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Tenth Meeting of Focal Points for SPAs

Marseilles, France, 17-20 May 2011

REPORT OF THE TENTH MEETING OF FOCAL POINTS FOR SPAs

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Report of the Tenth Meeting of Focal Points for SPAs (Marseilles, 17-20 May 2011)

Introduction

1. At their Sixteenth Ordinary Meeting (Marrakesh - Morocco, November 2009), the Contracting Parties to the Barcelona Convention invited the Regional Activity Centre for Specially Protected Areas (RAC/SPA) to hold the Tenth Meeting of the Focal Points for SPAs in 2011.

2. The meeting was organized in Marseilles (France) at the "Mercure Marseille Centre" Hotel from the 17 to 20 May 2011, with the support of the French authorities.

Participation

3. All the Focal Points for SPAs of the Contracting Parties to the Barcelona Convention for the protection of the Marine Environment and the Coastal Region of the Mediterranean were invited to attend the meeting or to designate their representative(s). The Meeting was attended by representatives of the following Contracting Parties: Algeria, Bosnia & Herzegovina, Cyprus, Croatia, the European Commission, France, Greece, Israel, Italy, Lebanon, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia and Turkey.

4. The Coordinating Unit for the Mediterranean Action Plan (UNEP/MAP), 100 Historic Sites Programme and RAC/Blue Plan were represented at the meeting.

5. The following institutions and organizations were represented by observers: ACCOBAMS, GFCM, RAMOGE, IUCN-Med, WWF Mediterranean Programme Office, Conservatoire du Littoral, French Marine Protected Areas Agency, Greenpeace International, MedPAN Association, Oceanographic Museum of Monaco, Oceana, Seagrass 2000 Association, Tour du Valat.

6. RAC/SPA acted as the secretariat for the Meeting.

7. The list of participants is attached as Annex I to the present report

Agenda item 1 - Opening of the Meeting

8. The meeting was opened on Tuesday 17 May 2011 at 9.00 by the representatives of the host country, the Coordinating Unit for the Mediterranean Action Plan (UNEP/MAP) and RAC/SPA.

9. Mr. Abderrahmen GANNOUN, the Director of RAC/SPA, welcomed the participants to the meeting and thanked the French authorities, especially the Ministry for the Ecology, Sustainable Development, Transport and Housing, the Conservatoire du Littoral and the Agency for Marine Protected Areas for their help in organizing the meeting.

10. Ms Maria Luisa SILVA MEJIAS, Coordinator of the Mediterranean Action Plan (UNEP/MAP), said that the previous Conference of the Parties, held in Marrakesh in 2009, had adopted an integrated programme of work for the period 2010-2015, to include combating pollution, developing the Mediterranean network of protected areas with a high degree of representativeness and improved site management, integrated and sustainable

coastal zone management (ICZM), promoting models of sustainable production and consumption, and regional cooperation in adaptation to climate change. She emphasized that to put those priorities into practice, RAC/SPA must be guided by certain fundamental principles, such as the "polluter pays" principle, the precautionary principle and the ecosystems approach. The new two-year programme must take account of the new international and regional challenges, and be in step with the Aichi Strategic Plan for 2010-2020. She pointed out that the activities of RAC/SPA, like those of other MAP components, must also take account of the growing regional uncertainties. The entry into force of the "Offshore" Protocol and the ICZM Protocol would further strengthen the Barcelona system.

11. Ms Sandrine SELLIER-RICHEZ, representing the Maritime Prefecture of the French Mediterranean, welcomed the participants and thanked the authorities which had helped to organize the meeting. She drew attention to the significant political and economic challenges involved in managing the marine environment, especially in the light of the important recent and forthcoming international meetings on biodiversity, and said that France had an active policy of managing and protecting marine and coastal resources, as evident from the Etats généraux du Grenelle de la mer and its efforts to consult all the actors involved, including the fisheries and transport sector. She wished the participants every possible success in their discussions and recommendations and a pleasant stay in Marseilles, the emblematic Mediterranean city, and declared the meeting officially open as of Tuesday 17 May 2011 at 10.00.

Agenda item 2 - Rules of Procedure

12. The internal rules adopted for meetings and conferences of the Contracting Parties to the Convention for the protection of the Mediterranean Sea against pollution and its related Protocols (UNEP/IG.43/6, Appendix XI) apply *mutatis mutandis* to the present meeting.

Agenda item 3 - Election of Officers

13. After informal consultations, the Meeting unanimously elected the following officers:

Chairperson:	Ms. Anne REOCREUX (France)
Vice-Chairpersons:	Mr. Robert TURK (Slovenia) Ms. Lara SAMAHA (Lebanon)
Rapporteur:	Ms. Saba GUELLOUZ (Tunisia)

Agenda item 4 - Adoption of the Agenda and organisation of work

14. The Secretariat introduced the provisional agenda distributed as UNEP(DEPI)/MED WG.359/1, and the annotated version in document UNEP(DEPI)/MED WG.359/2. The meeting considered both documents and agreed, on a proposal by the delegations of France and Spain, to consider the question of ecologically or biologically significant areas (EBSAs) under agenda item 6. The agenda for the meeting, Annex II to this report, was then adopted by the meeting.

15. The meeting approved the organization of work proposed by the Secretariat, set out in the annotated provisional agenda for the meeting (document UNEP(DEPI)/MED WG.359/2).

Agenda Item 5 - Status of implementation of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

A) Reports of the Parties on the implementation at national level of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD)

16. The Secretariat informed the meeting that in advance of the Tenth Meeting of Focal Points for Specially Protected Areas, RAC/SPA had invited the Focal Points for the SPAs to provide a report on the implementation, in their respective countries, of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (the SPA/BD Protocol). Those reports should be provided for the period from January 2008 to December 2009, following the format adopted for that purpose at the Fifteenth Ordinary Meeting of the Contracting Parties.

17. The Secretariat introduced document UNEP(DEPI)/MED WG.359/3, entitled "Report on the status of implementation of the SPA/BD Protocol" for the period January 2008 - December 2009, which constitutes a summary of the reports submitted by the Focal Points of RAC/SPA. These reports had been submitted either through the new online reporting system, or as electronic files using the same format as the online system. It was evident from the national reports, compiled by the 15 Parties which had completed the form, that considerable progress had been made in implementing the Protocol, especially through regulation. The aspects best handled were those relating to the regulation of research activities and the regulation or prohibition of all activities likely to have an impact on the SPAs, as well as the launch of impact studies before taking any decisions on activities likely to affect protected areas and/or species and their habitats. The protection and management of the species in Annexes II and III of the Protocol also seem to be well covered on the regulatory plane. Few Parties mentioned encountering any difficulties in the matter of legislation, and the aspects most frequently mentioned are the regulatory procedures and the administrative framework.

18. As for the SPAs, the institutional arrangements for the overall management of each SPA and for covering both land and marine areas now seem to be well in hand for most Parties, but there is still work to be done in setting up management plans for the SPAs, although many Parties (almost 40%) say they are willing to tackle this aspect.

19. There has been an increase in the number of SPAMIs, with the inclusion over the reporting period of eight SPAs in the SPAMI List and the addition of one country to the list of Parties with a SPAMI on their territory. It is also important to point out that one of the Parties is planning to create 2 SPAMIs in the eastern basin by the end of 2011, which would improve the geographical representativity of the SPAMIs.

20. As regards the protection and conservation of species, few activities have been carried out by the Parties, and the difficulties which have been mentioned are due mainly to shortage of financial resources and also of technical skills.

21. Finally, as regards action plans for endangered species, those best represented among the Parties are the action plans for birds, monk seals and marine turtles. Taking all the action plans together, the most activity by the Parties has taken place in the area of regulation, research programmes and the establishment of SPAs. Because of the adoption of the Action Plan concerning coralligenous and other Mediterranean bio-concretions in 2008, the online form needs to include points relating to that action plan in time for the next session.

22. At the end of the presentation, the representative of Greece emphasized the need for the reporting period and the submission of the document to match up more closely, because difficulties arose if the time interval between them was too long.

23. The representative of Slovenia said it would be useful to have cumulative reports showing all the activities being carried out by the Parties to implement the Protocol, not merely those relating to the reporting period.

24. The representative of the Coordinating Unit noted the suggestions and said the necessary action would be taken.

25. The representative of Greenpeace mentioned the importance of creating marine protected areas and SPAMIs in open seas, and expressed regret that no new proposals in that respect had been made during the reporting period. She said it was a matter of urgency for the Parties to demonstrate their commitment to cooperating in the designation of new SPAMIs in the open seas, and in the identification of the conservation sites which they regarded as a priority.

B) Report on the progress made in RAC/SPA activities

26. The Director of RAC/SPA gave a brief presentation on the Centre's activities since the last meeting of the Focal Points, referring to the document UNEP(DEPI)/MED WG.359/4 ("Progress report on RAC/SPA activities"). He said that the activities had been carried out in accordance with the MAP strategic programme for the period 2010 – 2015, having regard to the international calendar and the main events which had taken place in the region, including the 10th COP of the CBD, the entry into force of the ICZM Protocol and events in the Arab countries of the region. Most of the activities of RAC/SPA during the current biennium had been aimed at helping Mediterranean countries to halt the loss of marine and coastal biodiversity, and to develop a representative network of SPAs. RAC/SPA had focused its activities on three main areas: (i) the protection of endangered species, (ii) the establishment of new SPAs, and (iii) improving the management of SPAs.

27. The Director of RAC/SPA explained that the Centre's activities had been carried out in close collaboration with several partners, and that the activities would be described in detail under agenda item 6.

C) SPAMIs List

28. After a general recapitulation of the SPAMIs which had been included in the List up to 2009, the Secretariat informed the meeting that it had received seven requests for inclusion in the SPAMI List, two from France (Blue Coast Marine Park, Embiez Archipelago-Six Fours), three from Italy (the Porto Cesareo Marine Protected Area, the Capo Carbonara Marine Protected Area and the Marine Protected Area of Penisola del Sinis-Isola di Mal di Ventre) and two from Lebanon (Tyre Coast Nature Reserve and Palm Islands Nature Reserve). In accordance with the procedures laid down in the SPA/BD Protocol, these requests had been transmitted to the Focal Points for consideration (UNEP(DEPI)/MED WG.359/15, UNEP(DEPI)/MED WG.359/16, UNEP(DEPI)/MED WG.359/17, UNEP(DEPI)/MED WG.359/18, UNEP(DEPI)/MED WG.359/19, UNEP(DEPI)/MED WG.359/20 and UNEP(DEPI)/MED WG.359/21).

29. The floor was then given to delegations of the countries submitting sites for inclusion in the SPAMI List.

30. The delegation of France highlighted the interest of the Embiez Archipelagos – Six Fours site, with species of conservation interest and where the management involves a local authority. It gave a description of the measures taken to mitigate the impact of human activity in the area. The Blue Coast Marine Park was an example of a successful initiative by local authorities and fishermen. The area in question, based in two fishing reserves for fisheries resources management, may prove a model for this approach to conservation.

31. Following the presentation of the two SPAMI proposals, the meeting decided to submit both sites to the Parties for inclusion in the SPAMI List.

32. The delegation of Italy took the floor to present the three sites proposed by its country for inclusion in the SPAMI List. The areas concerned had outstanding features, such as red coral, suitable monk seal habitats, specific geological features such as lagoons, or species such as unique sponges and other interesting benthic species.

33. Following the presentation by Italy of its SPAMI proposals, the meeting decided to submit the three sites to the Parties for inclusion in the SPAMI List.

34. The representative of Lebanon took the floor to present her country's two SPAMI proposals. Both were nature reserves with a long history and a participatory approach to management alongside local bodies. She emphasized that the areas in question were of outstanding value for species and habitats and had appropriate management plans.

35. Following the presentation of the two SPAMI proposals from Lebanon, the meeting decided to submit both sites to the Parties for inclusion in the SPAMI List.

36. The Executive Secretary of GFCM congratulated RAC/SPA and the Parties on the new proposals. He mentioned the recommendations adopted by the GFCM at its last session concerning bycatch mitigation measures for monk seals, turtles, sharks and marine birds, and the establishment of a regional management plan for red coral. He thanked RAC/SPA for its support in preparing those recommendations, and told the meeting that the GFCM was particularly interested in collaborating with RAC/SPA in defining SPAMI management measures of relevance to fisheries.

37. He informed the participants that a coordination meeting was planned in coming months to investigate ways and means of strengthening cooperation between GFCM and UNEP/MAP-RAC/SPA, with a view to further harmonization of the decisions adopted by the two organizations. He suggested that the meeting be open to other partner organizations.

38. The delegation of France pointed out that her country encourages cooperation between the MAP organs and the regional fisheries organizations on the issues related to fisheries activities (GFCM and ICCAT), and she recalled the importance of this collaboration, in particular in the context of the establishment of MPAs. She also recalled the Memorandum of Understanding established between the RAC/SPA and the GFCM since 2008. This approach is in line with Decision IG.19/13 of the 16th Meeting of the Contracting Parties to the Barcelona Convention (Marrakech, 2009) which stressed on the necessity to strengthen links with MAP and existing regional fisheries organizations and other relevant organizations "*in order to ensure sustainable management of resources, including on the high seas, as appropriate*".

39. The Executive Secretary of ACCOBAMS proposed the inclusion of the cetacean conservation aspect in the management measures applicable to the two areas proposed by Lebanon for inclusion in the SPAMI List.

40. Introducing the document UNEP(DEPI)/MED WG.359/5, the Secretariat informed the meeting of the findings of the periodic ordinary review of the areas included in the SPAMI List in 2003 carried out during the current biennium, in accordance with the procedure adopted by the Contracting Parties (UNEP(DEPI)/MED IG.17/10; Annex V).

41. For the 2010-2011 biennium, a periodic ordinary review was undertaken of the two Spanish sites which had been included on the SPAMI List in 2003 by the Thirteenth Ordinary Meeting of the Contracting Parties to the Barcelona Convention (UNEP(DEC)/MED IG.15/11):
- Parque nacional marítimo terrestre del Archipélago de Cabrera,
- Acantilados de Maro-Cerro Gordo.

42. The Secretariat explained that the Technical Advisory Committees had recommended maintaining the SPAMI status of those two sites.

