) the sustainability of resources, which would require adopting a precautionary system that would ensure good status of stocks while accounting for ecosystem considerations, ii) the limits to fishing capacity and the impacts and implications of natural fluctuations in stock size; and iii) the limited information available about the status of other important small pelagic stocks in the area, including anchovy, horse mackerel and sardinella.

16. Participants observed that not only biological aspects but also marketing aspects should be improved and that environmental impact on this resource should be taken into account. The potential interest of having a common database at least for a given period, in order to perform a combined assessment exercise incorporating market and environmental aspects of relevance was raised. However, participants also stressed the need to assess if and to which extent the stock was shared between different countries in the Alboran Sea.

17. Several comments were made to improve the summary of adopted management measures presented by the Secretariat. The Moroccan focal point informed that, since March 2009, in addition to the industrial fleet, the coastal fleet had also been equipped with VMS, in compliance with GFCM recommendations. The Algerian focal point underlined that there were spatial restrictions in the country as well as fisheries restricted areas that were used as pilot zones to assess the growth of some species and where fishing was only authorized for scientific purposes. The Spanish focal point highlighted some revisions to be made on the presentation made by the Secretariat regarding national regulations.

18. The Spanish national focal point viewed the joint analysis of small pelagic fisheries in the Alborán Sea as a good exercise, which could lead to a future common framework of joint measures in the area. Moreover, she mentioned that the possibility to take joint measures for other species and fisheries in the area, such as *Pagellus bogaraveo* in the Strait of Gibraltar, should be examined.

Central Mediterranean: hake and shrimp

19. Mr Fabio Fiorentino made a presentation on the assessments of *P. longirostris* (deep-water rose shrimps) and hake stocks in the Strait of Sicily. He highlighted that catches of shrimps in this area accounted for more than half the total catches of this species in the Mediterranean, and also mentioned that the fishery caught small sizes of hake, which imposed a growth overfishing on this stock. However, he stressed that it was difficult to design a fishing gear allowing a compromise between continuing the catch of shrimps and reducing the pressure on small hake. He mentioned that the most likely solutions to improve the stock status of hake in the area could include therefore spatio-temporal closures to protect juveniles, combined with adequate control measures (e.g. VMS).

20. The GFCM Secretariat introduced the existing management frameworks of relevance for the fishery in the Strait of Sicily (GSA 12 – 16, 21), at the international, regional and national levels. It was noted that minimum conservation sizes were in place for some of the countries sharing the resources, but lacking in others. The regulation of the minimum mesh size in the codend of trawling nets was practically globally adopted in the region but, as discussed, it was likely to be ineffective to reduce the catch of immature shrimp and small-sized individuals of associated species. The combination of time and area closures was viewed as a more effective measure to improve the exploitation pattern of the trawling fisheries. The sustainability of the resources, the high rate of discards, the impact of trawling fishing on bottom habitats, the allocation and participatory rights of coastal States and the harmonization of management measures were proposed as priority issues that would need to be addressed in a regional management plan for this fishery.

21. The Italian focal point mentioned that the Italian fleet had undergone an important reduction of capacity over the last years. The invited expert noted that this reduction of capacity was accompanied by a slight change of target species in the remaining fleet, still maintaining high effort on the shrimp stock and therefore on hake.

22. Participants agreed that it was important to advance towards a management plan for the area, incorporating the views of stakeholders in the process. Issues such as gear selectivity and spatio-temporal restrictions for the protection of hake recruits were considered as important aspects to be included, together with the socio-economic aspects of the fishery. Mr Enrico Arneri, MedSudMed coordinator, explained that shrimps and hake showed large differences in market price and that bio-economic models would be therefore important tools to analyse the fishery.

Eastern Mediterranean: deep-water red shrimp

23. The GFCM Secretariat introduced a summary of the status of deep-water blue and red shrimp, *Aristeus antennatus*, and giant red shrimp, *Aristaomorpha foliacea* fisheries in the eastern and central Mediterranean area. It was highlighted that the species had antagonistic longitudinal gradient in distribution in the Mediterranean: *A. antennatus* with decreasing densities from West to East and *A. foliacea* with decreasing densities from East to West. It was noted that because of the shallower distribution and reproductive parameters, *A. foliacea* was comparatively more vulnerable to fishing pressure than *A. antennatus*. Available genetic studies support the hypothesis of two stocks of both species in the Mediterranean (West and East stock), with the Strait of Sicily and the Peloponnesian gyre acting as possible barriers to gene flows between the two basins. It was noted that in the eastern basin *A. foliacea* was under high fishing pressure in some areas (GSAs 15, 16 and 24) but, in general, information on the extent and status of the stock was lacking throughout most of the basin. The presentation also highlighted that the high rates of bycatch and discards and the potential bottom impacts on deep water habitats (e.g. deep water coral *Isidella elongata*) were important ecosystem considerations for the case study. The presentation also provided an overview of catches, fleets, fishing areas and seasons in the case study area. It was stressed that the reporting of catches by GSAs was problematic and that the available FAO catch data was likely to underestimate the actual levels of catches.

24. The GFCM Secretariat also presented the existing management frameworks for the area, at the international, regional and national levels. Particular reference was made to frameworks concerning precautionary and ecosystem considerations of relevance to the management of deep water trawling fisheries, including the UNGA Resolutions 61/105 and 64/72 concerning actions to protect vulnerable marine ecosystems and the FAO precautionary approach to capture fisheries. With regards to the latter, the relevance of recommendations concerning new or developing fisheries to prevent the overexploitation of resources and fleet overcapacity was stressed. The presentation also described the types of management measures currently in place at national and regional levels and discussed their possible effectiveness for ensuring resource sustainability and addressing potential ecosystem impacts of deep water bottom trawling fisheries. It was noted, for instance, that minimum size regulations for the target species were currently lacking. Moreover, the existence of specific regulations prohibiting trawling in areas deeper than 1 000 m was highlighted as an important measure to protect deep water habitats in the Mediterranean. The management of fishing capacity at the regional level was noted as an important aspect that deserved further consideration. Issues such as the participatory rights of coastal States and the overall lack of information on the limits of fishing capacity were raised as a focus for further discussions on this theme.

25. Participants agreed on the importance of taking into account discards for the management of this fishery, and remarked that there was an apparent link between discard rates and the depth of fishing operations, with higher discards at higher depths. Also, the protection of vulnerable habitats such as deep water corals was mentioned as an important topic for the management of these resources.

26. Some clarifications were sought on the criteria used for the definition of the Mediterranean subregional divisions. The Secretariat explained that the proposed geographical limits of the case study were based on information about the genetics of the stocks and the operation of the fleet. The limits were therefore only to be used for the purpose of the case study.

27. Several comments were made with the aim of adjusting the information presented by the Secretariat and improving the characterization of the national management frameworks. The Greek focal point clarified that a closing period from June to September had been defined and that some areas had been closed for many years. The EU DG MARE representative informed that national management plans for trawling fisheries were already adopted by Italy, Malta and Cyprus and that Greece was in the process of adopting its national management plan. It was recalled that a study on the comparative analysis of regulations in all GFCM countries based on questionnaires had been carried out within the LaMed project and that this study could be useful for the case studies. The participant from Tunisia pointed out that the country did not reply to the questionnaire as requested, as deep-water red shrimps were not fished in Tunisia.

All Mediterranean basin: eel

28. The GFCM Secretariat presented an overview of stock status and fisheries in the Mediterranean for the European eel *Anguilla anguilla*, based on replies received to the questionnaires and other available background information. The stock, which is shared among Northern European and Mediterranean countries, has showed a marked decline in recruitment and catches since the 1980s and is now under a recovery plan in several countries, including EU member States. Fisheries are one among several sources of anthropogenic mortality of the stock, including contamination, diseases and habitat changes. The eel fisheries in the Mediterranean are typically small-scale, operating mainly in coastal lagoons, rivers and lakes. It was noted that with a few exceptions, captures of glass eels were generally not allowed in the Mediterranean countries. Eel fisheries are locally important in some countries, particularly because of the high value, but in general eels are only a small component of catches. Until recently, capture fisheries production was mainly to supply the EU markets (with a significant trade occurring within the EU). Since 2010, when the listing of the species in CITES Appendix II entered into force, international trade has been significantly reduced, affecting traditionally exporting countries (e.g. Albania, Tunisia and Algeria). The overfishing of silver eels, illegal fisheries and the multiple sources of anthropogenic mortality have been highlighted as challenges for the management of eels. On the other hand, the trade controls imposed by CITES and the ongoing recovery plan in the EU are considered as important incentives for the implementation of management plans. The presentation also summarized the information on eel aquaculture in the Mediterranean, highlighting that the sector currently accounted for approximately half of the total production, being based on intensive (using water recirculation) and extensive production systems. Seed (glass eel) availability was one of the most important bottlenecks for production, that was affected by declining catches, high prices, trade controls and the lack of feasible alternatives (i.e. breeding in captivity).