43. The representative of Spain described the ways in which his country had supported the assessment team and the procedure carried out in March 2011. Commenting on the history and present of the two areas, he explained that Cabrera National Park was seen as a model for the Mediterranean and that Maro-Cerro Gordo protected area was a pristine zone in an area of high tourist pressure.

44. Spain intended to create new MPAs with the aim of building a coherent network and achieving 10 % of oceans preserved by 2020. It was working on 5 new MPAs, three of which were in the Mediterranean Sea. In the next few years Spain would be making new proposals for SPAMIs to the Parties to the Barcelona Convention.

45. The meeting considered the findings of the review and recommended that the two SPAMIs remain subject to the ordinary review procedure.

46. The Secretariat informed the meeting that for the 2012-2013 biennium, the periodic ordinary review would deal with the sites included in the SPAMI List in 2005, namely :
- The Banc des Kabyles marine reserve (Algeria)
- The Habibas islands (Algeria)
- The Portofino marine protected area (Italy).

47. The representative of Algeria expressed the willingness of his country to develop a marine protected areas network. He emphasized the need of RAC/SPA assistance to carry out the expected review of the Banc des Kabyles marine reserve and the Habibas islands.

48. The representative of the Conservatoire du Littoral (France) mentioned ongoing work in Algeria with the support of his organization and he indicated that such activities could contribute to ordinary review of the two Algerian SPAMIs, which will also optimize the use of the available means.

49. The Secretariat introduced document UNEP(DEPI)/MED WG.359/6 ("Draft approach to facilitate proposals for inclusion in the SPAMI List of areas located on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined"). That document should be read in conjunction with information document UNEP(DEPI)/MED WG.395/Inf.3, on the legal aspects relating to the establishment of marine protected areas beyond national jurisdiction in the Mediterranean.

50. The Secretariat explained that that approach had been worked out in close collaboration with the MAP Coordinating Unit, pursuant to a request from the Bureau of the Contracting Parties, and that a group of independent legal experts and

representatives of international and regional organizations had met to discuss and elaborate the approach.

51. Several delegations commented on the document and suggested changes to its title and substance. Following the discussion, the Secretariat prepared a second version of the document, reflecting the comments and proposals made by delegations. The meeting considered the second version and invited the Secretariat to submit it to the Contracting Parties. It was however agreed to allow a 10-day interval following the meeting to enable the Focal Points to send in any further comments. The final version of this document is contained in Annex III to this report.

D) Amending Annexes II and III to the SPA/BD Protocol

52. The Secretariat said that in accordance with the request made by the Parties at their most recent meeting, and the Marrakesh Declaration encouraging greater collaboration with regional organizations in order to improve protection for the most threatened Mediterranean species, RAC/SPA had continued work on the amendment of Annexes II and III to the Protocol. Document UNEP(DEPI)/MED WG.359/7 gave an overview of the extent to which the species included in Annex III to the Protocol were covered by international conventions relating to the Mediterranean, and of the activities carried out by other organizations. Several initiatives had been taken for fish species, in particular, but it seemed desirable to step up efforts for exploited and/or endemic invertebrate populations, to further strengthen cooperation with the partners concerned, and to assess the effectiveness of the conservation of the most threatened target species.

53. The representative of France emphasized the importance of looking for synergy between the relevant international conventions for setting up national action plans for the conservation of threatened species.

54. The representative of Greenpeace expressed support for the proposals by RAC/SPA, especially as regards elasmobranch species, and drew the attention of delegates to the need to include Blue fin Tuna in Annex II to the Protocol.

55. The Secretariat, referring to the procedure for amending Annexes II and III, explained that in the absence of a specific mandate it was not the role of the Secretariat to make proposals for amendments at future meetings of Focal Points. The meeting decided in favour of mandating the RAC/SPA to propose new amendments. Such proposals must reach the Parties six months before the meeting of Focal Points for SPAs which would have to consider them. That interval would enable the necessary consultations to be held at the national and European levels before the proposals were considered by the meeting of Focal Points.

E) Future orientations of SAP BIO

56. The Secretariat informed the meeting of the status of implementation of the Strategic Action Programme for the Conservation of Biological Diversity (SAP BIO) in the Mediterranean Region (UNEP(DEPI)/MED WG.359/Inf.4).

57. Referring specifically to the chronic problem of funding shortages, the Secretariat retraced the steps taken to remedy such problems by developing two major projects relating, respectively, to the development of protected areas in coastal zones and in open seas, relaying on external funds. Mention was also made of the significant progress achieved by assessing the status of biodiversity in countries, and other priority

environmental issues, including climate change. Among the results recently obtained, mention was made of the reports on climate change published by RAC/SPA and the reports on biodiversity submitted to the present meeting.

58. The Secretariat introduced document (UNEP(DEPI)/MED WG.359/8), dealing with the note on the future orientations of SAP BIO in the light of the decisions of the 10th Conference of Parties to the Convention on Biological Diversity (COP 10 to the CBD, Nagoya, 2010). It was explained that the note summarized the key decisions of COP 10 and set out a road map to assist Mediterranean countries in taking action to achieve the objectives of the Strategic Plan for Biodiversity 2011-2020, adopted at Nagoya. He pointed out that since the Mediterranean region already had the Strategic Action Plan for the Conservation of Biological Diversity (SAP BIO), the proposed road map took account of its principal features and considered the options for defining new directions for the SAP BIO in the light of the guidelines for the period up to 2020 set out in the Strategic Plan adopted at Nagoya, as well as other relevant decisions of the 10th Conference of Parties to the CBD (the Aichi Strategic Plan). The proposals in the note were designed to translate the Aichi Strategic Plan into recommendations and proposals for action to guide the work of the MAP and the partner organizations concerned in the conservation and sustainable use of Mediterranean marine and coastal biological diversity. The implementation of the recommendations in the note would contribute to assisting the Mediterranean countries to achieve the objectives adopted for the CBD for the period 2011-2020.

59. He also informed the meeting that the contents of the note had been considered at a consultation meeting organized by RAC/SPA at Tunis on 4 and 5 April 2011, at which several organizations involved in the conservation of Mediterranean marine and coastal biodiversity were represented.

60. The representative of Lebanon recalled that when SAP BIO was in preparation it had been intended that the Global Environment Facility (GEF) would finance the implementation of the national priorities which had been identified, but the MedPartnership had chosen only two of the priority topics identified by SAP BIO. That made it important to plan a fundraising strategy in the process of updating the SAP BIO.

61. The representative of France thanked the Secretariat for its proposal to update the SAP BIO in the light of the Aichi advances. She mentioned the need to find synergies between the process of updating the SAP BIO and the events which would be taking place in 2012 and 2013, such as the World Congress on Protected Areas, to be held in France in 2013.

62. The representative of Greece said it would be logical to undertake the revision and updating of the SAP BIO halfway. In line with that it would be more consistent for the Contracting Parties to consider document UNEP(DEPI)/MED WG.359/8 as a set of guidelines rather than a document to be adopted.

63. The representative of Morocco said it would be appropriate to update the SAP BIO, given all countries were expected to update their national action plans for biodiversity, and for that purpose it was important to ensure greater coordination among the national agencies concerned.

64. The Executive Secretary of ACCOBAMS emphasized the importance of communication between those responsible, at national level, for the various conservation instruments, so that a picture could be drawn up of the developing state of knowledge. That would help in reviewing the priorities defined at the beginning of the SAP BIO process. She repeated that the Secretariat of ACCOBAMS was willing to lend its support

to countries in conserving cetaceans, and explained that a system had been introduced to invite bids for small projects intended for developing countries and countries with economies in transition (available on the ACCOBAMS website : www.accobams.org).

65. At the end of the discussion, the Meeting decided to submit the orientation note, as amended by the meeting, to the Contracting Parties. The text of the note to be submitted to the Parties is contained in Annex IV to this report.

Agenda Item 6 - Progress made in RAC/SPA activities

66. The Director of RAC/SPA gave a brief presentation on the principal directions of the work of RAC/SPA, and explained that detailed presentations of its activities would be made under the agenda item by the Centre's staff members responsible for the programmes.

A) Inventorying, mapping and monitoring Mediterranean coastal and marine biodiversity

67. The Secretariat, referring to the relevant sections of document UNEP(DEPI)/MED WG.359/4, gave a presentation on the activities conducted by RAC/SPA, since the Ninth meeting of the Focal Points, in inventorying, mapping and monitoring coastal and marine biodiversity. Most of those activities involved assistance to countries in setting up networks for monitoring key habitats, and in mapping and characterizing significant benthic habitats and filling in gaps in their distribution.

68. The Secretariat introduced the Draft Guidelines for the standardization of methods for mapping and monitoring marine Magnoliophyta in the Mediterranean (Document UNEP(DEPI)MED WG.359/9), while explaining the context of its elaboration, its objectives and its various chapters.

69. The Secretariat introduced the draft proposals for standardized methods for inventorying and monitoring coralligenous and rhodolites communities and their main species (Document UNEP(DEPI)MED WG.359/10). The Secretariat representative thanked the Italian authorities, and especially ISPRA, for their logistical support in organizing the expert meeting held in Rome on 7 and 8 April 2011 in order to finalize the proposed standardized methods.

70. The representatives of Algeria and Montenegro paid tribute to the work of the Secretariat, and thanked RAC/SPA for the assistance given to their countries in inventorying marine flora and fauna and mapping Posidonia meadows. They were anxious for that assistance to continue.

71. The representative of France welcomed the work done by RAC/SPAS to establish a common methodology, while taking account of specific national characteristics, and emphasized the importance of ensuring a wide dissemination and appropriation of this tool.

72. The representative of the MAP Coordinating Unit commented that inventorying tools of that kind were well suited to the needs of the Mediterranean regional monitoring system which had been recommended following the development by MAP of the ecosystem approach.

73. The representative of Greece congratulated RAC/SPA on its work, which was a significant tool for the conservation and protection of habitats. She suggested a change

to the document, which was agreed by the meeting.

74. An observer pointed out that RAC/SPA had developed a geographic information system (GIS) containing information on the distribution of coralligenous habitats and marine vegetation in the Mediterranean, and that the inventorying tools would enable the GIS to be updated.

75. The representative of Italy emphasised that pelagic habitats were not adequately reflected by the Standard Data-entry Form (SDF). He suggested that RAC/SPA should coordinate the preparation of a reference list of Mediterranean pelagic habitats types, to be added to the habitat reference lists of the SDF.

76. Following the remarks by the representative of Italy concerning the importance of working to define pelagic habitats, the Secretariat representative reminded the meeting of the work already done in that area, and especially the preparation, in conjunction with the IUCN-Med, of the report “Status of knowledge on the Mediterranean pelagic ecosystem: an overview of the oceanographic and biological processes” He suggested setting up a working group to define types of pelagic habitats, on the basis of that study.

77. The meeting endorsed the draft guidelines for the standardization of methods of mapping and monitoring marine Magnoliophyta in the Mediterranean, as amended, and the draft proposals concerning standardized methods for inventorying and monitoring the coralligenous/rhodolites and their main species. Those documents appear, respectively, in Annexes V and VI to this report.

B) Protecting vulnerable habitats, species and sites

B.1. Activities concerning Specially Protected Areas

78. The Secretariat presented the activities developed by RAC/SPA since the last meeting of Focal Points for SPA, regarding the establishment and management of marine and coastal protected areas, by referring to the relevant sections of the document UNEP(DEPI)/MED WG.359/4. The actions carried out in the frame of the implementation of the "Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean, including the High Sea»" were presented, notably the progress of two regional projects aimed to improve the representativeness of the Mediterranean network of marine and coastal protected areas: “Regional Project for the Development of a Mediterranean Network of Marine and Coastal Protected Areas (MPAs) through the Creation and Management of MPAs” (MedMPAnet project), included in the Strategic Partnership for the Mediterranean Large Marine Ecosystem (MedPartnership), and the “Project for the creation of SPAMIs in the Open Seas, including the Deep Seas”

79. The Secretariat pointed out that the continuation of the activities of the project for establishing SPAMIs in open sea during the next biennium, 2012-2013, would have to be financed by raising funds from external sources.

80. The representatives of Croatia, Morocco and Tunisia thanked RAC/SPA for its support through the MedMPAnet Project and informed the meeting about the activities being implemented in this context by their respective countries and the measures undertaking to adapt the project activities to their national needs and context.

81. The representative of Lebanon announced that 18 sites are pre-selected for a network of MPAs in her country with support of IUCN and AECID. Inventory and cartography of three sites will be done, in the aim of preparing the technical documents

needed for proposing their declaration as MPAs. Three more sites are proposed to be worked out (field surveys, biodiversity inventory and cartography) with RAC/SPA within the context of the MedMPAnet project. She proposed to establish a mechanism to activate an expert pool to provide advice, upon request, to national authorities on MPAs management issues.

82. The representative of the Conservatoire du Littoral (France) underlined that partnerships help to cope with budgetary constraints and that economic indicators will much help to work on MPAs issues. He mentioned successful cooperation with several southern Mediterranean countries.

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83. The representative of Oceana informed the meeting about the MedNET project, an MPA development initiative based on seamounts in the Mediterranean Sea. Further information on the project is available in the website of Oceana.

84. Answering a question from the representative of the European Commission regarding the degree of synergy of data collection by RAC/SPA with other initiatives, RAC/SPA emphasised that these works are done with full exchange of communication with its partners. In this context, the representative of MedPAN South Project mentioned further activities linked to the MedMPAnet project and remarked that databases and work of both projects are fully coordinated.

85. The representative of Turkey asked for the priority area in the North Levantine Sea to be excluded or be re-evaluated to more clearly define the limits, considering that a sizeable part of it concerns its country waters. He also expressed his Country disposition to collaborate regarding the open seas conservation in the Aegean Sea.

86. The representative of the European Commission congratulated on that move to aid advancing the conservation of the eastern basin. He considered that development since the last extraordinary SPA Focal Points meeting (Istanbul, 1st June 2010) was slow. He further advised to try to get more speed on the system to agree at least two or three areas going on to allow starting a coherent network.

87. Several delegations emphasised that establishing SPAMIs is a long process, pointing out the importance of the consultation steps at national level for ensuring the success of cooperation initiatives undertaken by States to jointly propose SPAMIs. It was also stressed that since States remain sovereign, it was *in fine* up to them to propose SPAMIs. In this context, it was suggested that the European Commission should encourage European States to propose SPAMIs, including in open sea and deep sea areas.

88. The representative of Greece emphasised that in defining the limits of SPAMIs in open sea areas including deep sea areas, primary consideration should be addressed to ecological criteria. However, equal consideration should be ascribed to international law, in particular the Convention on the Law of the Sea, especially where there is reference to deep sea areas, since these involve areas of continental shelf which must be delineated in accordance with the above mentioned convention.

89. Following a request of the SPA Focal Points of France and Spain, who asked adding to the meeting agenda a topic on information and exchanges regarding the subject “ecologically or biologically significant areas” – EBSAs, the Secretariat has presented a note on the identification of EBSAs in the Mediterranean (UNEP(DEPI)/MED WG.359/CRP.1) distributed during the meeting.

90. The Secretariat presented the process launched by the Convention on Biological Diversity (CBD), recalling that scientific criteria as well as scientific orientations for the identification of EBSAs had been adopted by the Conference of the Parties in 2008 and that the Conference of the Parties of 2010 had allowed to detail the mechanisms to identify EBSAs through the application of scientific criteria.

91. It was further recalled that during the 10th COP, the Parties, other governments and the competent intergovernmental organisations were encouraged to cooperate, collectively or in a regional or sub-regional basis, accordingly, in order to identify and adopt appropriate conservation and sustainable use measures of the Ecologically or biologically significant areas, according to their competences.

92. Recalling the works undertaken by RAC/SPA in the frame of the project to create SPAMIs in the open seas, including the deep seas, presented and discussed during the Extraordinary meeting of SPA Focal Points, held in Istanbul last 1st June 2010, the Secretariat underlined that EBSAs had been identified following scientific and ecological criteria during the process of biogeographic classification driving to the identification of priority areas of conservation.

93. The Secretariat pointed out the importance of valorizing at world level the works undertaken in the Mediterranean, proposing for that purpose that the Parties give the mandate to the Secretariat to approach the CBD Secretariat in order to submit the results of the work already done following the procedure established during the Nagoya Conference.

94. The representative of France has recalled that the results presented during the Extraordinary meeting of Focal Points at Istanbul follow the sense of the engagements taken by the States during the COP 10 of the CBD in 2010, adding that France encourages all the States to adhere to the exercise launched by the RAC/SPA. She further indicated that following the need to share knowledge and means, and in a general context of budgetary restrictions which will be certainly narrowed in the future, the work already undertaken in the framework of the Barcelona Convention constitutes a solid base for the regional identification of EBSAs, as demanded in application of the decisions taken in the frame of the CBD.

95. Many delegations acknowledged the Secretariat the work provided for the identification of priority areas for conservation in the Mediterranean. They supported the Secretariat proposal to contact the CBD Secretariat to present the results of EBSA identification in the Mediterranean as a contribution by all the Mediterranean countries to the fulfilling of those CBD objectives, at the same time that following the synergy requested by the Parties to the different international and regional instruments for biodiversity conservation.

96. The representative of Spain expressed the interest of his country to reinforce the cooperation among France and Spain on the EBSA subject, in both the frames of the Mediterranean Action Plan and the OSPAR Convention.

97. The Secretariat informed that the set of documents related to the biogeographical classification prepared in the project framework were presented in a CD distributed during the meeting, and that it would be indeed important to transmit to the CBD the set of references available to support the scientific approach for the identification of EBSAs in the Mediterranean, based on the available data.

98. It further detailed that the results to be transferred to the CBD would concern only the EBSAs, and not the priority areas of conservation.

99. As conclusion of the discussion on the EBSA topic, the meeting agreed to propose to the Parties to mandate the Secretariat to contact the Secretariat of the CBD in order to present the works of identification of EBSAs in the Mediterranean as a contribution to the world process.

B.2. Implementing Action Plans for the conservation of species and habitats, adopted in the MAP context

100. The Secretariat presented, for each action plan, a synthesis of the activities carried out, referring to the relevant sections of the document UNEP(DEPI)/MED WG.359/4, and gave its proposals as regards the implementation of each of the action plans during the next biennium.

Action Plan for managing the Mediterranean monk seal:

101. The Secretariat described activities under the Action plan for the management of the Mediterranean monk seal, relating primarily to assistance in characterizing and monitoring monk seal habitats and populations, carried out in cooperation with the national institutions concerned. Referring to document UNEP(DEPI)/MED WG.359/Inf.6, it also presented the process to establish regional/sub-regional programmes for the conservation of the monk seal. It pointed out also that the recommendations proposed by RAC/SPA for measures to mitigate the interaction of fishery activities with endangered species, especially the monk seal, had been endorsed by the GFCM and its scientific advisory committee. The Secretariat reported that in the context of its cooperation with the secretariat and the members of the GFCM, RAC/SPA was drawing up a list of the existing caves being of importance for the monk seal in the Mediterranean.

102. Turkey representative thanked the support to projects on monk seals populations in the Antalya-Mersin-Hatay coastal sectors. He informed that an update of the national action plan was ongoing, also with RAC/SPA support.

103. The representative of Cyprus asked RAC/SPA for support to promote Natura 2000 network to protect monk seals, notably for the management plans in Cavo Grecko, in the East of Cyprus, and Akamas, in the West. Deploying camera traps would help collecting further data on the reproduction of the species in the area.

104. The EC representative emphasized the alarming situation of the species in the region, and notably its critical situation in North Africa, where conservation actions are needed without delay.

105. Greece representative mentioned that bycatch mitigation measures is a matter that must be seen with sensitivity as it concerns a critically endangered species and big part of the island and insular population of Greece. A LIFE project was done by a NGO to search for mitigation of conflict between fisheries and the species in Greece. She asked for this project to be taken into consideration for bycatch mitigation.

106. The delegate of Tunisia asked RAC/SPA to aid to install camera traps in La Galite Archipelago and keep working on that sense.

107. GFCM Executive Secretary expressed that the monk seal issue reflects the quality of collaboration with RAC/SPA. Indeed, diverse GFCM bycatch mitigation proposals were elaborated thanks to RAC/SPA information, fact which helped to take binding decisions to this respect.

Action Plan for the conservation of cetaceans in the Mediterranean Sea:

108. The Secretariat gave a presentation on activities carried out under the Action Plan on the conservation of Mediterranean cetaceans, which is featured in sections 7 and 8 of document UNEP(DEPI)/MED WG.359/4 and set out in detail in document UNEP(DEPI)/MED WG.359/Inf.7, which was prepared in conjunction with the Secretariat of ACCOBAMS.

109. The Executive Secretary of ACCOBAMS gave a presentation on the principal activities carried on in connection with the implementation of the Agreement in the Mediterranean. She explained that there were now 23 Contracting Parties to the Agreement, and that its geographical area had been extended to include the Atlantic exclusive economic zones of Spain and Portugal. In that respect, the Focal Points for the Agreement in attendance at the Meeting were encouraged to speed up the process of acceptance of the amendment, so that it could enter into force as quickly as possible. As for the activities, she pointed out that many of them had been carried out in the southern Mediterranean countries, thanks especially to funds available from the Supplementary Conservation Grants Fund. Fisheries and MPAs activities were addressed in synergy with RAC/SPA. Training of trainers was developed in the Adriatic and the Maghreb, while also training kits were prepared and sensitizing activities took place. She recalled that her Secretariat is member of the steering committee for the project on identification of SPAMI in open seas. Detailed information on these activities could be found in the ACCOBAMS website (www.accobams.org).

Action Plan for the conservation of Mediterranean marine turtles:

110. The Secretariat summarized the action being taken, involving both data collection and assistance to countries, especially in monitoring nesting sites and identifying migration routes and other critical habitats by satellite.

111. The Secretariat representative informed the meeting that the 4th Mediterranean Conference on Marine Turtles was being prepared and would be organized by the Naples Zoological Station (a partner of the Action Plan) from 7 to 11 November 2011. The conference would be a further example of synergy between the Barcelona, Berne and Bonn conventions regarding these species.

112. Introducing document UNEP(DEPI)/MED WG.359/11 "Draft protocol for data collection and assessing the interaction of fishing with marine turtles", the Secretariat drew the attention of participants to the fact that the protocol was a response to a recommendation from the “Transversal workshop on selectivity improvement and bycatch reduction” (Tunis, Tunisia, 23-25 September 2009) and the provisions of the Action Plan for minimizing bycatches.

113. Answering the concerns expressed with regard to a possible overlapping among the activities undertaken by RAC/SPA and the GFCM on mitigation of fishing interactions with threatened species, notably turtles, the Secretariat recalled that species conservation needs different levels of intervention such as monitoring of nesting sites and identification of migratory routes and that fisheries problems, notably the reduction of bycatch and selectivity are addressed since 2008 in close collaboration with GFCM.

114. The representative of Croatia informed the meeting on the activities undertaken for the elaboration of the protocol or code of conduct in case of finding or observing injured or ill marine turtles, mammals or cartilaginous fishes, aimed to put in place an information network on these strandings.

115. The meeting endorsed, with some changes, the draft Protocol for data collection and assessing the interaction of fishing with marine turtles, as contained in Annex VII to this report.

Action Plan for the conservation of marine vegetation in the Mediterranean Sea:

116. The Secretariat presented the activities undertaken in the frame of the implementation of the Action Plan for the conservation of marine vegetation in the Mediterranean Sea. When referring to the relevant sections of the document UNEP(DEPI)/MED WG.395/12 "Note relative to the implementation of the Action Plan for the conservation of marine vegetation in the Mediterranean Sea and proposal of updated working programme and calendar" the Secretariat evoked the historic of elaboration and updating of the Action Plan since 1999 and proposed a project of updated working programme and calendar of implementation for this Action Plan for the period 2012-2017, taking account of the achievements reached in the frame of the Action plan and the amendments of the Annex II to the Protocol SPA/BD.

117. The representative of Malta informed the meeting that her country had undertaken the mapping of Posidonia meadows and has to date protected four zones around Malta. These zones, which embrace more than 85% of all the Posidonia meadows in Malta, have been accepted as Natura 2000 sites. She asked about the possibility for RAC/SPA to assist Malta to undertake the cartography of other vegetal formations.

118. The representative of Seagrass 2000 acknowledged RAC/SPA for the edition of the English version of the RAMOGE Guide on the Posidonia meadows and underlined that it constitutes an important tool for the countries. Regarding the climate change problematic he informed the meeting that an ongoing study proves that Posidonia meadows play an important role as carbon sinks. He has also remarked that Posidonia meadows undergo a strong degradation by towed gears even in areas where fishing is forbidden.

119. The meeting approved the project of calendar of implementation for the Action Plan for the conservation of the marine vegetation in the Mediterranean Sea for the period 2012-2017 (Annex VIII to the present report) for its adoption by the Contracting Parties at its next meeting.

Action Plan for the conservation of cartilaginous fishes (chondrichthyans) in the Mediterranean Sea:

120. The Secretariat described the activities carried out within the Action Plan for the conservation of cartilaginous fishes (chondrichthyans) in the Mediterranean Sea. RAC/SPA cooperated closely with the GFCM, working in synergy on means to reduce and mitigate bycatches of elasmobranches.

121. The RAC/SPA added that in 2009 the Parties to the Barcelona Convention had requested an updated scientific assessment of some of the elasmobranch species listed in Annex III, with a view to their inclusion in Annex II.

122. The participants considered the various species of cartilaginous fishes (chondrichthyans) presented in document (UNEP(DEPI)/MED WG.359/7), as sent to the SPA Focal Points with the appropriate advance notice laid down in the relevant procedures. The species forms were considered by the Meeting for submission to the Parties, with a recommendation for the amendment of Annexes II and III of the SPA/BD Protocol.

123. The Secretariat explained that since RAC/SPA had engaged the services of elasmobranch experts in order to verify the status of cartilaginous fish species found in the Mediterranean which should be included in those Annexes.

124. RAC/SPA also presented the "Draft Guidelines for shark and ray recreational fishing the Mediterranean" (UNEP(DEPI)/MED WG.359/13), explaining that further details of the data registration procedures would be given in conjunction with the GFCM as soon as the mechanisms in question had been clearly defined by the latter's regulatory bodies for recreational fishing. The aim of the guidelines was to reduce the potentially harmful impact of recreational fishing activities, improve the monitoring of catches and encourage those engaged in recreational fishing to take part in gathering and managing data, and especially in programmes for tagging the species and returning them to the water.

125. The meeting considered the files concerning cartilaginous fish species (chondrichthyans) proposed for the amendment of Annexes II and III to the SPA/BD Protocol, and endorsed those documents given the status of the species in question, which were mostly at critical risk of extinction. These documents appear in Annexes IX to this report.

126. The representative of Italy pointed out that on the basis of the available data on the considered species, it was important to submit to the Parties the amendment proposals of Annexes II and III presented by the Secretariat.

127. However, the representative of the European Commission pointed out that his delegation as well as the delegations of member countries of the European Union, have to carry out internal consultations in order to define a common position. A scrutiny reserve on this issue was then expressed.

128. The representative of France recalled that the EU member States are subjected to the common fisheries policy. In this regard, a coordination is needed from the initial stages of Annexes amendment, in order to define a common position on the inclusion of species concerned by fisheries. A Scrutiny reserve is then requested on the document presented by the Secretariat.

129. The meeting agreed that comments, if any, on the proposed amendments must reach RAC/SPA by mid-July 2011.

130. The representative of Tunisia said that the two species of *Rhinobatos* now included in Annex III to the SPA/BD Protocol, and proposed for inclusion in Annex II, were quite abundant on southern coasts of Tunisia. She therefore had some reservations about including them in Annex II. She recommended carrying out research and fisheries management programmes, in conjunction with the GFCM, before making a decision on changing the status of those fish species.

131. Greenpeace, Oceana and WWF expressed their high concern about the critical situation of Mediterranean sharks and rays, and their extreme disappointment by the eventual decision to not consider these species as suitable for inclusion under Annex II.