29. The GFCM Secretariat also introduced the existing management frameworks relevant for this species. First, international frameworks of importance for eel were described (mainly UNCLOS, CITES and EU regulations) and then the situation regarding the management plans and the measures adopted at the national level was illustrated. The presentation noted that comprehensive management systems were in place in the EU and among some leading producers in the southern Mediterranean (Tunisia, Algeria, Morocco) while improvements were still needed among some of the top producers (including Albania, Egypt and Turkey). In relation to the harmonization of technical management measures, it was noted that measures were adapted to local conditions of stock and fisheries and therefore varied widely across the Mediterranean (e.g. minimum catch sizes). The harmonization of measures would be difficult in some cases. A regionalized approach to eel management was proposed, based on the EU experience, where common objectives and targets are established regionally and specific management actions and measures are adopted locally. The management of fisheries and aquaculture activities in coastal lagoons was viewed as a potential focus area for the GFCM, which should be complementary to the efforts adopted nationally to manage the anthropogenic sources of mortality of eels in the river basins.

30. Several participants pointed out to the importance of taking into account the interactions of the eel fishery with aquaculture and reference was made to the guide for the sustainable management of coastal lagoons to be prepared within the CAQ. In some countries in fact, eel is treated within extensive aquaculture. Therefore, not only environmental aspects but also economic aspects should be considered within integrated coastal management.

31. Participants also emphasized the difficulties of having an assessment of the state of populations as well as of obtaining adequate data on catches. The problem of data shortage was associated to the fact that this fishery was conducted at small-scale, while further research on better assessment methods for this resource were deemed necessary.

32. Mr Mejjedine Kraiem, from the *Institut National des Sciences et Technologies de la Mer*, Tunisia (INSTM), informed the participants about the ongoing research programme on European eels carried out by his institute in collaboration with the GFCM to support the management plan. Despite the limited financial means, the research carried out managed to solve some issues such as estimations

of escape flows. He also underlined that, since the species was listed in Appendix II of CITES and in the IUCN List of endangered species, joint efforts to understand the main issues to be solved for this resource would be beneficial.

33. The participant from Turkey mentioned that the main reason for missing data in his country was that the eel fishery took place without aquaculture and there was a misreporting of catches. He agreed to provide the GFCM Secretariat with some data in this respect.

34. Regarding stock assessment needs, the participant from Italy suggested that a model approach could be used when there was a lack of data for stock assessment. He made reference in this respect to the specific model approach developed by the University of Parma, considered as one of the best for coastal lagoon management, which enabled to calculate the escape of eels from national waters. He informed that a simplified version could be retrieved from: www.eelmanagement.eu for its use in other countries or areas.

35. Some participants commented on the minimum size regulations, suggesting that a distinction should be made between the catch of live eel for farming purposes and the minimum size for marketing. Since eel is listed in Appendix II of CITES and there is a request from EU for management plans, greater attention should be paid to this resource. The need to harmonize regulations and to make transfer of fishing technologies to facilitate migration was noted.

36. The focal point from Albania mentioned that her country was in a transitory situation due to the fact that the fishery law had been approved but the aquaculture law was still under development. She agreed to inform the GFCM Secretariat about the current transitory measures.

37. The focal point from Tunisia reported that the socio-economic status of small-scale eel fishermen was becoming very critical due to the ban on exports to the EU for this species. He also recalled that the national law prohibited the fishing of eels less than 30 cm and mentioned the efforts engaged in 2010 to produce a national management plan for this species. In this regard, he called for a harmonization of management measures for eel stocks in the Mediterranean countries.

38. The issue of banning exports to the EU, while internal exploitation of glass eels by EU countries was still allowed, was also raised by several participants as an important factor affecting the fishery and the market for catches. The EU representative explained that the ban had been decided in implementation of CITES Annex II and that strictly regulated and controlled catches of glass eel by EU members were mainly for intra-community exchanges.

SUBREGIONAL MANAGEMENT MEASURES AND MANAGEMENT PLANS FOR WESTERN MEDITERRANEAN SMALL PELAGICS, CENTRAL MEDITERRANEAN ROSE SHRIMP AND ASSOCIATED SPECIES AND EASTERN MEDITERRANEAN DEEP WATER RED SHRIMPS FISHERIES.

39. In order to discuss concrete management measures and a proposal for the required structure of a management plan, two parallel sessions were held to discuss management issues related to: a) Western Mediterranean small pelagics fisheries, and b) Central Mediterranean rose shrimp and associated species and Eastern Mediterranean deep water red shrimps fisheries.

Session A: Western Mediterranean, small pelagics fisheries

40. The session was attended by the experts from Algeria, Morocco and Spain, plus the coordinator of CopeMed II and the GFCM Secretariat.

41. Experts from these three countries presented a short overview of their fishery, complementing the information provided in the questionnaires. The information presented covered GFCM GSAs 1 to 3 and partially GSA 4 (western part of the GSA, coastal area of Algeria from the limit with Morocco to Oran). Some corrections to the summary of questionnaires for this case study were provided by each country, namely in relation to existing monitoring and control structures (e.g. VMS). Information on existing areas with some figure of protection (fisheries restricted areas or marine protected areas) in

national waters was also provided. Participants agreed to incorporate all this information in a technical background document for this fishery, to be prepared by the GFCM Secretariat.

42. Participants from Morocco and Algeria highlighted that the fishery of small pelagics in Alboran targeted mainly sardine and represented an important economic source. Also, for both countries the main bulk of the catch was used for local consumption, representing an important source of protein for coastal communities.

43. Participants observed that all the fishing activity for this fishery took place within national waters and the Spanish national focal point commented that there was little interaction between the Spanish fleet and third countries' fleets regarding this fishery. It was noted that a management plan addressing this fishery was available in Spain, in compliance with EU requirements, while management plans were being developed in Morocco and Algeria.

44. Participants informed that all countries operating in this fishery had fishing capacity control measures in place. Spain had been implementing a management plan that included a fleet reduction of around 10 percent every two years since 2008, the current one establishing a 20 percent reduction over five years (2013–2017). Algeria had started a freeze in the number of vessels operating in the fishery until a management plan is in place or there are clear indications that unexploited fishing opportunities exist.

45. For the existing management plans in Spain, participants from Morocco and Algeria asked if i) the different stakeholders (e.g. fishing associations and professionals) were included in the design of the plan, ii) what was the level of applications of the measures included in it, and iii) whether (and how) the quotas mentioned in the plan (weekly quotas) were split between the different fleet units. The Spanish focal point informed that the plan was designed following EU Mediterranean regulations, and that the quotas (maximum daily and weekly catches and landings) were set up on sardine and anchovy for purse seine fleets, in order to facilitate its recovery, and also as a commercial measure, to avoid saturation of the market. Mr Juan Antonio Camiñas, CopeMed II coordinator, added that stakeholders were included in the process at EU regional level through the Regional Advisory Committees (RACs), more specifically in this case through the Regional Advisory Council for the Mediterranean (RAC MED), created in August 2008 and operational since April 2009..

46. Participants of Morocco described an ongoing national effort to implement management plans for pelagic resources in the different Atlantic and Mediterranean regions, explaining that a plan was already in place for the southern Atlantic area, while plans for the other regions were currently under consultations with the different stakeholders. Main measures anticipated in the ongoing development of the management plan included the definition of fisheries restricted areas, control on vessel engine power, minimum landing size, the use of licensing system and the limitation of fishing capacity. Main difficulties anticipated for small pelagic fisheries in the Mediterranean included the mobility of the fleet (between Atlantic and Mediterranean areas) and the fluctuations of the resources.

47. Participants of Algeria also informed that there were working towards the implementation of management plans for this fishery, as they observed an increase for the demand of sardines and other small pelagic fish, which translated into an increase of the number of vessels and total catches in the recent years. They also informed that as a general management measure in all Algerian waters, there was a system of fishing authorizations. Furthermore, some spatial restrictions for fishing had been already established, the fishery for small pelagics being restricted to an area between 6 to 12 nautical miles from the coast. Also, fishing was not allowed between the months of May to September, and there were minimum landing sizes for the main small pelagics species, although 20% of the catch was allowed to be composed of undersized fish.

48. The CopeMed II coordinator provided an overview of the activities carried out during the whole life of the project (CopeMed I and II), highlighting that previous efforts towards management plans for small pelagic fisheries in the Alboran Sea involving Algeria, Morocco and Spain had already been undertaken, namely with a dedicated meeting in 2004, and that joint work towards the assessment of small pelagic resources in the Alboran Sea was regularly being done within the second phase of the project since 2010. Also he mentioned the work towards the harmonization of acoustic

surveys, assessment methods and common databases in the area, and he stressed the importance of continuing these efforts using a common framework for management plans in the area. Participants appraised the work carried out by CopeMed and expressed interest in pursuing it.

49. The GFCM Secretariat presented a tentative list of issues and priorities to be addressed by national management plans in the region, based on the replies to the questionnaire and other available background information on the case study. The issues and priorities were agreed by participants and included: i) the sustainability of the resources, including the need for a precautionary system that maintain the target and associated stocks within safe biological limits, taking into account natural fluctuation of these resources and making use of the adequate limits of fishing capacity, and ii) the limited information available about the status and distribution of small pelagic stocks in the area, including the main target species, sardine, but also other species such as anchovy, horse mackerel and sardinella.

50. The subgroup discussed and agreed upon a proposed minimal structure of a management plan for small pelagics in the Western Mediterranean as attached in Appendix C.