<u>Action Plan for the conservation of bird species listed in Annex II to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean</u>:

132. The Secretariat summarized activities conducted in the framework of the Action Plan for the conservation of the bird species listed in Annex II to the SPA/BD Protocol, namely :

- organizing a national training course on methods of identifying and census birds, in conjunction with the ONCFS, followed by a campaign to list waterfowl along the entire Mediterranean coast of Egypt.
- organizing missions to monitor and ring the nesting populations of Lesser Crested Tern, and an inventory of waterfowl in Libya in winter.
- the preparation and publication of the Atlas of Birds of Libya in English and Arabic versions. This project is supported by the ONCFS and the French Ministry of Ecology, Sustainable Development, Transport and Housing.

133. The representative of the Conservatoire du Littoral congratulated RAC/SPA on its excellent work in the context of the Action Plan. He told the meeting of the outcome of the census of a species covered by the Action Plan, carried out at the Zembra site in Tunisia. The census had recorded 140,000 couples of Cory's Shearwaters, whereas previous records accounted for only 80,000 couples. He added that the activities of the Conservatoire in the framework of the Mediterranean Small Islands initiative were conducted in close cooperation with RAC/SPA.

134. In that connection, he announced that 10 monographs on species covered by the Action Plan were in preparation, and that the monitoring protocols were being harmonized. The results of both would be considered by Mediterranean experts at a seminar to be organized in September 2011.

Action Plan for the conservation of the coralligenous and other calcareous Mediterranean bio-concretions:

135. The Secretariat mentioned the activities undertaken in the context of the Action Plan for coralligenous and other calcareous Mediterranean bio-concretions, pointing out that those activities had already been presented under agenda item 6.a.

136. The representative of the Secretariat told the meeting that the participants at the expert meeting to propose standard methods for inventorying and monitoring coralligenous and maërl communities had said it was necessary to protect obscure populations living in submarine caves and canyons, and that an action plan for those formations, which were not covered by the other action plans, was essential.

137. The representative of Morocco emphasized the importance of obscure caves and deep habitats in terms of biological diversity. He recalled that during the expert meeting on coralligenous and Rhodolites, all the experts had underlined the richness of such biocenoses and they wanted them to be taken into consideration in a specific action plan, since they could not be included in the action plan for coralligenous.

138. He added that at the expert meeting on coralligenous, it was evident that there was a grave lack of data for those biocenoses on the southern side of the Mediterranean. For this purpose, special attention should be paid to that region of the Mediterranean by organizing survey campaigns and involving researchers from the South in various survey activities conducted elsewhere in the Mediterranean.

139. The representative of France emphasized the importance of deep habitats (deep corals, caves and canyons) and recalled that the work of the first mapping campaign for coralligenous habitats in Cap Corse had been carried out by the University of Corsica through the CAPCORAL project, financed by the AAMP.

140. Several delegations supported the proposal to draw up a specific action plan for obscure populations (submarine caves, canyons, etc.). The meeting mandated RAC/SPA

to study ways of drawing up such an action plan and to submit proposals for that purpose to the next meeting of the Contracting Parties.

C) Assessing and mitigating the impacts of threats to biodiversity

141. Under this agenda item, the Secretariat described activities carried out in the context of implementation of the Action Plan concerning species introductions and invasive species in the Mediterranean Sea, as presented in document UNEP(DEPI)/MED WG.359/4. The Secretariat also mentioned the initiative to set up a regional mechanism to gather, compile and disseminate information about non-indigenous invasive species in the Mediterranean region (including an early warning system) for which RAC/SPA had prepared a feasibility study. This initiative was due to begin during the second half of 2011, and would continue over the two-year period 2012-2013.

142. Some delegations took the floor to congratulate RAC/SPA on its activities and to emphasize the need to maintain and promote synergies between the MAP components dealing with the matter.

143. The representative of the European Commission said there should be more cooperation with IMO on the question of ballast waters, and suggested that a proposal be made to IMO to draw up a Memorandum of cooperation with RAC/SPA on the subject.

D) Training, coordination and technical assistance

144. The Secretariat described the training activities of RAC/SPA, referring to the relevant sections of document UNEP(DEPI)/MED WG.359/4, which cover two key aspects :

- Strengthening capacities and training relating to SPAs and to the conservation of biodiversity, especially species ;
- The training programme in the framework of the MedMPAnet project.

145. On the first point, a number of activities had been started to strengthen national capacities for the management of SPAs and the conservation of species, either in the form of training courses organized and/or financed by RAC/SPA or as training modules provided during field missions.

146. In the framework of the MedMPAnet project, the efforts of RAC/SPA had been mainly in the area of on-the-job training and regional training courses organized in conjunction with the MedPAN South project.

147. Several delegates congratulated RAC/SPA on its training efforts and asked for them to be continued.

148. The representative of Morocco suggested that the Secretariat make an assessment of the actual needs of countries, and review existing training initiatives. He emphasized the need to improve the impact of the training provided by the various organizations, and to devise training activities in the framework of a consistent programme reflecting the needs of countries.

149. The representative of Cyprus requested the help of ACCOBAMS and RAC/SPA for the monitoring of cetaceans population in Cyprus.

150. The representatives of WWF-MedPO and MedPAN spoke of the ongoing initiative to establish a long-term strategy to strengthen capacity for the management of MPAs in the Mediterranean region. That initiative was being conducted in close collaboration with RAC/SPA, which chaired the steering committee comprising all the relevant organizations in the region. They also said that the findings of a feasibility study, now being carried out to assess the training needs of countries, would be ready by the end of the current year.

151. The Secretariat said that to improve the effectiveness of its regional training sessions, which normally involved only one participant for each country, the Secretariat would now promote the approach of training the trainers.

152. The representative of ACCOBAMS reiterated its interest in collaborating with RAC/SPA to strengthen the capacity of Mediterranean countries for the conservation of cetaceans.

Agenda Item 7 - Programme of work of RAC/SPA for 2012-2013

153. The Director of RAC/SPA informed the meeting that having regard of budgetary constraints ordered by the UNEP/MAP for the biennia 2010-2011 and 2012-2013 (reduction of 15 to 20%) and having regard of the unfulfilled results of the Scientific Director recruitment process, the RAC/SPA envisages to not conclude such recruitment for the time being. This option, considered in coordination with the Coordinating Unit of MAP, will allow to allocate the funds budgeted for this permanent post to the implementation of other priorities, including those proposed in the current meeting. The work structure of the Centre will be reorganized consequently.

154. The Secretariat has afterwards presented the working programme for the next biennium 2012-2013 included in the document UNEP(DEPI)/MED WG.359/14. He indicated that the working programme will be submitted to the Contacting Parties, which will take the final decisions to this regard.

155. The meeting has then examined the activities proposed in the working programme and the participants have expressed remarks and suggestions on the content of the activities and on the implication of the partners in its implementation.

156. The representative of France regretted that the budget for the previous biennium did not appear next to the budgetary proposal made for the forthcoming biennial period, in order to show the budgetary evolutions, and she has requested the Secretariat to provide this information to the Focal Points after the meeting. Considering that this programme has been made taking into account the present budgetary context of the Barcelona Convention, she stressed the importance of prioritizing the programme of work for the forthcoming years around the main directions of the Protocol implementation, in collaboration with the other activity centres, in view of pooling means and optimizing costs. This prioritization of the working programme should be then made following these two main directions: the setting-up of a consistent MPA network in the Mediterranean, this action would contribute directly to a regional fulfillment of States commitments made in Nagoya in 2010; and species conservation. She also recalled her country's commitment to see the issues of conserving species as well as marine and coastal sites treated in the framework of the SPA/BD Protocol; she added that the ICZM thematic is also a very important work direction.

157. The representative of France has also proposed to held the meeting of Focal Points for SPAs back-to-back to the ones of other RACs which activities have a link with the SPA/BD Protocol, like the recent meetings of RAC/PAP, RAC/INFO and RAC/Blue

Plan. This will allow Focal Points to attend several meetings (on agenda items of direct relevance) facilitating the identification of possible synergies between the various decisions, the programmes implemented and the existent structures within the Barcelona Convention system.

158. On the activities related to the taxonomy, the delegation of France pointed out that after consulting national institutions involved in the monitoring of the work on taxonomy in the Mediterranean, it appears that there is no taxonomic referential for the whole species. It was proposed that RAC/SPA organize a technical workshop on defining taxonomic standards related to the CBD global initiative on taxonomy.

159. The Secretariat said that RAC/SPA must prepare before the end of May a new version of the working programme taking account of the remarks and suggestions of the meeting. This new version will be integrated within the general programme of the MAP components and submitted to the next meeting of Focal Points of MAP, planned on September 2011.

160. At the end of the works of the Meeting on the working programme, the representative of Greenpeace addressed a declaration in the name of Greenpeace, Oceana and WWF. This declaration is contained in Annex X of this report.

Agenda Item 8 - Any other matters

161. No other matters were raised for discussion.

Agenda Item 9 - Adoption of the Report of the Meeting

162. The Meeting reviewed the draft report prepared by the Secretariat, modified it and adopted the present report.

Agenda Item 10 - Closure of the Meeting

163. After the customary exchange of courtesies, the Meeting was closed on Friday, 20 June 2011 at 4.50 p.m.

Annex I - LIST OF PARTICIPANTS

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Annex II – AGENDA OF THE MEETING

Agenda of the meeting

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Agenda item 2 - Rules of Procedure

Agenda item 3 - Election of Officers

Agenda item 4 - Adoption of the Agenda and organisation of work

Agenda item 5 - Status of implementation of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

Agenda item 6 - Progress activities of Regional Activity Centre for Specially Protected Areas

Agenda item 7 - Programme-Budget of RAC/SPA for 2012-2013

Agenda item 8 - Any other matters

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Annex III - DRAFT APPROACH TO FACILITATE THE PREPARATION OF JOINT PROPOSALS FOR INCLUSION IN THE SPAMI LIST IN ACCORDANCE WITH ARTICLE 9 OF THE SPA/BD PROTOCOL

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Objective of this document

1. The present approach aims to facilitate and to give indications on the preparatory phase of the elaboration of joint proposals for inclusion in the SPAMI List.

2. It is not a legal document, it has no to be adopted by the Parties.

3. It is however in full line with international law.

Context

4. In 2008, the Contracting Parties to the Barcelona Convention decided to promote measures for the establishment of a comprehensive and coherent Mediterranean network of coastal and marine protected areas by 2012.

5. The expression of this political will was repeated in 2009 when the Contracting Parties to the Barcelona Convention called States to continue the establishment of marine protected areas and to pursue the protection of biodiversity with a view to the establishment by 2012 of a network of marine protected areas, including on the high seas, in accordance with the relevant international legal framework and the objectives of the World Summit on Sustainable Development.

6. In addition, the Contracting Parties to the Barcelona Convention adopted in 2009 a regional working programme for coastal and marine protected areas in the Mediterranean, including in the high seas, which aims to support Mediterranean countries to achieve the 2012 targets of the Convention on Biological Diversity by establishing a representative network of marine protected areas in the Mediterranean.

7. To date, the SPAMI List includes 25 sites, among which one encompasses an area established also on the high sea: the Pelagos Sanctuary for marine mammals established under an agreement signed in Rome in 1999 by France, Italy and Monaco and included in 2001 in the List.

8. In 2010, during the last Conference of the Parties to the Convention on Biological Diversity (CBD), the Parties were invited to make further efforts on establishing ecologically representative and effectively managed marine and coastal protected areas under national jurisdiction or in areas subject to international regimes competent for the adoption of such measures, and achieving the commonly agreed 2012 target of establishing marine and coastal protected areas, in accordance with international law, including the United Nations Convention on the Law of the Sea[1].

[1] Decision X/29 on marine and coastal biodiversity.

9. So, in the frame of the implementation of the ecosystem approach, and to progress towards the objectives set by the CBD and the Mediterranean Action Plan / Barcelona Convention related to marine protected areas, it is necessary to work for the establishment of marine protected areas in the whole Mediterranean Sea, taking into consideration the complexity of the legal situation of the Mediterranean Sea, and bearing in mind accordingly the legal issues raised concerning the establishment and management of such marine protected areas, and the enforcement of the regulatory measures.

10. In this context, and based on the provisions of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean, the Regional Activity Center for Specially Protected Areas (MAP-RAC/SPA) implements a project aiming to support the development of marine protected areas, through the Specially Protected Areas of Mediterranean Importance (SPAMIs) system in open sea areas, including the deep seas. Based on the identification of priority conservation areas located in open seas, including the deep seas, this project aims to support the concerned interested Parties for setting up a favorable framework to prepare, as appropriate, the joint SPAMI proposal in accordance with Article 9 of the SPA/BD Protocol.

11. The international legal framework for conservation and protection of marine environment is provided in a number of international instruments including the United Nations Convention on the Law of the Sea (UNCLOS). Therefore, all actions taken within the framework of a regional legal instrument need to be consistent with these international instruments.

12. In this context, during its meeting held on 5 and 6 May 2010, the Bureau of the Contracting Parties to the Barcelona Convention requested the Secretariat to begin a reflection to prepare a legal and institutional approach for establishing SPAMIs beyond national jurisdiction. As stated by the report of the meeting, “the Bureau addressed ways and means for elaborating a sound legal and institutional approach for establishing SPAMIs in areas beyond national jurisdiction for further discussion by the Bureau and SPA/RAC Focal Points. This approach would help creating a clear vision with regard to SPAMI management and the need to enhance cooperation with other component international organizations for this purpose, in line with MAP Programme of work and Marrakesh Declaration”.

13. A working group meeting with experts from international organizations and Mediterranean independent experts was convened upon MAP Coordinating Unit’s initiative in Athens, on 3 and 4 March 2011, to discuss and elaborate this approach.

14. The present document takes into account the recommendations of this meeting and intends to provide indications and suggestions to facilitate proposals for inclusion in the SPAMI List of areas located, partly or wholly, on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined. This document also includes elements on the management of these SPAMIs, in accordance with the relevant international legal framework. The legal aspects of the issues considered in this document are detailed in the report “*Note on the establishment of marine protected areas beyond national jurisdiction or in areas where the limits of national sovereignty or jurisdiction have not yet been defined in the Mediterranean Sea”* presented as an information document to the approach proposal (UNEP(DEPI)/MED WG.359/Inf.3 Rev.1).

15. This document was submitted to the Tenth Meeting of the Focal Points for SPAs as a draft with the view to reviewing it.