Session B: Central-Eastern Mediterranean: deep-water rose shrimp and associated species; deep-water red shrimps (giant red shrimp and blue and red shrimp).

51. The session was attended by experts from Albania, Egypt, Greece, Italy, Lebanon, Malta, Tunisia and Turkey, plus the coordinator and an officer of MedSudMed, the EastMed coordinator, the SAC chairperson, the EU representative and the invited expert.

Deep-water rose shrimp and associated species in the Strait of Sicily

52. Several countries commented and provided complementary information on the questionnaires they had compiled and submitted to the GFCM Secretariat.

53. The Maltese focal point informed that the national management plan for hake and shrimp had been accepted by the EU on 1st October 2013.

54. Mr Fiorentino reported that, in the strait of Sicily, two Italian management plans had been in force since 2010: one for trawlers smaller than 18 m LOA and another for trawlers larger than 18 m, mainly engaged in distant fisheries. These management plans combined measures on the reduction of fishing capacity as well as technical measures (trawling ban, protection of juvenile, etc.). The Italian management plans were currently under revision. The participant from Italy added that the management plans were prepared taking into account both biological and socio-economic aspects of demersal fisheries, including the assessment of the effects of management measures on the stock status and fisheries performance.

55. The participant from Tunisia expounded that fishing activity for trawlers was subject to annual authorizations. The main objectives for Tunisia were to maintain the same fishing effort and to inform as much as possible all the stakeholders. He informed also that no new studies had been carried out and that available stocks were taken into consideration.

56. The Libyan focal point informed that no high sea vessels fisheries were present in his country and prompted partners fishing in the area to take strong measures in order to keep the sustainability in the area. He added that there were some plans to resume this fishery in the future.

57. The GFCM Secretariat presented a tentative list of issues and priorities to be addressed by a regional management plan, based on the replies to the questionnaire and other available background information on the case study. The issues and priorities were agreed by participants and included: i) the sustainability of the resources, including the need for a precautionary system that maintain the target and associated stocks within safe biological limits; ii) the high rate of discards; iii) the impacts of trawl fisheries on bottom habitats and iv) the allocation and participatory rights of coastal States.

58. With regards to discards, it was noted that two types of discards were normally reported: discards of undersized species and discards of non-commercial species. Mr Fiorentino informed for

instance that, for the Sicilian trawling fleet, the discards of undersized species in areas deeper than 300 m was usually low in weight and number. On the other hand the discards of non-commercial species tended to be higher. He also added that the discard of smaller commercial trawlers in shallow water was low in weight but high in number. Hake discards in rose shrimp fisheries could be also very high, which re-emphasized the need to link both species in a management plan.

59. The EU representative noted that new rules concerning discards would be applied in the EU following the reform of the Common Fisheries Policy (due to enter into force from next year), which sets an obligation for landing all catches. Discards of species will no longer be possible. Specific rules will be elaborated in application of this provision.

60. Several participants highlighted the importance of quantifying the levels of bycatch and discards and noted the role of observers on board to this end. It was pointed out that some programmes on discards were carried out in order to assess discards of the bottom trawling fisheries and participants concurred with the importance of the issue, noting that a key problem was the lack of financial and technical means to adequately assess and address the problem.

61. Commenting on the overall lack of means for fisheries management, the EU representative recalled participants of the existence of the EU neighbourhood policy which had dedicated funds to be used in priority areas defined by the neighboring countries. She noted that projects to support the implementation of GFCM recommendations and decisions were in principle eligible for these funds and that it was up to each country's authorities to include them in their priorities when applying for EU funding.

62. Mr Arneri recalled that the FAO GEF-Med-LME project in collaboration with MedSudMed and CopeMed was working on bycatch and discards in the Gulf of Gabès. He suggested that a meeting on discards in the Sicilian channel could also be organized within the framework of MedSudMed.

63. Some concerns were raised regarding the negative impact of bottom trawlers on habitat. There was a general agreement that targeted actions and research should be planned in this respect. Several participants highlighted the role of VMS data in the assessment of habitat impacts of fishing operations.

64. There was a general consensus on the importance of allocation and participatory rights of coastal States and on the need to address this issue in a management plan. Some points to be taken into account in future discussions were raised in this regard, including the jurisdiction of countries and the need to investigate the pros and cons of different types of right-based systems (e.g. based on quotas, effort, etc.).

65. Participants concurred with the need to keep encouraging research and collaboration among countries sharing the resources, preferably within research networks supported by GFCM and FAO regional projects.

66. The subgroup discussed and agreed upon a proposed minimal structure of a management plan for rose shrimp and associated species in the Strait of Sicily as attached in Appendix D.

Deep-water red shrimps in the Central- Eastern Mediterranean

67. The GFCM Secretariat presented a tentative list of issues and priorities to be addressed by a regional management plan, based on the replies to the questionnaire and other available background information on the case study. The issues and priorities were agreed by participants and included: i) the sustainability of the resources, which requires a precautionary system that maintains the stocks in exploited areas within safe biological limits and links the progression of fishery development in areas still underexploited to the acquisition of new knowledge; ii) the high rate of discards; iii) the impacts of bottom trawl fisheries on bottom habitats; iv) the limited information about stocks and associated ecosystems; and iv) the allocation and participatory rights of coastal States.

68. Participants raised several points on the issue of trawling impacts on bottom habitats. They highlighted the importance of protecting deeper waters areas since it was expected that, with the

overexploitation of shallower water stocks, fishermen would search for new opportunities in deeper waters. In general, deep water communities are more sensitive to impacts because of the lower turnover rate. It was also highlighted that deep water corals should be protected from fisheries impacts and it was noted that the relationship between coral habitat and shrimp should be further investigated. Mr Fiorentino observed for instance that Italian skippers had a good knowledge about the location of deep water coral habitats and tended to avoid them during trawling operations.

69. In relation to the sustainability of deep-water red shrimps stocks, it was remarked that *A. foliacea* was more sensitive to fishing pressure than *A. antennatus* due to its biological characteristics (shallower distribution, slower growth, lower fecundity, etc.). Both species are supposed to have biomass reservoirs in deep waters and move on the fishing ground depending on biological cycle and environmental factors such as currents and the morphology of the bottom (e.g. canyons and plains). The pattern of exploitation adopted by the fleet changes according to these conditions, which should be considered when designing management measures for the fishery. In this regard, it was also underlined that, contrary to hake and deep-water rose shrimp, the recruitment of deep-water red shrimps did not seem to be stable in space, and this affected for instance the effectiveness of spatial restrictions to protect nursery areas.

70. In the ensuing discussion, it was highlighted that the contribution of research was extremely important for these deep water fisheries. The minimal depth as well as the relationship between habitat characteristics and resource availability should be further examined. In this respect, knowledge provided by fishermen and research would be useful. The importance of conducting research based on well-designed sampling schemes, considering for instance depth strata, was also highlighted.

71. With regards to the issue of discards and bycatch it was noted that, contrary to the trawl fisheries for deep-water rose shrimp that produce high quantities of discards of commercial species (hake, etc.), most discards in the deep-water red shrimp fisheries were non-commercial and included elasmobranchs. Therefore, highly selective gear would be easier to adopt based on the technology available, which could be further improved. It was also suggested to study the effects of horsepower and trawling operations and to prioritize research in all these fields.

72. Finally, reference was made to a report produced within the European RedFISH project which provided excellent information on the size of maturity for both sexes and species. Participants from Turkey and Greece mentioned that local studies were available on size of maturity and could be used in the definition of minimum size regulations.

73. The subgroup discussed and agreed upon a proposed minimal structure of a management plan for deep-water red shrimps in the Eastern Mediterranean as attached in Appendix E.

DISCUSSION ON A ROADMAP FOR THE IMPLEMENTATION OF MANAGEMENT PLANS FOR THE SELECTED CASE STUDIES

Case studies of small pelagics fisheries in the Alborán Sea, rose shrimps and associated species in the Strait of Sicily and deep water red shrimps in Central – Eastern Mediterranean areas

74. The GFCM Secretariat presented a proposed roadmap to be followed for all case studies but eel, which was discussed separately (*see below*). The proposed roadmap included: i) the preparation by the Secretariat of a background technical document including information on the fishery, to be sent to participants for comments and then presented to the subcommittees and SAC, ii) the presentation of the conclusions and recommendations of this meeting, including the proposed minimum structure and potential measures by case study, to the subcommittees and SAC for comments and evaluation of measures, and iii) the possible organization of a follow-up meeting to discuss the costs and benefits of the different management scenarios proposed.

75. Several participants commented on the opportunity of creating a new group to follow up the conclusions of this meeting, including inter alia the review of decision rules to be studied, and then report to the subcommittees and the SAC. It was clarified that such meeting would aim at advancing towards the assessment of management scenarios to be presented to the SAC, in order to prepare all

information required for SAC to provide advice to the Commission. The institutional aspects and timetable of this follow-up meeting were discussed among partners. Participants agreed that the meeting could be held between the subcommittees and the SAC sessions, so that the subcommittees could review technical options and evaluate their feasibility while SAC could validate the technical proposals and provide advice.