Draft approach to facilitate the preparation of joint proposals for inclusion in the SPAMI List in accordance with Article 9 of the SPA/BD Protocol

1. Introduction

16. In the Mediterranean, deep seabed encompasses some unique habitats such as hydrothermal vents, seamounts, submarine canyons and deep coral reefs characterized by high biodiversity and endemism. In addition, oceanographic features and movements of open sea waters like upwelling, gyres or fronts create critical habitats for the development, reproduction and feeding of many pelagic species. They are also supporting a wide range of components of the trophic chain from planktonic species to top predators like bluefin tuna, pelagic sharks and cetaceans. But these ecosystems are under several pressures.

17. Fishing activities represent an important threat to the biodiversity in the Mediterranean open seas: by-catch affects harshly the populations of cartilaginous fishes, turtles, monk seals, cetaceans and sea birds; bottom trawling disturbs the most vulnerable benthic habitats such as cold coral communities and the coralligenous facies; and stocks of some commercial fishes like bluefin tuna and swordfish are locally overexploited weakening the sustainability of local economies. More generally, shipping activities, drilling, accidental oil spills, discharge of waste, also represent causes of ecosystem degradation, disturbing the food chain.

18. The Mediterranean enjoys, through the Mediterranean Action Plan (MAP) and the Barcelona Convention, a legal and institutional framework that is particularly favorable to the fulfillment of the commitments related to the setting-up by 2012 of a network of marine protected areas, including on the high seas, in accordance with the relevant international legal framework and the objectives of the World Summit on Sustainable Development. In this case, the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD Protocol), adopted in 1995 by the Contracting Parties to the Barcelona Convention, provides for the establishment of a List of Specially Protected areas of Mediterranean Importance (SPAMI List) in order to promote the conservation of natural areas and protection of threatened species and their habitats, taking into consideration that the SPAMIs can be established both in marine and coastal areas under sovereignty or jurisdiction of the Parties and in areas situated partly or wholly on the high seas (Art. 9, para. 1).

19. The SPA/BD Protocol provides for the criteria for the choice of protected marine and coastal areas that could be included in the SPAMI List, as well as the procedure and the stages to be followed with the view of including an area in the List. The Protocol provisions cover the steps from the SPAMI presentation report provided by the Party (or the Parties) concerned to the decision to include the proposed area in the SPAMI List.

20. In particular, Art. 9 of the SPA/BD Protocol sets the procedure: for areas situated, partly or wholly, on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined.

21. Considering the geographical characteristics of the Mediterranean Sea, no point in the Mediterranean is located at a distance of more than 200 n.m. from the closest land or island.

22. Considering at the regional scale the high variability of the socio-environmental and political contexts as well as the threats on the ecosystems, it is difficult to get an approach applicable

everywhere in the Mediterranean. Although this approach is applicable for a wide range of situations covered by the Article 9 of the Protocol, each case must certainly be examined taking into account its own political, social, economic and environmental conditions.

2. Provisions of the SPA/BD Protocol related to the SPAMIs on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined

23. The List of Specially Protected Areas of Mediterranean Importance (SPAMI List) may include sites which are of importance for conserving the components of biological diversity in the Mediterranean; contain ecosystems specific to the Mediterranean area or the habitats of endangered species; are of special interest at the scientific, aesthetic, cultural or educational levels (Art. 8, para. 2).

24. In addition, the SPA Protocol includes three annexes, among them the Annex I on the Common Criteria for the Choice of Protected Marine and Coastal Areas that Could be Included in the SPAMI List. In this respect, the sites included in the SPAMI List must be “provided with adequate legal status, protection measures and management methods and means” (para. A, *e*) and must fulfill at least one of six general criteria (“uniqueness”, “natural representativeness”, “diversity”, “naturalness”, “presence of habitats that are critical to endangered, threatened or endemic species”, “cultural representativeness”). The SPAMIs must be awarded a legal status guaranteeing their effective long term, protection (para. C.1) and must have a management body, a management plan and a monitoring programme (paras. from D.6 to D.8).

25. The procedure for establishing SPAMIs is envisaged in Article 9 of the Protocol, providing that the proposal for inclusion is submitted by two or more neighbouring Parties concerned if the area is situated, partly or wholly, on the high seas, and by the neighbouring Parties concerned in areas where the limits of national sovereignty or jurisdiction have not yet been defined.

26. The Parties concerned provide the RAC/SPA with a joint presentation report, whose format was adopted in 2001 by the Contracting Parties to the Barcelona Convention, containing information on the area’s geographical location, its physical and ecological characteristics, its legal status, its management plans and the means for their implementation, as well as a statement justifying its Mediterranean importance.

27. For proposing an area situated, partly or wholly, on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined, the neighbouring Parties concerned shall consult each other with a view to ensuring the consistency of the proposed protection and management measures, as well as the means for their implementation.

28. After officially sending the presentation report to RAC/SPA, the joint proposal is submitted to the National Focal Points which shall examine its conformity with the guidelines for the establishment and management of specially protected areas and the common criteria for the choice of protected marine and coastal areas that could be included in the SPAMI List (Annex I of the SPA/BD Protocol).

29. If the proposal is considered to be consistent by the National Focal Points, the RAC/SPA then transmits it to the Secretariat, which informs the meeting of the Parties. The decision to include the area in the SPAMI List is taken by consensus by the Contracting Parties, which also approve the management measures applicable to the area.

30. In addition, the Parties may revise the SPAMI List according to the procedure adopted in 2008. The objective of this procedure is to evaluate SPAMI sites in order to examine whether they meet the SPA/BD Protocol's criteria (Annex I).

31. Lastly, to overcome the difficulties arising from the fact that different types of zones have been proclaimed (e.g., ecological protection zone, fishing zone) and that several maritime boundaries have yet to be agreed upon by the Mediterranean States concerned, the Protocol included two non-prejudice clauses:

"Nothing in this Protocol nor any act adopted on the basis of this Protocol shall prejudice the rights, the present and future claims or legal views of any State relating to the law of the sea, in particular, the nature and the extent of marine areas, the delimitation of marine areas between States with opposite or adjacent coasts, freedom of navigation on the high seas, the right and the modalities of passage through straits used for international navigation and the right of innocent passage in territorial seas, as well as the nature and extent of the jurisdiction of the coastal State, the flag State and the port State.

No act or activity undertaken on the basis of this Protocol shall constitute grounds for claiming, contending or disputing any claim to national sovereignty or jurisdiction." (Art. 2, paras. 2 and 3)

3. Preparatory stages for establishing SPAMIs on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined

32. Designed as a tool to promote cooperation between the riparian countries of the Mediterranean Sea, the establishment of SPAMIs on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined could be considered as a way to promote new forms of cooperation between the States concerned by the establishment of marine protected areas in the whole Mediterranean Sea.

3.1 Identification of the neighbouring Parties concerned

33. In order to identify the neighbouring Parties concerned with the establishment of a SPAMI, the geographic location, the limits of which were defined on the basis of the scientific and ecologic data collected during preliminary work, has to be examined.

34. If this area is situated in areas where the limits of national sovereignty or jurisdiction have not yet been defined, then it should not be difficult to identify the States that have a claim over the waters where the area is located. So, they qualify as the "neighbouring Parties concerned".

35. If the area is situated, partly or wholly, on the high seas, the notion of "neighbouring Parties concerned" acquires a more elastic character and is not devoid of a certain margin of ambiguity. It needs to be determined on a case by case basis, taking into account the relevant circumstances. The notion of neighbourhood should be understood in the sense of vicinity and not necessarily of contiguity.

36. The "neighbouring Parties concerned" might even be only one State, if the area of high seas is surrounded by the territorial sea that State solely[2], but in most cases the "neighbouring Parties concerned" are more than one State and they should be identified taking into consideration the

[2] The example may be given of a hypothetical high seas SPAMI in an area of central Tyrrhenian Sea totally surrounded by the coasts of Italy (Sardinia, Sicily and continental Italy).

present zones of national sovereignty or jurisdiction and the potential claims that the States concerned may put forward as regards future exclusive economic zones and the possibility of overlapping claims. Relevant international and arbitral awards, if any, should also be considered. In areas where there are potential overlapping claims by two or more States, all the claimant States shall jointly formulate the proposal for inclusion in the SPAMI List

3.2 Consultation between the neighbouring Parties concerned and national consultation processes

37. Considering the provisions of the SPA/BD Protocol recalled in the first part of the document, it appears necessary for the neighbouring Parties concerned to begin a cooperation and consultation process, especially for preparing jointly the presentation report (collecting the data, defining the limits of the site, defining the management measures…).

38. The joint submission of a proposal for inclusion in the SPAMI List could then be considered as the catalyst for bilateral and multilateral cooperation that could be strengthened if need be by the development of sub-regional framework agreements.

39. This sub-regional cooperation could also be supported by the existing cooperation agreements and cooperation frameworks, such as the ones developed in the framework of the prevention of marine pollution.

40. On the basis of the intention of the neighbouring Parties concerned to cooperate, and on their initiative, the countries could set up for example informal working groups or consultation committees between their technical departments. If it is necessary for the States to formalize this approach, official letters or diplomatic notes could be exchanged through the appropriate diplomatic channels.

41. The countries could also consider making individually or jointly a preliminary declaration stating their intention to conduct consultation processes with the neighbouring Parties concerned for preparing the presentation report.

The Meetings of the Focal Points for Specially Protected Areas are opportunities for the Parties to make such preliminary declarations. For strengthening their initiative, the Parties could also consider to make political declarations during the Meetings of the Contracting Parties

For the preliminary declaration, the country/ies considered would not have to present the proposal format but it could content itself with providing information requested in the following parts of the format[3]:

- 1.3 Name of the area
- 1.4 Geographic location (it is implied at this stage that the geographic location is not yet the precise determination of the boundaries of the proposed area)
- 1.5 Surface of the area
- 7.1 Legal status (with a general indication of the kind of measures that would be appropriate for the area)

Such preliminary declaration could allow to get opinions and any possible reactions from other Parties on the SPAMI proposal project and could be used as an invitation to the neighbouring Parties concerned for getting involved in the necessary consultation. Through this declaration,

[3] A section for the preliminary declaration shall be included in the annotated format for the presentation reports for the areas proposed for inclusion in the SPAMI List (when the format was adopted in 2001, the Contracting Parties have agreed that it could be improved if necessary - UNEP (DEC)/MED IG.13/8).

the country may as appropriate request RAC/SPA and Secretariat assistance to facilitate the consultation process including with relevant international or regional organisations.

That would be particularly helpful when countries don't have enough information as requested by the format and more scientific explorations are necessary.

42. In addition, in parallel with consultation processes, the countries have to begin internally national consultation processes.

43. The national consultation could then allow to orient and to organize the consultation among the neighbouring Parties concerned. It would enable to ensure effectiveness and sustainability of the sub-regional governance framework set up.

44. With regard to the context of the area considered and its related environmental issues, this national consultation process could involve many stake-holders. Even if the institutional organization is specific to each country, several departments and ministries could be involved at the central level of the States, such as the ministries in charge of environment, fisheries, foreign affairs, maritime affairs as well as transport.

45. Each State has specific means and tools for institutional consultation, such as the setting up of advisory committees, steering committees or working groups.

46. In addition, the consultation with the civil society and sea users concerned has also to be considered at the national scale, through appropriate participatory approach.

3.3 Consultation with the relevant international organizations at the regional level

47. Consultation with the relevant international organizations has to be considered during the preparatory stages of the process at regional level.

48. In fact, a certain number of measures that can be adopted for a SPAMI already fall within the specific scope of treaties different from the SPA/BD Protocol or institutions different from UNEP-MAP. Full coordination is then necessary among all the legal instruments and entities operating at the Mediterranean level.

49. The neighbouring Parties concerned could then include the relevant international organizations in the consultation process. For this purpose, and as appropriate, Memoranda of Understanding could be established. They may contact for consultation purposes the relevant international organizations, directly or with the assistance of the Secretariat, including REMPEC and RAC/SPA as the case may be, especially if the preliminary assessment of the area and the analysis of the conservation objectives may require action with regard to maritime navigation, fisheries or the protection of the environment".

50. The preliminary declarations and the political declarations of intention mentioned in paragraph 41 hereinbefore could constitute a basis for requesting the collaboration and contribution of the organizations in the process for preparing SPAMI proposals. These organizations may need a mandate to cooperate in the process from their respective governance bodies (Scientific Committee, Parties, etc).

a) The International Maritime Organization (IMO) and the REMPEC

51. The International Maritime Organization (IMO) is a United Nations' specialized agency responsible for improving maritime safety and preventing pollution from ships. Through its instruments, IMO has mechanisms in place for the elaboration, development and adoption of

international treaties, rules and regulations related to the shipping activities, including for preventing the pollution of the marine environment.

52. IMO consists of an Assembly, a Council and five main Committees, including the Marine environment Protection Committee (MEPC) which is empowered to consider any matter within the scope of the IMO concerned with prevention and control of pollution from ships. In particular it is concerned with the adoption and amendment of conventions and other regulations and measures to ensure their enforcement. It is responsible among others for the International Convention for the Prevention of Pollution from Ships (Marpol Convention).

53. The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), managed under the joint auspices of MAP and IMO, assists the Mediterranean coastal States in ratifying, transposing, implementing and enforcing international maritime conventions related to the prevention, reduction and surveillance of marine pollution from ships.

b) The General Fisheries Commission for the Mediterranean

54. The General Fisheries Commission for the Mediterranean (GFCM) is a regional fisheries management organization established in 1949 under Article XIV of the Constitution of the Food and Agriculture Organization of the United Nations (FAO). It consists of 23 Member countries along with the European Union.

55. Its objectives are to promote the development, conservation, rational management and best utilization of living marine resources in the Mediterranean, Black Sea and connecting waters. The area covered by the GFCM Agreement includes both the high seas and marine areas under national sovereignty or jurisdiction.

56. Through its instruments, GFCM has mechanisms in place for the elaboration, development and adoption of international regulations related to fisheries activities in the Mediterranean.

c) ACCOBAMS

57. Adopted in 1996 under the Convention on the Conservation of Migratory Species of Wild Animals, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and neighbouring Atlantic Area (ACCOBAMS) aims to encourage the Parties to take coordinated measures to achieve and maintain a favorable conservation status for cetaceans; to prohibit and to take all necessary measures to eliminate, where this is not already done, any deliberate taking of cetaceans; and to cooperate to create and maintain a network of specially protected areas to conserve cetaceans. This Agreement is currently composed of 23 States parties.