76. Moreover, it was emphasized that it was important to discuss technical proposals with the stakeholders and it was agreed that this would be done at the national level by each country. The report of this meeting as well as the technical documents would thus be sent to the countries to enable them to consult their stakeholders before coming back to the subcommittees.

77. To ease such a task in French-speaking countries, the GFCM Secretariat agreed to examine the possibility of translating such documents in French.

78. Participants agreed on a roadmap for the implementation of management plans for small pelagics fisheries in the Alborán Sea, rose shrimps and associated species in the Strait of Sicily and deep water red shrimps in central-eastern Mediterranean areas, as detailed in the **Conclusions and Recommendations** section of this report.

Mediterranean eel case study

79. In the discussion regarding the next steps to be undertaken for the management of eels at the Mediterranean level, several countries insisted on the need to keep working at the national and local level before moving to a regional management of the eel fishery.

80. In some cases, such as in Spain, the regulations for these fisheries are placed under the competence of the autonomous regions, the national effort being aimed at coordinating the regional efforts to comply with the EU regulations on eel. In such cases, it was felt that data collection needed to be improved and harmonized in order to cope with the differences.

81. Participants concurred that it was important to improve data collection, scientific research and stock assessment in order to provide information, data and standard methods supporting the management of eels in the Mediterranean.

82. In this respect, all participants agreed to pursue efforts within the GFCM/ICES/EIFAAC Working Group on European Eel.

83. Moreover, it was agreed that the GFCM Secretariat would produce draft technical guidelines for the management of eel in the Mediterranean to be submitted to SAC, taking into consideration interactions between fisheries and aquaculture as well as integrated coastal management.

ADOPTION OF CONCLUSIONS AND RECOMMENDATIONS

84. The following conclusions were adopted by the participants:

Case studies of small pelagics fisheries in the Alborán Sea, deep-water rose shrimp and associated species in the Strait of Sicily and deep-water red shrimps in Central – Eastern Mediterranean areas

- To advance towards the development of management rules and management plans for these fisheries following the proposed minimum structure, criteria and measures agreed by the workshop (included as Appendix C, D and E) and according to the following roadmap:
 - a. Preparation by the GFCM Secretariat of a technical background document for each fishery describing the current state of stocks, fisheries and existing legal frameworks (as per agreed table of contents in Appendix F). Deadline for transmission to the countries by 15th November 2013. Deadline for comments by 15th January 2014.
 - b. Consultations with involved stakeholders at the national level, if and when appropriate.

- c. Review by the GFCM subcommittees of the proposed minimum structure criteria and measures for each of the case study, including: ranking of technical options, evaluation of their feasibility, taking into consideration their ability to maintain stocks within decided limits, associated economical cost/benefits, etc.
- d. Submission of the technical proposals to SAC for validation and formulation of advice on the different options.
- e. Other activities within the GFCM Framework Programme could take place to further elaborate on these management plans.

Management of eel fisheries in the Mediterranean

- To advance towards the development of a regional management of eel fisheries in the Mediterranean.
- To support the organization of the first meeting of the GFCM/ICES/EIFAAC Working Group on European Eel
- To produce draft technical guidelines for the management of eel in the Mediterranean to be submitted to SAC, taking into consideration interactions between fisheries and aquaculture as well as integrated coastal management.
- To improve data collection, scientific research and stock assessment in order to provide reliable information and data supporting the management of eel in the Mediterranean

85. During the discussion, the importance of socio-economic impacts was stressed by several participants who also suggested that cost-benefit analysis related to the development of management plans should be carried out. In this respect, it was advised that countries undertake studies on these aspects. The issue was also incorporated in the research priorities for the different proposed minimum structure documents in Appendixes C, D and E.

86. Moreover, participants concurred that the interactions between the work done by the countries and the work of SAC should be taken into consideration.

87. Participants acknowledged the efforts made by the GFCM Secretariat to collect and analyze existing information for the different case studies, and appraised the quality of the information summarized. Participants therefore expressed their hope that the background technical documents would become a reference to describe the situation in the different fisheries examined.

88. Participants appraised the work carried out by the FAO regional projects involved in these case studies (CopeMed II, MedSudMed and EastMed) and recognized that a lot of the background work that allowed the current knowledge on stocks and fisheries emanated from the works performed by the projects.

CLOSURE OF THE MEETING

89. The GFCM Secretariat acknowledged the wealth of support received from the countries and the regional projects and thanked all participants and all countries for their active collaboration and valuable inputs in providing information and replying to the questionnaires. Gratitude was expressed to the FAO regional projects for their contribution in the preparation of the meeting and for the information made available in relation to the case studies examined.

90. The meeting was closed and the GFCM Secretariat reiterated its thanks to Tunisia for the hospitality and the excellent support provided in the organization of the meeting.

Agenda

MONDAY 7 OCTOBER

Morning, 09:00 – 13:00

1. **Opening and arrangement of the meeting**
 - Adoption of the agenda
 - Introduction of participants
 - Introduction of workshop objectives

2. **Introduction of the GFCM guidelines on management plans, fishing capacity and precautionary measures**

3. **Status of selected fisheries in the Mediterranean**
 - Introduction : status of Mediterranean stocks and recommendations from the SAC
 - Western Mediterranean: small pelagics
 - Central Mediterranean: hake and shrimp
 - Eastern Mediterranean: red shrimp
 - All Mediterranean basin: eel

LUNCH

Afternoon (14:30 – 17:30)

4. **Summary of replies to the questionnaire on management issues**
 - Western Mediterranean: small pelagics
 - Central Mediterranean: hake and shrimp
 - Eastern Mediterranean: red shrimp

TUESDAY 8 OCTOBER

Morning (09:00 – 13:00)

5. **Sub - regional management objectives¹**
 - Session A: Western Mediterranean, small pelagics fisheries
 - Session B: Central Mediterranean, hake and shrimp, and Eastern Mediterranean, red shrimp

LUNCH

Afternoon (14:30 – 17:30)

6. **Subregional management objectives (cont²)**

¹ A proposal for potential objectives by subregion will be introduced on the basis of the replies to the questionnaire. Sessions A and B will be organized in parallel .

WEDNESDAY 9 OCTOBER

Morning (09:00 – 13:00)

7. Outcomes of sessions A and B

- Western Mediterranean: small pelagics
- Central Mediterranean: hake and shrimp
- Eastern Mediterranean: red shrimp

LUNCH

Afternoon (14:30 – 17:30)

8. Issues related to the management of eel fisheries in the Mediterranean

- Regional objectives in relation to management of eel fisheries
- Discussion

THURSDAY 10 OCTOBER

Morning (09:00 – 13:00)

9. Adoption of conclusions and recommendations

10. Closure of the meeting

List of participants

ALBANIA

Mimoza COBANI
FWP National Focal Point
 Fishery & Aquaculture specialist
 Fisheries Directorate
 Ministry of Environment, Forestry and
 Water Administration
 Rruga e Durrës, Nr.27
 Tirana
 Tel.: +355 672055778
 E-mail: mimoza.cobani@moe.gov.al;
cobanimimi@yahoo.com

Luljeta DERVISHI
 Statistical data specialist
 Ministry of Environment, Forestry and
 Water Administration
 Rruga e Durrës, Nr.27
 Tirana
 E-mail: luljeta.dervishi@moe.gov.al

ALGERIA

Leila LOUNACI
FWP National Focal Point
 Direction des études prospectives et de
 l'investissement
 Ministère de la Pêche et des Ressources
 Halieutiques
 Rue des 4 canons, BP 224
 Alger
 E-mail: leilapeche@yahoo.fr
lila.lounaci@mpeche.gov.dz

Sarah CHENITI
 Chef de Bureau
 Direction des pêches maritimes et océaniques
 Sous-direction de la régulation des échanges
 et du contrôle des produits halieutiques
 Ministère de la Pêche et des Ressources
 Halieutiques
 Rue des 4 canons, BP 224,
 Alger
 E-mail: chenitisarah@yahoo.fr

EGYPT

Madani Ali MADANI
FWP National Focal Point
 General Director
 International Agreements Dept.
 General Authority for Fish Resources
 Development (GAFRD)
 4, Tayaran st., Nasr City
 Cairo
 Tel.: +202 22620117 / 22620118
 Fax: +202 22620117 / 22620130
 E-mail: madani_gafrd@yahoo.com

EUROPEAN UNION

Anna MANOUSSOPOULOU
 Directorate General for Maritime Affairs and
 Fisheries
 European Commission of the European Union
 200 rue de la Loi
 1049 Bruxelles
 E-mail: Anna.Manoussopoulou@ec.europa.eu

FRANCE

Philippe MARAVAL
 Chargé de mission affaires internationales
 Direction des pêches maritimes et de
 l'aquaculture
 Ministère de l'Ecologie et du Développement
 Durable
 1 place des degrés, La Défense
 Paris
 Tel.: +33 0140818936
 E-mail: philippe.maraval@developpement-durable.gouv.fr

GREECE

Stefanos KAVADAS
FWP National Focal Point
 System analyst
 Hellenic Centre for Marine Research
 Ag. Kosmas, Hellinikon,
 Athens
 E-mail: stefanos@hcmr.gr