58. The Conservation Plan, as included in the Annex 2 of the Agreement, requires that the ACCOBAMS Parties endeavor to establish and manage specially protected areas for cetaceans corresponding to the areas which serve as habitats of cetaceans and/or which provide important food resources for them. Such specially protected areas should be established within the framework of the Regional Seas Conventions (OSPAR, Barcelona and Bucarest Conventions), or within the framework of other appropriate instruments.

59. Guidelines for the establishment and management of marine protected areas for cetaceans were prepared in collaboration with RAC/SPA and adopted by the Eighth Meeting of RAC/SPA Focal Points (Palermo, Italy, 6-9 June 2007).

3.4 Involving other relevant organizations

60. In the preparatory phases, the countries may also involve, as appropriate and in accordance with their national regulations and UNEP/MAP policy, other relevant organizations such as:

a) The International Union for Conservation of Nature

61. The International Union for Conservation of Nature (IUCN) is an international organization established in 1948. The IUCN unites both States and non-governmental organizations. IUCN aims to support the coordination of the work related to the biodiversity conservation and use of natural resources, and develops a knowledge strategy intending for a better conservation of species and habitats in the Mediterranean.

62. In the Mediterranean, IUCN has conducted for a few years a project on the improvement of the governance of the Mediterranean Sea as well as a project for identifying priority representative areas and species.

b) The Mediterranean Science Commission

63. Established in 1919, the Mediterranean Science Commission (CIESM) aims to promote scientific cooperation in the Mediterranean, in particular through the development of monitoring programmes, the organization of oceanographic campaigns or the organization of scientific congresses and research workshops. 22 countries are members to the Commission, among them 17 are Parties the Barcelona Convention (Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Monaco, Slovenia, Spain, Syria, Tunisia and Turkey).

c) Non-governmental organizations

64. Thanks to their bilateral relations with the countries, as well as through their action within international bodies, NGOs have the potential to play an important role for increasing decision-makers awareness.

65. NGOs could also contribute technically to establish a state of the knowledge for an area. Through their research and exploration work, some NGOs contribute to improving knowledge of the Mediterranean environment.

3.5 Defining the limits of the future SPAMI

66. According to the regional working programme for the coastal and marine protected areas in the Mediterranean adopted in 2009, it is recommended that States consider the establishment of protected areas in the setting-up of representative networks, and not in a isolated way. SPAMIs may be established in a planning framework at the different scales considered, regional, sub-regional and national, and based on existing inventories for the sites of conservation interest and the relevant criteria.

67. In this field, the work conducted by the RAC/SPA and submitted to its Focal Points, for identifying Mediterranean ecologically or biologically significant marine areas, and priority conservation areas in the open seas, including the deep seas, as well as on the Operational criteria for identifying SPAMIs in open sea areas, including the deep seas, could be considered as an example of process that could be followed and replicate in the future.

68. The countries could rely more generally on the biogeographic classification works conducted by other organizations. In this respect, it could be pointed out that in the ACCOBAMS framework

areas of special importance for cetaceans are identified and adopted by the Contracting Parties to the Agreement.

69. On the basis of the data collected, the selection criteria and taking into consideration the ecological issues of the area, the States can define jointly the limits of the future SPAMI.

70. The data on the site (geographic location, physical, hydrological and ecological features, socio-economic data, pressures and threats) justifying its importance for the Mediterranean, are then included in the presentation report.

3.6 Legal instrument needed for establishing marine protected areas likely to be SPAMIs in accordance with Article 9 of the SPA/BD Protocol

71. Once the area has been identified and delimited on the basis of the relevant scientific data related to the ecological issues of the area, the countries have to formalize their will to establish jointly this SPAMI. For this purpose, the best and most effective way to establish a joint marine protected area is to conclude a treaty. Unilateral legislation by one State is not likely to be acceptable for other States.

72. Nevertheless, the fact that an agreement between the neighbouring Parties concerned is the best and most effective way does not mean that the States directly concerned must necessarily sign and ratify a specific treaty for the establishment of any future marine protected areas on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined, and wait for its entry into force after having exchanged or deposited their ratifications.

73. If the States concerned prefer to do so, they can proceed in an informal and flexible way. In fact a treaty framework, that is the SPA/BD Protocol itself, already exists for that purpose. It provides for a special procedure of making proposals for inscription in the SPAMI List by two or more neighbouring Parties concerned.

74. The joint proposal, which is discussed, negotiated, agreed and signed by the competent authorities of the States concerned and must indicate the protection and management measures applicable to the envisaged area, can be considered as a treaty concluded in a simplified form subject to the condition of subsequent approval by the Meeting of the Parties to the SPA/BD Protocol.

75. The only cases where a specific treaty is needed would be where the Parties concerned with the future protected area include a State which is not a party to the SPA/BD Protocol or where the States concerned do not intend to have the MPA inscribed on the SPAMI List.

76. Nevertheless, this does not prevent the States concerned, if they want to do so, to conclude before or after the joint proposal for inscription of the area on the SPAMI list a specific treaty giving details on some provisions, in particular for the setting-up of the joint management structure and its operating terms. For example, the Pelagos Sanctuary was established under a treaty between the three States concerned, who proposed afterwards its inclusion on the SPAMI List.

77. During the preparatory work for setting the joint proposal, the neighbouring Parties concerned have to take into account the legal status of the area, in accordance with the provisions of the Annex I, para. C.

78. It is also recommended that the joint proposal and/or the treaty include a non-prejudice clause as the one included in Art. 2, paras. 2 and 3, of the SPA/BD Protocol.

4. Guidance on the content of the joint proposal as regards the SPAMI management

79. The management of a SPAMI has to be considered with regard to both the institutional side related to the area management body, and the regulation measures that would be in force in the area, in accordance with the main trends of the management plan.

4.1 An operational management body endowed with the appropriate resources

80. Under paragraph D, 6 of Annex I of the SPA/BD Protocol, “to be included in the SPAMI List, a protected area must have a management body, endowed with sufficient powers as well as means and human resources to prevent and/or control activities likely to be contrary to the aims of the protected area”.

81. For a SPAMI situated as per Article 9, para. 2, the treaty or the joint proposal for establishing the SPAMI should provide for a governance body. This one could rely on national management bodies, having a clear mandate and the necessary human and financial resources, guaranteeing the involvement of each neighbouring Party concerned in decision-making related to the management.

82. If the countries would like to set up a joint management body, they should face legal and administrative complexities that exist in any project of cross-boundary governance, considering the heterogeneity of the legal contexts and administrative procedures in force in each country.

83. For progressing towards the setting-up of a joint management body considering these constraints, guidance and good practices could be gotten from projects and experiences developed in other cross-boundary management frameworks, in particular the ones developed for the management of shared waters (cross-boundary management of rivers, drainage basins, lakes or ground waters). However, for SPAMIs situated partly or wholly on the high seas, it is important to consider the specificity and the complexity of the legal and political situation of the high seas which is not subject to any sovereignty or jurisdiction and where the international cooperation is appropriate.

84. It could also be useful to point out that the European countries could rely on a tool set up by the European Union (EU): the European cross-border cooperation groupings (EGCC). These groupings may be established between EU Members States, and they provide for a status ensuring the involvement of each Party in a bilateral or multilateral cooperation framework.

85. A progressive process could also be considered by the neighbouring Parties concerned, that is to say a provisional management body, coming under one of the Parties, would be designated in agreement with all the Parties, and would have a mandate to prepare the setting-up at mid-term of a joint management body. This progressive process would allow each Party to examine all the implications related to the legal responsibility of this new structure and would also allow to overcome the difficulties for implementing.

4.2 Management plan and monitoring activities

86. In order to guarantee an effective management of the area, the SPA/BD Protocol specifies that “protection, planning and management measures applicable to each area must be adequate for the achievement of the conservation and management objectives set for the site in the short and long term, and take in particular into account the threats upon it” (Annex I of the SPA/BD Protocol, para. D, 2).

87. Planning and management measures must be based on an adequate knowledge of the elements of the environmental conditions and of socio-economic and cultural factors that characterize the area.

88. Under the paragraph D, 7 of Annex I of the SPA/BD Protocol, “to be included in the SPAMI List, an area will have to be endowed with a management plan. The main rules of this management plan are to be laid down as from the time of inclusion and implemented immediately. A detailed management plan must be presented within three years of the time of inclusion. Failure to respect this obligation entails the removal of the site from the List”.

89. Thus, the treaty or the joint proposal that will provide to the neighbouring Parties concerned the framework for establishing the SPAMI, should provide at least the main rules of the management. In such case, it should also precise the necessary conditions for preparing the management documents during the three years after the time of inclusion of the site in the SPAMI List.

90. In addition, under the paragraph D, 8 of Annex I of the SPA/BD Protocol, “to be included in the SPAMI List, an area will have to be endowed with a monitoring programme. This programme should include the identification and monitoring of a certain number of significant parameters for the area in question, in order to allow the assessment of the state and evolution of the area, as well as the effectiveness of protection and management measures implemented, so that they may be adapted if need be. To this end further necessary studies are to be commissioned”.

91. Once established, a marine protected area requires continuous monitoring of ecological processes, habitats, population dynamics and the impact of human activities. This information is essential for periodic updating of applicable regulations and management plans.

92. The treaty or the joint proposal should then define the procedures according to which new protection measures, as well as the management plan and the subsequent modifications, are to be agreed and adopted by the States concerned.

4.3 Description of regulatory measures

93. The management of a natural area is associated with the regulation of activities within the site and, as appropriate, with the zoning of the activities. However, it is important to recall that the management of an area and its natural resources associated does not necessarily mean the closing of the area to one or more activities that take place in it[4].

94. In addition, wherever possible, incentives and non-regulatory approaches should be considered to encourage voluntary compliance and a culture of self-enforcement of rules by user groups. This is particularly important at sea where monitoring and detection are often harder than on land. Such approaches are likely to work best within a context that encourages public participation, education and awareness-building on the values of these ecosystems and the services they supply.

95. All actions taken within the framework of a regional legal instrument need to be consistent with international law. The international legal framework for regulating all activities in the oceans is provided in international law of the sea, including the United Nations Convention on the Law of the Sea (UNCLOS). One should also note that not all the States parties to the Barcelona Convention are parties to UNCLOS. Yet the UNCLOS provisions on the high seas codify customary law and are then binding for all States, Parties to UNCLOS or not.

4.3.1 Regulating the shipping activities

96. Shipping activities are regulated under the instruments provided according to IMO competence, such as the establishment of a Particularly Sensitive Sea Area (PSSA).

97. The Guidelines for the Identification of Particularly Sensitive Sea Areas (PSSAs) adopted in 1991 by the Assembly of the IMO and revised in 2001 and 2005, define a PSSA as an area that needs special protection through action by IMO because of its significance for recognized ecological or socio-economic or scientific reasons and which may be vulnerable to damage by international maritime activities.

98. When an area is agreed as PSSA, specific measures may be taken to control maritime activities in this area, as for example measures related to ship' routeing, stricter application of MARPOL[5] obligations related to equipment and discharges from ships, or setting up of services of vessel traffic management.

99. To be identified as a PSSA, an area should meet at least one of eleven ecological criteria (uniqueness or rarity; critical habitat; dependency; representativity; diversity; productivity; spawning or breeding grounds; naturalness; integrity; vulnerability; bio-geographic importance),

[4] During the February 2010 meeting of the Ad Hoc Open-ended Informal Working Group established by the United Nations General Assembly to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction, "it was underlined that management arrangements should be based on science, including considerations of threats and ecological values. Several delegations emphasized the need for flexibility in the selection of area-based management tools, and the need to avoid a "one-size-fits-all" approach, recognizing regional and local characteristics. In that regard, some delegations noted that the designation of marine protected areas did not require closing those areas to all activities, or particular activities, but rather managing those areas to ensure that ecological values were maintained. A suggestion was made that fisheries management measures, such as the protection of spawning stocks and the establishment of catch or fishing limits for specific areas could be considered a form of marine protected area." U.N. Document A/65/68 (para. 66)

[5] The International Convention for the Prevention of Pollution from ships, adopted in 1973 in the frame of the IMO, and completed by the 1978 Protocol, known as MARPOL, provides the provisions to designate sensitive areas as special areas with regard to a particular type of pollution, leading to the application of stricter standards than those generally applicable, in particular for the equipment and discharges from ships. The whole Mediterranean Sea is designate as a special area under Annex I (Regulations for the Prevention of Pollution by Oil) and Annex V (Regulations for the Prevention of Pollution by Garbage from Ships).

three social, cultural and economic criteria (economic benefit; recreation; human dependency) or three scientific and educational criteria (research; baseline and monitoring studies; education). In addition, the area should be at risk from international shipping activities, taking into consideration vessel traffic (operational factors; vessel types; traffic characteristics; harmful substances carried) and natural factors of hydrographical, meteorological and oceanographic character.

100. The guidelines for the identification of PSSA specify that at least one of the relevant criteria should be present in the entire proposed area, though this does not have to be the same criterion throughout the area.

101. PSSAs may be located in or beyond the limits of the territorial sea. They are identified by the Marine Environment Protection Committee of IMO on proposal by one or more member States and under a procedure which takes place at the multilateral level. PSSA proposals should be accompanied by proposals for associated protective measures, identifying the legal basis for each measure.

102. Associated protective measures that may be taken in PSSAs include those available under IMO instruments and cannot be extended to fields different from shipping. They encompass the following options: designation of an area as a Special Area under MARPOL Annexes I, II, V and VI; adoption of ships' routeing systems under the 1974 International Convention for the Safety of Life at Sea, including areas to be avoided; reporting systems near or in the area; other measures, such as compulsory pilotage schemes or vessel traffic management systems.