ITALY

Mauro BERTELLETTI
FWP National Focal Point
 Direzione generale della pesca marittima e
 dell'acquacultura
 Ministero per le Politiche Agricole,
 Alimentari e Forestali
 Viale dell'Arte 16
 00144 Rome
 Tel.: +39 0646652849
 E-mail: m.bertelletti@mpaaf.gov.it

Fabrizio CAPOCCIONI
 Consiglio per la ricerca e la sperimentazione
 in agricoltura (CRA)
 Centro di ricerca per la produzione delle carni
 e il miglioramento genetico (PCM)
 Via Salaria, 31, 00016
 Monterotondo (Roma)
 Tel.: +39 06 90090 263
 E-mail: fabrizio.capoccioni@entecra.it

LEBANON

Samir MAJDALANI
FWP National Focal Point
 Head
 Department of Fisheries & Wildlife
 Ministry of Agriculture
 Embassies Street, Bir Hassan
 Beirut
 Tel.: +961 3384421
 E-mail: sem@cyberia.net.lb
smajdalani@agriculture.gov.lb

Dahej EL MOKDAD
 Head of the Division of Forestry and Natural
 Resources
 Ministry of Agriculture
 Embassies Street, Bir Hassan
 Beirut
 Tel.: +961 3602794
 E-mail: dmokdad@agriculture.gov.lb

LIBYA

Nureddin ETBENI
FWP National Focal Point
 General Authority for Marine Wealth
 Tripoli
 E-mail: nurabdala@live.co.uk

Ahmed G. ABUKHDER
 General Authority for Marine Wealth
 Tripoli
 Tel.: +218 91 3866651
 E-mail: abukh_53@yahoo.com

MALTA

Reno MICALLEF
FWP National Focal Point
 Scientific Officer
 Department of Fisheries and Aquaculture
 Ministry for Sustainable Development,
 Environment and Climate Change
 Government Farm Ghammieri,
 Marsa
 Tel.: +356 22921222
 Fax: +356 2292 1221
 E-mail: reno.micallef@gov.mt

Stephen BRINCAT
 Scientific Officer
 Department of Fisheries and Aquaculture
 Ministry for Sustainable Development,
 Environment and Climate Change
 Government Farm Ghammieri,
 Marsa,
 Tel.: +356 22921211
 E-mail: stephen.b.brincat@gov.mt

MOROCCO

Bouchra HAOUJAR
 Assistant of the National Focal Point
 Department of Marines Fisheries
 Ministère des Pêches Maritimes et de
 l'Agriculture
 BP 476 Quartier Administratif
 Agdal Rabat
 Tel.: +212 666410318
 E-mail: haoujar@mpm.gov.ma

Mohamed MALOULI IDRISSE
 Socio-économiste des pêches
 Institut National de Recherche Halieutique
 (INRH)
 Tanger
 Tel.: + 212 661263050
 E-mail: malouliinrh@yahoo.fr

SPAIN

Encarnación BENITO REVUELTA
FWP National Focal Point
 Jefa de Area
 SG Caladero Nacional, Aguas Comunitarias
 y Acuicultura
 Dirección General de Recursos Pesqueros
 y Acuicultura
 Secretaría General de Pesca
 Ministerio de Agricultura, Alimentación y
 Medio Ambiente
 C/ Velázquez 144 - 28071 Madrid
 Tel. / Fax: +34 913476161 / 6046
 E-mail: ebenitor@magrama.es

Alberto GARCÍA
 Fisheries Programme Coordinator
 Instituto Español de Oceanografía (IEO)
 Puerto Pesquero de Fuengirola
 29640 Fuengirola
 Tel.: +34 952197123
 E-mail: agarcia@ma.ieo.es

TUNISIA

Mohamed HMANI
 Directeur de la conservation des ressources
 halieutiques
 Ministère de l'agriculture et des ressources
 hydrauliques
 30 rue Alain Savary, 1002 Tunis Belvédère
 Tel.: +216 71 890 784
 Fax : +216 71 799 401
 E-mail: m.hmani@yahoo.fr

Mehrez BESTA
 Direction générale de la pêche et de
 l'aquaculture
 Ministère de l'agriculture et des ressources
 hydrauliques
 30 rue Alain Savary, 1002 Tunis Belvédère
 Tel.: +216 71 890 593
 E-mail: mehrezbesta@gmail.com

Mejdeddine KRAIEM
 Professor
 Institut National des Sciences et Technologies
 de la Mer (INSTM)
 28 rue 2 mars 1934
 2025 Salammbô
 Tel.:+ 216 71730420
 Fax:+216 71732622
 E-mail: mejd.kraiem@instm.rnrt.tn

Nidhal MELAOUAH
 Direction générale de la pêche et de
 l'aquaculture
 Ministère de l'agriculture et des ressources
 hydrauliques
 30 rue Alain Savary, 1002 Tunis Belvédère
 Tel.: +216 98337736
 E-mail: dr.melaouah@yahoo.fr

Ridha M'RABET
 Directeur Général
 Institut National des Sciences et Technologies
 de la Mer (INSTM)
 28 rue 2 mars 1934
 2025 Salammbô
 Tel.:+ 216 71730548
 Fax:+216 71732622
 E-mail: ridha.mrabet@instm.rnrt.tn

Sadok BEN MERIEM
 Institut National des Sciences et Technologies
 de la Mer (INSTM)
 28 rue 2 mars 1934
 2025 Salammbô
 E-mail: sadokbm@yahoo.fr

Scander BEN SALEM
 Researcher / SCESS coordinator
 Institut National des Sciences et Technologies
 de la Mer (INSTM)
 28 rue 2 mars 1934
 2025 Salammbô
 Tel.: +216 71 730548
 E-mail: scander.bensalem@instm.rnrt.tn

Adel GAAMOUR
 Institut National des Sciences et Technologies
 de la Mer (INSTM)
 28 rue 2 mars 1934
 2025 Salammbô
 E-mail: gaamour.adel@instm.rnrt.tn

Mohamed Salah ROMDHANE
 INAT/UR
 Ecosystèmes et ressources aquatiques
 E-mail: ramadhanms@gmail.com

Mohamed CHALGHAF
 Institut supérieur de pêche et d'aquaculture de
 Bizerte (ISPAB)
 BP 15 Errimel
 7080 Bizerte
 E-mail: med.chalghaf@iresa.agrinet.tn

TURKEY

Mehmet Cengiz DEVAL
Associate Professor
Faculty of Fisheries
Akdeniz University
E-mail: deval@akdeniz.edu.tr

Şükran Yalçın ÖZDİLEK
Associate Professor
Faculty of Science and Literature
Çanakkale OnSekiz Mart University
E-mail: yalcinozdilek@gmail.com

FAO ADRIAMED/MEDSUDMED PROJECT

Enrico ARNERI
Project Coordinator
Fisheries and Aquaculture Resources Use and Conservation Division (FIRF)
Fisheries and Aquaculture Department
Viale delle Terme di Caracalla, 00153 Rome, Italy
Tel.: +39 06 57056092
Fax: +39 06 57053020
E-mail: enrico.arneri@fao.org

Luca CERIOLA
FAO AdriaMed/MedSudMed
Fisheries and Aquaculture Resources Use and Conservation Division (FIRF)
Fisheries and Aquaculture Department
Tel.: +39 06 570 54492
Fax: +39 06 570 53020
E-mail: luca.ceriola@fao.org

FAO COPEMED PROJECT

Juan A. CAMIÑAS
CopeMed Project Coordinator
Fisheries and Aquaculture Resources Use and Conservation Division (FIRF)
Fisheries and Aquaculture Department
Food and Agriculture Organization of the United Nations (FAO)
Paseo de Sancha 64, 29071 Málaga
Spain
Tel.: +349 52478148
Fax: +349 52463808
E-mail: juanantonio.caminas@fao.org

FAO EASTMED PROJECT

Constantina KARLOU-RIGA
EastMed Project Coordinator
Fisheries and Aquaculture Resources Use and Conservation Division (FIRF)
Fisheries and Aquaculture Department
Andron 1, 11257, Athens
Greece
Tel.: +30 2108847960
E-mail: konstantina.riga@fao.org

GFCM

Henri FARRUGIO
GFCM-SAC Chairperson
7 impasse de la Trémie
34140 Bouzigues,
France
Tel.: +33 6 87165530
E-mail: farrugio.fisheries@gmail.com

Miguel BERNAL
Fisheries Resources Officer
Policy, Economics and Institutions Service
Fisheries and Aquaculture Policy and Economics Division
Fisheries and Aquaculture Department of the FAO
GFCM HQ, Palazzo Blumenstihl
Via Vittoria Colonna 1
00193, Rome, Italy
Tel.: +39 06 57056537
E-mail: miguel.bernal@fao.org

Dominique BOURDENET
Scientific editor/translator
Fisheries and Aquaculture Policy and Economics Division
Fisheries and Aquaculture Department of the FAO
GFCM HQ, Palazzo Blumenstihl
Via Vittoria Colonna 1
00193, Rome, Italy
Tel.: +39 06 57056557
E-mail: dominique.bourdenet@fao.org

Marcelo VASCONCELLOS
Consultant
Policy, Economics and Institutions Service
Fisheries and Aquaculture Policy and
Economics Division
Fisheries and Aquaculture Department of the
FAO
GFCM HQ, Palazzo Blumenstihl
Via Vittoria Colonna 1
00193, Rome, Italy
E-mail: marcelo.vasconcellos@fao.org

INVITED EXPERTS

Fabio FIORENTINO
Istituto per l'Ambiente Marino Costiero
Consiglio Nazionale delle Ricerche
V. Luigi Vaccara 61
91026 Mazara del Vallo
Italy
Tel.: +39 09 23948966
Fax: +39 09 23906634
E-mail: Fabio.fiorentino@iamc.cnr.it

Proposed minimum structure, criteria and measures for the management of small pelagic fisheries in the Alboran Sea

1. Scope of this proposal

A definition of the area covered by this proposal (the *Alborán Sea*) as well as the fisheries included in this proposal (*small pelagic fisheries in the Alborán sea*) and species concerned (*target and associated species*) will be needed.