103. A proposal for regulating the shipping within a SPAMI should be then jointly submitted to IMO by the Parties concerned with the establishment of SPAMI and, whenever possible, by all the Parties to the SPA/BD Protocol. The 2002 Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea already contains a provision that should encourage Mediterranean States to take such an action:
"In conformity with generally accepted international rules and standards and the global mandate of the International Maritime Organization, the Parties shall individually, bilaterally or multilaterally take the necessary steps to assess the environmental risks of the recognized routes used in maritime traffic and shall take the appropriate measures aimed at reducing the risks of accidents or the environmental consequences thereof" (Art. 15).

4.3.2 Regulating fisheries

104. Fisheries activities are regulated under GFCM competence who adopts binding decisions as regards the conservation and rationale management of living marine resources, in particular with a view to:

- Regulate fishing methods and fishing gear,
- Prescribe the minimum size for individuals of specified species,
- Establish open and closed fishing seasons and areas,
- Regulate the amount of total catch and fishing efforts and their allocation among members,
- Control of fishing capacity,
- Take measures for the conservation of endangered species.

105. In addition, in the framework of their close collaboration, the GFCM takes on the recommendations of the International Convention for the Conservation of Atlantic Tunas (ICCAT) who is responsible for the management of tuna and tuna-like species in the Atlantic Ocean and its adjacent seas, including the Mediterranean Sea.

106. Lastly, regarding the establishment, in the GFCM framework, of Fisheries Restricted Areas (FRA), the procedure to be followed implies the fulfilling of a form ("Standard Format for the Submission of Proposals for GFCM Fisheries Restricted Areas (FRA) in the Mediterranean"). Presented by either an institution, a scientist or by GFCM Members, it must first get the endorsement by the GFCM Sub-Committee of Marine Environment and Ecosystems (SCMEE). If endorsed, it is further verified by the Scientific Advisory Committee and then transferred to the Contracting Parties annual Session of the GFCM, where it is examined with a view of its possible adoption.

4.3.3 Regulating exploitation of the mineral resources of the seabed

107. There is no point in the Mediterranean that is located at a distance of more than 200 n.m. from the nearest land or island. Consequently, activities for the exploration and exploitation of mineral resources of the seabed all fall within the sovereign rights of a Mediterranean State as they are conducted on the continental shelf of a State (see paragraph 77(3) of UNCLOS).

108. The proposal for the inclusion of an area on the SPAMI List, with the relevant protection and management measures, must consequently be submitted by the concerned State(s).

109. The Parties could also refer to the Article 21 of the Protocol Concerning Pollution Resulting from Exploration and Exploitation of the Continental Shelf, the Seabed and its Subsoil adopted in 1994 and entered into force in 2011:

"For the protection of the areas defined in the Protocol concerning Mediterranean Specially Protected Areas and any other area established by a Party and in furtherance of the goals stated therein, the Parties shall take special measures in conformity with international law, either individually or through multilateral or bilateral cooperation, to prevent, abate, combat and control pollution arising from activities in these areas.

In addition to the measures referred to in the Protocol concerning Mediterranean Specially Protected Areas for the granting of authorization, such measures may include, *inter alia*:

(a) Special restrictions or conditions when granting authorizations for such areas:

(i) The preparation and evaluation of environmental impact assessments;

(ii) The elaboration of special provisions in such areas concerning monitoring, removal of installations and prohibition of any discharge.

(b) Intensified exchange of information among operators, the competent authorities, Parties and the Organization regarding matters which may affect such areas".

4.3.4 Measures for the conservation of the large migratory pelagic species

110. The conservation of the large migratory pelagic species requires often actions on the high seas. Two international conventions address the issues related to the conservation of migratory species by promoting the cooperation between the States, and provide in their annexes or appendices lists of the concerned species:

- the UNCLOS (Annex I)
- the Convention on Migratory Species (CMS - Appendices I and II).

111. Based on the CMS provisions, the conservation of the cetaceans in the Mediterranean is under the ACCOBAMS Agreement. The Agreement includes a conservation plan which mentions the conservatory measures that have to be undertaken by the Parties so that the cetaceans' species present in the area enjoy a favorable protection status. These measures concern the following issues:

- Adoption and enforcement of national legislation

- Assessment and management of human-cetacean interactions
- Habitat protection
- Research and monitoring
- Capacity building, collection and dissemination of information, training and education
- Responses to emergency situations.

4.4 Implementation, compliance and enforcement of the regulatory measures

112. The joint proposal should describe the measures to be taken by the Parties with regard compliance and enforcement.

113. Implementation, compliance and enforcement of the regulatory measures within SPAMIs situated on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined could be distinguished between the Contracting Parties to the SPA/BD Protocol and the third States.

4.4.1 Implications for the Contracting Parties to the SPA/BD Protocol

114. In accordance with Article 9, para. 5, of the SPA/BD Protocol, “the Parties which proposed the inclusion of the area in the List shall implement the protection and conservation measures specified in their proposals”. The neighbouring Parties concerned, as parties to a specific treaty or signatories of a joint proposal, are thus required to implement the protection, planning and management measures applicable.

115. If the area proposed for inclusion in the SPAMI List is situated in areas where the limits of national sovereignty or jurisdiction have not yet been defined, that is to say that is in an area where no agreement has been concluded by the States concerned as regards their maritime boundaries, then the neighbouring Parties concerned for establishing the SPAMI are those who could have a claim over the waters where the area is located.

116. In this case, the neigbouring Parties concerned could agree, as regards enforcement of the relevant measures, on a solution similar to that adopted by the parties to the Agreement establishing the Pelagos Sanctuary, which provides as follows: “1. In the part of the sanctuary located in the waters subject to its sovereignty or jurisdiction, any of the States Parties to the present agreement is entitled to ensure the enforcement of the provisions set forth by it” (Art. 14, para. 1). Such a solution is facilitated by the disclaimer provision included in the SPA/BD Protocol (Art. 2, para. 2), according to which no act adopted on the basis of the Protocol “shall prejudice the rights, the present and future claims or legal views of any State relating to the law of the sea, in particular, the nature and the extent of marine areas, the delimitation of marine areas between States with opposite or adjacent coasts”.

117. In addition, in accordance with Article 8, para. 3, of the SPA/BD Protocol, all the Parties agree “to comply with the measures applicable to the SPAMIs and not to authorize nor undertake any activities that might be contrary to the objectives for which the SPAMIs were established”. Moreover, in accordance with the provisions of the Article 9, para. 5, all the Parties undertake to respect the rules laid down in the proposal for the protection and conservation of the area. These provisions make the protection, planning and management measures adopted for the SPAMI binding on all the Parties to the SPA/BD Protocol.

118. In this situation, procedures and mechanisms on compliance under the Barcelona Convention and its protocols, adopted in 2008 by the Contracting Parties, are also applicable[6].

[6] Decision IG. 17/2

Their objective is “to facilitate and promote compliance with the obligations under the Barcelona Convention and its Protocols, taking into account the specific situation of each Contracting Party, in particular those, which are developing countries”.

119. These procedures provide the setting-up of the Compliance Committee who “shall consider submissions by:

- a Party in respect of its own actual or potential situation of non-compliance, despite its best endeavours; and

- a Party in respect of another Party’s situation of non-compliance, after it has undertaken consultations through the Secretariat with the Party concerned and the matter has not been resolved within three months at the latest, or a longer period as the circumstances of a particular case may require, but not later than six months.”

120. Then, the Committee may take measures with a view “to promoting compliance and addressing cases of non-compliance, taking into account the capacity of the Party concerned, in particular if it is a developing country, and also factors such as the cause, type, degree and frequency of non-compliance”, by providing advice or facilitating assistance, or by inviting the Party concerned to develop an action plan to achieve compliance.

4.4.2 Implication for third States

121. The issue of third States is often raised as an obstacle to the implementation of measures intended to be applied in marine areas beyond the limits of national jurisdiction or in areas where the limits of national sovereignty or jurisdiction have not yet been defined. In these areas, where no sovereignty exists, jurisdiction is exercised according to criterion of the nationality of the ship concerned that is by the State that has granted its flag to a certain ship. No State can impose its own legislation on the others. No State can, consequently, unilaterally establish a marine protected area on the high seas and claim that ships flying a foreign flag abide by the relevant provisions.

122. As regards the enforcement of the provisions applying to the SPAMI against ships flying the flag of third States in areas where the limits of national sovereignty or jurisdiction have not yet been defined or in the waters beyond the sovereignty or jurisdiction of the neighbouring Parties concerned, the latter could agree on a solution similar to that adopted by the parties to the Agreement establishing the Pelagos Sanctuary, which provides that any of the States parties is entitled to ensure the enforcement of the relevant provisions “with respect to ships flying its flag, as well as, within the limits established by the rules of international law, with respect to ships flying the flag of third States” (Art. 14, para. 2). Such a solution is facilitated by the fact that, due to the limited extension of the Mediterannean Sea, all the present high seas waters included in the SPAMI would fall within the exclusive economic zones of one or another of the coastal States if they decided to establish such zones.

123. In addition, the cooperation with the international competent organizations and the mobilization of instruments under their competence could be a helpful tool in addressing some of the obstacles. In fact, specific instruments allow to regulate, under certain conditions, some precise activities, such as the Particularly Sensitive Sea Area (PSSA) declared under the International Maritime Organization (IMO) and the Fisheries Restricted Areas established under the General Fishery Commission for the Mediterranean (GFCM).

124. These instruments, which legal scope is different from Barcelona Convention's one, could allow to extend the enforcement of regulation measures to some States non-parties to the SPA/BD Protocol.

125. Moreover, Article 28 of the SPA/BD Protocol provides that:

"1. The Parties shall invite States that are not Parties to the Protocol and international organizations to cooperate in the implementation of this Protocol.

2. The Parties undertake to adopt appropriate measures, consistent with international law, to ensure that no one engages in any activity contrary to the principles or purposes of this Protocol."

126. Managing a SPAMI could be then considered as a way to promote new forms of cooperation between the neighbouring Parties involved in the SPAMI and the non-parties States that could be concerned by enforcing the regulation.

5. Conclusions

127. In the framework of the UNEP/MAP Barcelona Convention, the SPA/BD Protocol provides for the establishment of SPAMIs on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined. The proposal for inclusion in the SPAMI List has to be prepared jointly by the competent authorities of the neighbouring Parties concerned.

128. The main aspect for creating and managing a SPAMI on the high seas or in areas where the limits of national sovereignty or jurisdiction have not yet been defined is related to the will of the countries concerned to set up a sub-regional cooperative framework favorable for developing and implementing such project, involving all the technical departments concerned in each country as well as the relevant international organizations.

129. The coordination and consultation process would be achieved when an agreement would be reached between the neighbouring Parties concerned for establishing the SPAMI. For this purpose, the joint proposal, which is discussed, negotiated, agreed and signed by the competent authorities of the States concerned and must indicate the protection and management measures applicable to the envisaged area, can be considered as a treaty concluded in a simplified form subject to the condition of subsequent approval by the Meeting of the Parties to the SPA/BD Protocol.

130. Nevertheless, this does not prevent the States concerned, if they want to do so, to conclude before or after the joint proposal for inscription of the area on the SPAMI list a specific treaty giving details on some provisions, in particular for the setting-up of the joint management structure and its operating terms.

131. Through the establishment of a SPAMI, the neighbouring Parties concerned are involved in the implementation of the protection and conservation measures defined in the proposal for inclusion. More broadly, considering the *erga omnes partes* effect given by the SPA/BD Protocol dispositions, all the Parties to the Protocol are committed to respecting the protection and conservation measures defined in the proposal for inclusion.

132. Lastly, the mobilization of legal instruments under the competence of other organizations, such as IMO and GFCM, could allow to regulate, under certain conditions, some precise

activities, involving some States non-parties to the SPA/BD Protocol in the implementation of these specific measures.

133. Thus, the joint establishment of SPAMIs could be considered as the driving force for developing a broader cooperation between the States concerned, contributing to a better governance of the Mediterranean and its shared resources.

Note on the comments received regarding the draft approach after the meeting of the Focal Points for Specially Protected Areas (Marseilles, 17-20 May 2011) in accordance with paragraph 51 of the report of the meeting (UNEP(DEPI)/MED WG.359/22)

The comments received by the Secretariat were taken into consideration as far as possible in the new version of the Draft approach document. Hereinafter are included the comments received from Cyprus and Greece Focal Points. Comments by Cyprus are related to the Ecologically or Biologically Significant Areas (EBSAs), and in her comments, Greece recalls that she is not a party to the 1995 Protocol on Specially Protected Areas and Biodiversity (SPA/BD Protocol) and expresses opinions on the provisions of the 1995 Protocol regarding the procedures for establishing SPAMIs.

REPUBLIC OF CYPRUS

MINISTRY OF AGRICULTURE,
NATURAL RESOURCES
AND ENVIRONMENT

DEPARTMENT OF FISHERIES
AND MARINE RESEARCH
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15 June, 2011

Mr. Abderrahmen Gannoun
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Boulevard du Leader Yasser Arafat
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1080 TUNIS CEDEX
TUNISIE

Fax: +216 71 206 490

Dear Mr. Abderrahmen Gannoun,

Subject: Draft approach for facilitating SPAMI proposals

With reference to the above subject, please find here below our comments on the document UNEP(DEPI)/MED WG.359/CRP.2 :

- At Page 3, Paragraph 10, there is a reference on **open sea areas** "*...the development of marine protected areas, through the Specially Protected Areas of Mediterranean Importance (SPAMIs) system in **open sea areas**, including the deep seas. Based on the identification of priority conservation areas located in **open seas**, including the deep seas...*". We consider the term "open seas" should be replaced by the term "areas where the limits of national sovereignty or jurisdiction have not yet been defined", as stated in Page 3, Paragraph 14, in order to reflect the scope of this document and to be in lined with the United Nations Convention on the Law of the Sea (UNCLOS).

- At Page 10, Paragraph 67, it is stated that the identification of these proposed SPAMIs is relied on previous work conducted by RAC/SPA on Ecologically or Biologically Significant Areas (EBSAs) in the Open Seas, including the deep seas. We therefore consider that the document "*Note on the identification of ecologically or biologically significant areas in the Mediterranean*", that was distributed during the 10th SPA Focal Point meeting held in Marseilles, should be adjusted in compliance to the document UNEP(DEPI)/MED WG.359/CRP.2, which facilitates the approach for the establishment of SPAMIs in the high seas.