A definition of the stock units and limits in the area is not currently clear; therefore it will not become part of the scope, but else become a key research priority within this proposal.

2. Objectives

Following the GFCM guidelines on management plans (GFCM/36/2012), management plans should consider inter alia the following objectives:

- To prevent overfishing of small pelagics in the Alboran Sea area with a view to ensure the sustainable economic viability of fisheries;
- To maintain the stock of sardine in the area at levels that can produce the maximum sustainable yield and to facilitate the restoration of anchovy stocks to historical levels;
- To guarantee a low risk of sardine and anchovy stocks in the area falling outside safe biological limits;
- To ensure protection of biodiversity in the Alborán Sea to avoid undermining ecosystems' structure and functioning;

Operational objectives

- To maintain the biomass of sardine and anchovy above agreed precautionary biological reference points ($B > B_{pa}$ and $F < F_{pa}$)
- To minimize the risk that small pelagic fisheries in Alboran Sea put the population of other accompanying and non-target species at risk of falling below its safe biological limits (if exist) or in risk of collapse.
- To minimize bycatch of endangered or protected species
- To minimize any potential effect of small pelagic fisheries in Alboran Sea in the Alboran Sea habitat

3. Indicators and reference points

Both biomass and fishing mortality indicators should be used in order to incorporate natural fluctuations and minimize risk of collapse. Current stock assessment methods should be improved following the recommendations of SAC and reference points should be based on these models, once validated. Also, reference points should take into account the role of small pelagics in the trophic web. For biomass, the following reference points should be attempted:

- B_{lim} : a biomass level which is considered undesirable and which management actions should avoid with high probability.
- B_{pa} : a threshold level of biomass established to reduce the probability that the limit reference point will be exceeded.

The possibility to use generic reference points (e.g. $E < 0.4$ or $F_{0.1}$ for fishing mortality) while specific points of reference are designed for the stock should be evaluated.

Pending the availability of stock biomass and fishing mortality estimates and the identification of appropriate reference points, the following indicators and reference points could be used.

| Indicator of stock abundance* | Reference point |
|---|--|
| Standardized catch-per-unit-of-effort (CPUE) data from the fishery | - Historical level - Trend (e.g. increase by x% per year) |
| As secondary indicator: Catch or trade data without information on effort | - Historical level - Trend (e.g. increase by x% per year) |
| Indicator of stock status | Reference point |
| Mean body size in the catch (Lt) | Lt > Lm; Lm = minimum conservation size. |
| Indicator of fishing pressure | Reference point |
| Fleet size | - Historical level - Trend (e.g. decrease by x% per year) |
| Fishing effort | - Historical level - Trend (e.g. decrease by x% per year) |

The following indicator could be used for non-target species, and some reference points could be established:

- Landings of main non-target species defined in each fishery

The following indicators could be used for ecosystem status, and some reference points could be established:

- Presence and volume of catches of alien species
- Composition of the catch
- Mean length of the catches
- Any information on cetaceans and sea birds abundance and distribution

4. Fisheries management measures

In order to reach the objectives of this proposal, and without prejudice to stricter measures adopted nationally, the following tools can be used and the following potential measures are provided as options:

| Management tools | Potential measures |
|----------------------------|--|
| Spatial restrictions | <ul style="list-style-type: none"> - (low impact on the plan) Seagrass beds, - (low impact on the plan) Coralligenous habitats and mäerl beds. - Nursery areas - Minimum distance to the coast - Minimum bottom depth - Protected areas |
| Gear restriction | <p>Specific for the different operational units. Minimum mesh size and the way to be measures.</p> <ul style="list-style-type: none"> - Purse seiners: <ul style="list-style-type: none"> o Minimum mesh size (potentially easily to be harmonized) o Maximum dimensions (length and depth) - Trawl nets: <ul style="list-style-type: none"> o Minimum mesh size o Cod-end o Dimensions - Accessories: characteristics of the light, |
| Minimum landing size | <p>Minimum size – current measures are similar. To be checked on a technical forum. Use length weight conversions from each area</p> <p><u>Minimal proposal:</u> <i>E. encrasicolus</i>: 9 cm. <i>S. pilchardus</i>: 11 cm <i>Trachurus</i> spp: 15 cm to be checked against ind./kg <i>Scomber</i> spp: 18 cm to be checked against ind./kg <i>Sardinella</i> spp: 15 cm to be evaluated Minimum sizes should be converted to ind./kg</p> |
| Limits to fishing capacity | <p>Pending the availability of sound scientific evidence indicating the existence of unutilized fishing opportunities, Countries shall not increase the number of vessels authorized to operate in this fishery. The allowance of changes in fishing capacity for existing vessels should be revised at national level.</p> |
| MCS measures | <p>Vessel information submitted to GFCM Regional Fleet Register. Record of fishing vessels larger than 15 metres authorized to fish in the GFCM Area. Satellite-based VMS required for vessels >15 meters authorized to fish in the GFCM area. The submission of information from smaller vessels in this fishery could be evaluated Required submission of data on vessels engaged in IUU fishing (IUU Vessel List). Required logbook for vessels exceeding 15 meters authorized to fish in GFCM area. Logbook shall register quantities of each species caught and kept on board, above 50kg in live weight. Adoption of Port State measures to prevent, deter and eliminate IUU fishing.</p> |

5. Decision rules

Management plans will include decision rules with pre-agreed measures to be adopted under different conditions of the stock and other indicators such as fisheries activity, revenues, etc. in relation to agreed reference points. The specific technical measures to be adopted under each scenario for each indicator (stock status, economic indicator) are to be defined in appropriate national and sub-regional working groups.

6. Scientific monitoring

The Scientific Advisory Committee (SAC) of the GFCM should be responsible for advice on status of stocks and economic indicators of the fishery.

Adequate annual scientific monitoring of fisheries and exploited stocks at national level should be ensured so that SAC is in a position to provide scientific advice.

7. Research priorities

1. Definition of stock structure (stock identification, existence of metapopulations, stock boundaries, migration flows) with a view of determining if fisheries are sharing the same stock in the sub-region and the interconnectivity between areas.
2. Research towards improvement of the assessment of stock status, including:
 - a. Improve biological information of target species (sardine and anchovy)
 - b. Identify main accessory species for the fishery object of the plan in relation to the volume of catches and obtain a minimum of information on them (e.g. catches)
 - c. Improve the assessment model used, including:
 - i. Identification of the most adequate assessment model given the information foreseen
 - ii. Definition of minimum information on biological parameters, catches and effort required to perform an assessment of the status of the stock using the preferred model
 - iii. Investigation of the possibility to have a minimum set of data harmonized between countries in the region to compile a common dataset and apply a common assessment model
 - iv. Recover data on direct surveys in the area, continue with the national survey that combined cover all the area, make the indicators compatible (single coordinated survey, calibrated surveys, etc.)
 - d. Improve the knowledge of natural fluctuations of small pelagics in the Alboran Sea, including range of fluctuations, periodicity and causes.
3. Socioeconomic impacts of the implementation of management measures and plans, including:
 - a. Socioeconomic impacts of the plan: short and long term potential negative effects, medium and long term potential positive impacts.
 - b. Improvement of value chain, and conditions of the people working in the fisheries (security on board, etc.)
 - c. Requirements for the preparation of the plan: technical meetings, meetings with stakeholders, studies needed (socioeconomic indicators)
 - d. Requirements for the implementation of the plan, including:
 - i. Analysis of the expected impact of the implementation of the measures proposed
 - ii. Capacity building to implement the management measures proposed (control, etc.)
 - iii. Requirements to implement research lines

8. Fisheries Monitoring, Control and Surveillance

To ensure compliance with the measures to be adopted in the management plan, the following actions are to be implemented:

- Concerned Parties should make efforts to implement GFCM recommendations related to MCS, including those listed under the section on management measures.
- Concerned Parties are responsible for implementing the adopted management measures in their jurisdictional waters and by vessels flying their flag beyond national jurisdiction.
- Development of a specific mechanism for MCS in areas beyond national jurisdictions covered by the management plan.

9. Review of the management plan

The contents of the management plans should be periodically reviewed in order to accommodate changes in the fisheries system. The review should be carried out as follows:

To be done by SAC:

- Status of stocks assessed yearly.
- Status of the fishery (e.g. economic indicators)
- Reference points should be proposed by the SAC once indicators are available.
- Once reference points are established, the SAC should propose a review term for them.

To be done by Concerned Parties:

Management action taken based on stock status and fishery conditions (socioeconomic indicators) and according to the decision rules and management tools described.

10. Compliance with the plan

Management actions, modifications of the plan and compliance with the plan should be reported to the GFCM within the National Report submitted yearly to the GFCM. The Compliance Committee of the GFCM shall review this report and take necessary actions.

Proposed minimum structure, criteria and measures to be used in a regional management plan for bottom trawling fisheries for deep-water rose shrimp (*P. longirostris*) and associated species in the Strait of Sicily (GSA12 – 16)

1. Scope of the management plan

Need to define the species, the fleets and the areas that will be covered by the management plan.

2. Objectives

Following the GFCM guidelines on management plans (GFCM/36/2012), the regional plan should consider inter alia the following options:

To counteract and/or to prevent overfishing with a view to ensure the sustainable economic viability of fisheries;

To maintain and/or to restore, to the extent possible, the stock size of harvested species at least at levels which can produce the maximum sustainable yield;

To guarantee a low risk of stocks falling outside safe biological limits;

To ensure protection of biodiversity to avoid undermining ecosystems' structure and functioning.

Operational objectives

The plan should define, for each agreed objective, specific operational objectives that have practical interpretation, can clearly describe expected outcomes and can be measured with indicators. For example, in relation to the objective of “guarantee a low risk of stocks falling outside safe biological limits” the following operational objective could be applied:

- To maintain the biomass of target species above agreed precautionary biological reference points ($B > B_{pa}$ and $F < F_{0.1}$).
- To maintain indicators of stock status and fishing pressure (according to the Table on alternative indicators and reference points) at levels which ensure the sustainability of the fishery.

In relation to the objective of “ensure protection of biodiversity to avoid undermining ecosystem's structure and functioning”, the following operational objective could be applied:

- To decrease discards of commercial and non-commercial species by (x)% in (y) years.
- To decrease the incidental catch of protected and endangered species.
- To prevent significant adverse impacts of bottom trawling fisheries on sensitive habitats by increasing the protection of areas where these habitats are known or are likely to occur.

3. Indicators and reference points

In situations where stock biomass is used as indicator of status of the stock, the following reference points could be used:

B_{lim} : a biomass level which is considered undesirable and which management actions should avoid with high probability.

B_{pa} : a threshold level of biomass established to reduce the probability that the limit reference point will be exceeded.

B_{msy} : as a possible target reference point.

In situations where fishing mortality is used as an indicator of fishing pressure, the following reference point could be used:

$F_{0.1}$: The fishing mortality rate at which the slope of the yield-per-recruit curve is only one-tenth the slope of the curve at its origin.

Pending the availability of stock biomass and fishing mortality estimates and the identification of appropriate reference points, the following indicators and reference points could be used.

| | |
|---|---|
| Indicator of stock abundance* | Reference point |
| Standardized index from scientific surveys (3) | - Historical level - Trend (e.g. increase by x% per year) |
| Standardized catch-per-unit-of-effort (CPUE) data from the fishery (2), assuming fishing pattern remained constant. | - Historical level - Trend (e.g. increase by x% per year) |
| Unstandardized CPUE data from the fishery (1), assuming fishing pattern remained constant. | - Historical level - Trend (e.g. increase by x% per year) |
| Indicator of stock status | Reference point |
| Mean body size in the catch (Lt), assuming that selectivity pattern is kept constant. | Lt > Lm; Lm = minimum conservation size. |
| Indicator of fishing pressure | Reference point |
| Fleet size (by operational units as defined by GFCM Task 1) | - Historical level - Trend (e.g. decrease by x% per year) |
| Fishing effort (accounting for capacity and activity, including vessel tonnage, power and days at sea) | - Optimal Effort to reach MSY - Historical level - Trend (e.g. decrease by x% per year) |

*In brackets the relative level of reliability of the indicators of stock abundance (1 lower level, 3 higher level).

Concerning the objective of ensure protection of biodiversity to avoid undermining ecosystem's structure and functioning, the following indicators and references points could be used:

| Indicator | Reference point |
|---|---------------------------------------|
| Discard rate (%) | - Historical - Trend (% over time) |
| Bycatch of protected/endangered species | - Historical - Trend (% over time) |
| Area of sensitive habitats under protection | - Historical - Trend (% over time) |

4. Fisheries management measures

In order to reach the objectives of the regional management plan, and without prejudice to stricter measures adopted nationally, countries should consider the adoption of the following minimum conservation measures for the bottom trawling fisheries targeting deep water rose shrimp.

| Rank (effectiveness) | Management measures | Examples |
|----------------------|----------------------------|---|
| High | Spatial restrictions | Prohibited fishing above coralligenous habitats and mærl beds. Protection of nursery areas. |
| Low | Temporal restrictions | Adopting common closed seasons by GSAs. |
| High | Gear restrictions | Minimum 40 mm square mesh or a diamond mesh size of at least 50 mm in the codend (according to Recommendation GFCM/ 33/2009/2). Improve the selectivity of the gear to reduce the capture of immature individuals and bycatch (e.g. through the implementation of Bycatch Reduction Devices) |
| High | Minimum size | Minimum conservation sizes should be defined and harmonized in the sub-region, based on the best scientific knowledge about maturity. Obs: Minimum conservation sizes should be used as reference points on the monitoring of the efficiency of the management plan. |
| High | Habitat protection | Establishment of provisions to minimize the encounter of bottom trawlers with unmapped sensitive habitats (e.g. through “move-on” rules). |
| Medium | Participatory restrictions | Consider mechanisms to control access in order to adapt the fishing effort and fishing capacity according to the status of the resource. |

5. Decision rules

Management plans will include decision rules with pre-agreed measures to be adopted under different conditions of the stock in relation to agreed biological reference points. The specific technical measures to be adopted under each stock status scenarios are to be defined in appropriate national and sub-regional working groups, taking into account the socio-economic impacts of the proposed measures.

6. Scientific monitoring

The Scientific Advisory Committee (SAC) of the GFCM should be responsible for advice on status of stocks and economic indicators of fisheries.

Adequate and periodic scientific monitoring of fisheries (including socioeconomic indicators) and exploited stocks at national level should be ensured so that SAC is in a position to provide scientific advice.

7. Research priorities to improve the assessment and management of fisheries

- Assessment of socioeconomic impacts of the management plan (the assessment of socioeconomic impact of the proposed management measures should be carried out prior to and during the implementation of the management plan)
- Research on the valorisation of fish products.

- Research to improve the selectivity of fishing gear.
- Assessment of bycatch and discards.
- Improvement of the knowledge on stock boundaries
- Advance in the application of ecosystem/multispecies approaches.
- Improvement of the assessment of the status of associated species taking into account the multi-species characteristics of the fisheries.
- Advance in the application of bioeconomic analysis of fisheries.

8. Fisheries Monitoring, Control and Surveillance

To ensure compliance with the measures to be adopted in the management plan, the following actions are to be implemented:

- Concerned Parties should make efforts to implement GFCM recommendations related to MCS, including those listed below:
 - Vessel information submitted to GFCM Regional Fleet Register.
 - Record of fishing vessels larger than 15 metres authorized to fish in the GFCM Area.
 - Satellite-based VMS required for vessels >15 meters authorized to fish in the GFCM area.
 - Required submission of data on vessels engaged in IUU fishing (IUU Vessel List).
 - Required logbook for vessels exceeding 15 meters authorized to fish in GFCM area. Logbook shall register quantities of each species caught and kept on board, above 50 kg in live weight.
 - Adoption of Port State measures to prevent, deter and eliminate IUU fishing.
- Strengthen national capacities for fisheries monitoring, control and surveillance.
- Concerned Parties are responsible for implementing the adopted management measures in their jurisdictional waters and by vessels flying their flag beyond national jurisdiction.
- Development of a specific mechanism for MCS in areas beyond national jurisdictions covered by the management plan.
- Improve the collection of fisheries statistical data, including social and economic data.

9. Review of the management plan

The contents of the management plans should be periodically reviewed in order to accommodate changes in the fisheries system. The review should be carried out as follows:

To be done by SAC:

- Status of stocks assessed yearly.
- Status of the fishery (e.g., economic indicators)
- Reference points should be proposed by the SAC once indicators are available.
- Once reference points are established, the SAC should propose a review term for them.

To be done by Concerned Parties:

Management action taken based on stock status and fishery conditions (socioeconomic indicators) and according to the decision rules and management tools described.

Proposed minimum structure, criteria and measures to be used in a regional management plan for bottom trawling fisheries for deep-water red shrimps (*A. foliacea* and *A. antennatus*) in the Central-Eastern Mediterranean (GSA12 – 16; 19 -27)

1. Scope of the management plan

Need to define the species, the fleets and the areas that will be covered by the management plan.

2. Objectives

Following the GFCM guidelines on management plans (GFCM/36/2012), the regional plan should consider inter alia the following options:

To counteract and/or to prevent overfishing with a view to ensure the sustainable economic viability of fisheries;

To maintain and/or to restore, to the extent possible, the stock size of harvested species at least at levels which can produce the maximum sustainable yield;

To guarantee a low risk of stocks falling outside safe biological limits;

To ensure protection of biodiversity to avoid undermining ecosystems' structure and functioning;

Operational objectives

The plan should define, for each agreed objective, specific operational objectives that have practical interpretation, can clearly describe expected outcomes and can be measured with indicators. For example, in relation to the objective of “guarantee a low risk of stocks falling outside safe biological limits” the following operational objectives could be applied:

- To maintain the biomass of target species above agreed precautionary biological reference points ($B > B_{pa}$ and $F < F_{0.1}$).
- To maintain indicators of stock status and fishing pressure (according to the Table on alternative indicators and reference points) at levels which ensure the sustainability of the fishery.

In relation to the objective of “ensure protection of biodiversity to avoid undermining ecosystem's structure and functioning”, the following operational objectives could be applied:

- To decrease discards of commercial and non-commercial species by (x)% in (y) years.
- To decrease the incidental catch of protected and endangered species.
- To prevent significant adverse impacts of bottom trawling fisheries on sensitive habitats by increasing the protection of areas where these habitats are known or are likely to occur.

3. Indicators and reference points

In situations where stock biomass is used as indicator of status of the stock, the following reference points could be used:

B_{lim} : a biomass level which is considered undesirable and which management actions should avoid with high probability.

B_{pa} : a threshold level of biomass established to reduce the probability that the limit reference point will be exceeded.

B_{msy} : as a possible target reference point.

In situations where fishing mortality is used as an indicator of fishing pressure, the following reference points could be used:

$F_{0.1}$: The fishing mortality rate at which the slope of the yield-per-recruit curve is only one-tenth the slope of the curve at its origin.

Pending the availability of stock biomass and fishing mortality estimates and the identification of appropriate reference points, the following indicators and reference points could be used.

| | |
|---|---|
| Indicator of stock abundance* | Reference point |
| Standardized index from scientific surveys (3) | - Historical level - Trend (e.g. increase by x% per year) |
| Standardized catch-per-unit-of-effort (CPUE) data from the fishery (2), assuming fishing pattern remained constant. | - Historical level - Trend (e.g. increase by x% per year) |
| Unstandardized CPUE data from the fishery (1), assuming fishing pattern remained constant. | - Historical level - Trend (e.g. increase by x% per year) |
| Indicator of stock status | Reference point |
| Mean body size in the catch (Lt), assuming that selectivity pattern is kept constant. | Lt > Lm; Lm = minimum conservation size. |
| Indicator of fishing pressure | Reference point |
| Fleet size (by operational units as defined by GFCM Task 1) | - Historical level - Trend (e.g. decrease by x% per year) |
| Fishing effort (accounting for capacity and activity, including vessel tonnage, power and days at sea) | - Optimal Effort to reach MSY - Historical level - Trend (e.g. decrease by x% per year) |

*In brackets the relative level of reliability of the indicators of stock abundance (1 lower level, 3 higher level).

Concerning the objective of ensure protection of biodiversity to avoid undermining ecosystem's structure and functioning, the following indicators and references points could be used:

| Indicator | Reference point |
|---|---------------------------------------|
| Discard rate (%) | - Historical - Trend (% over time) |
| Bycatch of protected/endangered species | - Historical - Trend (% over time) |
| Area of sensitive habitats under protection | - Historical - Trend (% over time) |

4. Fisheries management measures

In order to reach the objectives of the regional management plan, and without prejudice to stricter measures adopted nationally, countries should consider the adoption of the following minimum conservation measures for the bottom trawling fisheries targeting deep water red shrimp.

| Rank (effectiveness) | Management measures | Examples |
|-------------------------------|----------------------------|--|
| High | Spatial restrictions | Prohibited fishing above coralligenous habitats. Protection of nursery areas (likely lower effectiveness for the species). Consider additional measures, such as depth limits to the fishing operation. Trawling is forbidden below 1000m depth (recommendation GFCM 29/2005/01) |
| Higher for <i>A. foliacea</i> | Temporal restrictions | Adopting common closed seasons for red shrimp and associated species by GSAs. |
| High | Gear restrictions | Minimum 40 mm square mesh or a diamond mesh size of at least 50 mm in the codend (according to Recommendation GFCM/ /33/2009/2). (Measure is expected to have a high economic impact on some segments of the fleet – multipurpose. An assessment of the impact should be carried out and measures to counteract it should be sought – see research priorities) Improve the selectivity of the gear to reduce the capture of immature individuals and bycatch (e.g. through the implementation of Bycatch Reduction Devices). |
| High | Minimum size | Minimum conservation sizes should be defined and harmonized in the sub-region, based on the best scientific knowledge about maturity**. Obs: Minimum conservation sizes should be used as reference points on the monitoring of the efficiency of the management plan. |
| High | Habitat protection | Establishment of provisions to minimize the encounter of bottom trawlers with unmapped sensitive habitats (e.g. through the implementation of “move-on” rules). |
| Medium | Participatory restrictions | Consider mechanisms to control access in order to adapt the fishing effort and fishing capacity according to the status of the resource. In view of the limited information about the stock and habitats in many GSAs, consider additional mechanisms that condition the development of fishing capacity to the acquisition of new knowledge. |

**See for instance: AAVV (2008). Status of deep-sea Red Shrimps in the Central and Eastern Mediterranean Sea, Final Report. Project Ref FISH/2004/03-32; Deval, M. C. (unpublished). Some useful information for the stock assessment of giant red shrimp (*Aristaemorpha foliacea*, Risso 1827) in the Gulf of Antalya, eastern Mediterranean; INTERREG II GREECE-ITALY project: New perspectives for the investigation and management of shared deep-water resources in the Ionian Sea.

5. Decision rules

The management plan will include decision rules with pre-agreed measures to be adopted under different conditions of the stock in relation to agreed biological reference points. The specific technical measures to be adopted under each stock status scenarios are to be defined in appropriate national and sub-regional working groups, taking into account the socioeconomic impacts of the proposed measures.

6. Scientific monitoring

The Scientific Advisory Committee (SAC) of the GFCM should be responsible for advice on status of stocks and economic indicators of fisheries.

Adequate and periodic scientific monitoring of fisheries (including socioeconomic indicators) and exploited stocks at national level should be ensured so that SAC is in a position to provide scientific advice.

7. Research priorities to improve the assessment and management of fisheries

- Assessment of socioeconomic impact of the management plan.
(the assessment of socioeconomic impact of the proposed management measures should be carried out prior to and during the implementation of the management plan)
- Research on the valorisation of fish products through improvement in product quality (e.g. preservation techniques) and ecolabelling.
- Research to improve the selectivity of fishing gear.
- Assessment of bycatch and discards.
- Improvement of the knowledge on stock boundaries .
- Advance in the application of ecosystem/multispecies approaches.
- Improvement of the assessment of the status of associated species taking into account the multi-species characteristics of the fisheries.
- Advance in the application of bioeconomic analysis of fisheries.
- Identification of sensitive areas (VMEs) that will need to be protected from the impact of bottom trawl gears. Use of fishers knowledge complementary to scientific knowledge.
- Research aimed at understanding the relationship between deep water corals and red shrimps.
- Research to improve knowledge on the relationship between habitat characteristics (depth, sea bottom morphology and other environmental factors) on resource availability.
- Studies on the effect of horsepower on trawling operation and selectivity.

8. Fisheries Monitoring, Control and Surveillance

To ensure compliance with the measures to be adopted in the management plan, the following actions are to be implemented:

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 - Vessel information submitted to GFCM Regional Fleet Register.
 - Record of fishing vessels larger than 15 metres authorized to fish in the GFCM Area.
 - Satellite-based VMS required for vessels >15 meters authorized to fish in the GFCM area.
 - Required submission of data on vessels engaged in IUU fishing (IUU Vessel List).
 - Required logbook for vessels exceeding 15 meters authorized to fish in GFCM area. Logbook shall register quantities of each species caught and kept on board, above 50 kg in live weight.
 - Adoption of Port State measures to prevent, deter and eliminate IUU fishing.

- Strengthen national capacities for fisheries monitoring, control and surveillance.
- Concerned Parties are responsible for implementing the adopted management measures in their jurisdictional waters and by vessels flying their flag beyond national jurisdiction.
- Development of a specific mechanism for MCS in areas beyond national jurisdictions covered by the management plan.
- Improve the collection of fisheries statistical data, including social and economic data.

9. Review of the management plan

The contents of the management plans should be periodically reviewed in order to accommodate changes in the fisheries system. The review should be carried out as follows:

To be done by SAC:

- Status of stocks assessed yearly.
- Status of the fishery (e.g. economic indicators)
- Reference points should be proposed by the SAC once indicators are available.
- Once reference points are established, the SAC should propose a review term for them.

To be done by Concerned Parties:

- Management action taken based on stock status and fishery conditions (socioeconomic indicators) and according to the decision rules and management tools described.

Proposed table of contents of technical background documents

- Environmental and geographical settings
- Fisheries resources
- Fishing activities
- Market situation
- Fisheries governance and management frameworks
- Management priorities and issues (for eel only)