Subsequently, the Eratosthenes Seamount, which lies within the Exclusive Economic Zone (EEZ) of the Republic of Cyprus should be excluded from the list of EBSAs presented in the aforementioned document.

Looking forward to your prompt reply.

Sincerely Yours,

Marina Argyrou
for Director

C.C:
- Permanent Secretary
Ministry of Agriculture, Natural Resources and Environment

- Permanent Secretary
Ministry of Foreign Affairs

HELLENIC REPUBLIC
MINISTRY OF ENVIRONMENT ENERGY AND CLIMATE CHANGE
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Our ref: οικ. 161243/2197
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Athens, 24-8-2011

To: Mr. Abderrahmen GANNOUN
Director of RAC/SPA
Boulevard du Leader Yasser Arafat
BP 337 – 1080 Tunis cedex
TUNISIE
Fax: 00216 71 206 490

CC: International and EU Department

Subject: Draft approach of RAC/SPA for facilitating SPAMI proposals according to art. 9 of SPA and Biodiversity Protocol of Barcelona Convention

Dear Mr. Gannoun,

Following to your e-mail, please find attached our comments with regard to the draft approach for facilitating SPAMI proposals.

Attached: Comments

cc Division
DGE office
Section (file XIII)
E. Tryfon

Yours sincerely

N. Alexopoulos
Secretary General

C:/eleni/Barcelona/SPAMI Procedure Comments.doc

"Draft approach to facilitate the preparation of joint proposals for inclusion in the SPAMI List in accordance with Article 9 of the SPA/BD Protocol"

Comments by GREECE

Greece shares the concerns of all Mediterranean States for the protection of the marine environment of the Mediterranean Sea and is ready to work towards the common goal of the conservation and sustainable use of marine biodiversity. Greece is a party to the Barcelona Convention and almost all of its Protocols, including the Geneva Protocol concerning Mediterranean Specially Protected Areas (1982) and has participated actively in all efforts to establish a workable and effective regional scheme of environmental protection. However, Greece is not a party to the 1995 Barcelona Protocol on Specially Protected Areas and Biodiversity (SPA/BD Protocol) for reasons primarily related to the legal status of and the envisaged procedure for establishing SPAMIs on the high seas and in areas where the limits of national sovereignty or jurisdiction have not yet been defined (c/f article 9 of the SPA/BD Protocol).

It has been Greece's firm belief that the procedure under article 9 suffers from serious flaws, whilst it completely disregards the rights of coastal States over their continental shelf. It has to be recalled that, under international law and more specifically under article 77 of the UN Convention on the Law of the Sea (1982), the coastal State exercises *ab initio* and *ipso facto* sovereign rights over its continental shelf which must be respected. Furthermore, in many cases, marine protected areas encompass both the superjacent waters and the seabed. Consequently, there is need for the adoption of protective measures also on the seabed, which must be taken by the relevant competent coastal State authorities. This legal and factual situation has been taken into account by other *fora*, such as the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR, 1982).

The complexities and shortcomings of article 9 are evidenced by the fact that the "Draft Approach", in its attempt to implement it, adopts interpretations and proposes procedures which go well beyond the scope of the Protocol. Some of these issues merit closer scrutiny.

i. Identification of the neighbouring Parties concerned (para. 33-36)

In paragraph 35, it is recognized that the notion of "neighbouring Parties concerned is not devoid of a certain margin of *ambiguity*" especially in cases where the area is situated, partly or wholly, on the high seas and that,

therefore, needs to be defined on a case by case basis, taking into account the relevant circumstances. However, the proposed criteria for determining the "neighbouring Parties concerned" are not clear and may easily lead to arbitrary claims and conflicts. More specifically:

The "Draft Approach" stresses that the "notion of neighbourhood should be understood in the sense of vicinity and not necessarily of contiguity". Greece does not share this view as evidenced in the statement that was submitted at the time of the adoption of the Annexes to the SPA/BD Protocol in 1996.[1] In our view, the criterion of "*contiguity*" is more appropriate for determining the "neighbouring Parties concerned" in the context of article 9 of the SPA/BD Protocol. We would, therefore, agree with the conclusion in paragraph 36 that "the neighbouring Parties concerned *might even be only one State*, if the area of high seas is *surrounded by the territorial sea of that State solely*".

Nevertheless, this conclusion is subsequently *qualified* by an additional criterion stating that, in most cases, the neighbouring Parties concerned should be identified taking into consideration the "*potential* claims that they may put forward as regards future exclusive economic zones and the possibility of overlapping claims. In areas where there are potential overlapping claims by two or more States all the claimant States shall jointly formulate the proposal for inclusion in the SPAMI LIST". Similarly, with respect to cases where the limits of national sovereignty or jurisdiction have not been defined, it is stated that "it should not be difficult to identify the States that have a claim over the waters where the area is located. So, they qualify as the "neighbouring parties concerned" (paragraph 34).

This criterion is characterized by a certain degree of uncertainty and ambiguity, which could lead to the assertion of arbitrary claims. The same holds true for the reference in paragraph 36 to "potential claims". All claims must be based on international law and more specifically on the UN Convention on the Law of the Sea (1982), which provides the general legal framework within which all activities and uses of the oceans and seas must be carried out and determines the rights and obligations of all States (port, coastal and flag States).

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[1] "Greece understands that the procedures for submission of a proposal for inclusion in the SPAMI list referred to in part C par. 3 (legal status) of Annex I of the Barcelona Protocol of 10.06.1995 and in article 9, par. 2 sub. b of the same Protocol, apply to those areas situated partly or wholly on the high sea which are in a reasonable distance from, and immediately adjacent to zones where the neighbouring Parties exercise sovereignty or jurisdiction".

A final point should be made with respect to paragraph 108 of the "Draft Approach", where it is stated that with respect to activities for the exploration and exploitation of mineral resources of the seabed, "the proposal for the inclusion of an area on the SPAMI List, with the relevant protection and management measures, must consequently be submitted by the concerned State(s)." It would seem that the "Draft Approach" takes into consideration the sovereign rights of coastal States over their continental shelf; it is not clear, however, how this is related to article 9 of the SPA/BD Protocol and its implementation. Does this mean that in case the area under consideration encompasses the seabed, the coastal State on whose continental shelf it is located would be the only State entitled to propose its inclusion on the SPAMI List? Or that the coastal State would be entitled to propose its inclusion on the SPAMI List only in case it relates to the control and elimination of pollution arising from exploration and exploitation of the mineral resources of the seabed?

ii. Consultations with all the relevant international organizations at the regional level (para. 47-59)

Undoubtedly, the effective implementation of marine protected areas on the high seas depends to a considerable extent on co-ordination with other competent international organizations. As specifically recognized in paragraph 48, "in fact, a certain number of measures that can be adopted for a SPAMI already fall within the specific scope of treaties different from the SPA/BD Protocol or institutions different from UNEP-MAP. Full co-ordination is then necessary among all the legal instruments and entities operating at the Mediterranean level."

The SPA/BD Protocol is silent on this issue. For this reason, the "Draft Approach" attempts to "fill" this gap by proposing means and procedures for consultation and co-ordination with the relevant international organizations inevitably on a *case-by-case basis*. For example, in paragraph 49, it is stated that "as appropriate, Memoranda of Understanding could be established" by the neighbouring Parties concerned and the relevant international organizations, "directly or with the assistance of the Secretariat" and that "these organizations may need a mandate to co-operate in the process from their governance bodies (Scientific Committee, Parties, etc)." Similarly, in paragraph 103 it is stated that "a proposal for regulating the shipping with a SPAMI should then be jointly submitted to IMO by the Parties concerned with the establishment of SPAMI and, whenever possible, by all the Parties to the SPA/BD Protocol".

In Greece's view, this fragmentative approach cannot ensure an effective scheme of protection. If there is need for co-ordination with other international organizations, including the IMO, this cannot take place on a case-by-case basis. It must be effected institutionally, especially in cases where these organizations need a new mandate from their governance bodies in order to co-operate.

iii. Legal instrument needed for establishing marine protected areas likely to be SPAMI in accordance with article 9 of the SPA/BD Protocol (para. 71-78)

Another point in the "Draft Approach" that calls for comment is paragraph 74 and the proposed submission of joint proposals in the form of *'treaties in simplified form'* pending the adoption by the Meeting of the Parties. Apart from the fact that this reference may be misinterpreted as establishing "the subsequent approval by the Meetings of the Parties to the SPA/BD Protocol treaties" as a condition of the entry into force of such a treaty (treaties are binding upon Parties without the need for endorsement by third States), the joint proposal is not another 'treaty', but it is subject to the procedure of article 9 of the SPA/BD Protocol. This is also acknowledged in paragraph 73, where it is stated that "a treaty framework, that is the SPA/BD Protocol itself, already exists for that purpose".

Should the States concerned decide to adopt such treaty, there is no need to have recourse to the procedures of the SPA/BD Protocol. To exemplify this, suffice it to say that the Pelagos Sanctuary had been established by virtue of a treaty among Italy, Monaco and France and it was subsequently included in the SPAMI List.

iv. An operational management body endowed with the appropriate measures (para. 80-85)

The "Draft Approach" would appear to promote the establishment of joint management bodies and joint schemes for the implementation of article 9 of the SPA/BD Protocol, which, in our view, are too far-fetched and go well beyond the scope of its application, such as the references to cross-boundary governance and the "progressive process" envisaged in paragraph 85. As already stated, one of the main reasons that Greece is not a party to the SPA/BD Protocol is the ambiguity and shortcomings of article 9, which are now evidenced by the difficulties in applying it in practice. However, neither the Protocol nor international law requires the development of cross-boundary management frameworks for the establishment of marine protected areas on the high seas.

v. Implications for third States

As already stated, the proposal for the parallel application of other legal instruments in the SPAMI (see para. 122 of Draft Approach), should be met with caution. Each legal instrument for the protection of the marine environment is established within a different setting and applies to different State parties. Moreover, it is highly unlikely that all the States, whose vessels enter in a SPAMI, would be bound by these legal instruments.

So far as the proposal in paragraph 121 to "agree on a solution similar to that adopted by the parties to the Agreement establishing the Pelagos Sanctuary, which provides that any of the States parties is entitled to ensure the enforcement of the relevant provisions 'with respect to ships flying its flag, as well as, within the limits established by the rules of international law, with respect to ships flying the flag of third States'", we would like to make the following comments: first, we agree with the conclusion that such a solution would be facilitated if all the Mediterranean States decided to establish exclusive economic zones (EEZs), since there would be no areas of high seas left in the Mediterranean. However, if all Mediterranean States claimed EEZs, then there would be no need for article 9 the SPA/BD Protocol. On the other hand, within the existing legal regime of the high seas, the enforcement of the relevant provisions with respect to ships flying the flag of third States remains extremely limited. Second, the adoption of such a solution would require an amendment to the SPA/BD Protocol.

Finally, there is a vague mention to '*erga omnes partes'* effect given by the SPA/BD Protocol, which goes well beyond the nature of the legal obligations under this Protocol as well as the relevant international law.

v. Relation to the UN Convention on the Law of the Sea (UNCLOS), para. 95 and 130)

The recognition that the international legal framework for regulating all activities in the oceans is provided in UNCLOS and that all actions taken within the framework of a regional legal instrument need to be consistent with UNCLOS provisions, is qualified by the reference to the fact that not all the States Parties to the Barcelona Convention are parties to UNCLOS.

Greece fails to understand the emphasis placed on this reference, which may be misinterpreted as undermining the universal character of UNCLOS and the need of consistency with its provisions. In this respect, we would like to emphasize that not only UNCLOS provisions on the high seas codify customary law, as stated in footnote 4. As evidenced by State practice and acknowledged by jurisprudence, UNCLOS provisions reflect customary

international law, in particular its provisions on the territorial sea, the continental shelf, the exclusive economic zone and the rights of islands to maritime zones, which are of particular relevance in this regard.

Last but not least, Greece wishes to refer to the ongoing discussion at the United Nations concerning the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction and the Recommendations of the recent meeting of the *Ad Hoc Open-ended Working Group to study issues relating to the conservation and use of marine biological diversity beyond areas of national jurisdiction,* which state, *inter alia*, that: "A process be initiated, by the General Assembly, with a view to ensuring that the legal framework for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction effectively addresses those issues by identifying gaps and ways forward, including through the implementation of existing instruments and the possible development of a multilateral agreement under the United Nations Convention on the Law of the Sea".

In our view, it would be useful to take into account the developments within the United Nations before moving forward to solutions which go well beyond the letter and the spirit of article 9 of the SPA/BD Protocol.

Annex IV – NOTE ON THE FUTURE ORIENTATIONS OF SAPBIO IN THE LIGHT OF THE DECISIONS OF THE 10TH CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY

Note on the future orientations of SAPBIO in the light of the decisions of the 10th Conference of the Parties to the Convention on Biological Diversity

INTRODUCTION

The present note takes stock of the main decisions of COP 10 of the CBD (Nagoya, 2010) and proposes a road map to as to help the Mediterranean countries to act in order to attain the objectives of the 2011 – 2020 Strategic Plan adopted in Nagoya.

As the Mediterranean region has a Strategic Action Programme for the conservation of biological diversity (SAPBIO), the road map proposed in the present note takes into account the SAPBIO main elements and reviews the options in order to define the new orientations for SAPBIO bearing in mind the orientations up to 2020 of the Strategic Plan adopted in Nagoya as well as the other relevant decisions of the 10th Conference of the Parties to the CBD.

The proposals in the present note have been designed in such a way as to translate the Strategic Plan adopted in Nagoya into recommendations and draft actions of MAP and partner organisations involved in conservation and sustainable utilization of marine and coastal biological diversity in the Mediterranean.

They were reviewed by a concertation meeting which was organized by CAR/ASP (RAC/SPA) in Tunis on 4 and 5 April 2011 where several organisations were represented which are involved in the conservation of marine and coastal biodiversity in the Mediterranean. Other participants had been invited to the meeting by CAR/ASP and the list of participants is appended to the present Note.

On the basis of the discussions at the concertation meeting, CAR/ASP elaborated the present version of the Note for submission at the next meeting of the National Focal Points for the SPAs (Marseille, 17 – 20 May 2011) and for it to be submitted to the Contracting Parties to the Barcelona Convention.

Observations:

The following two options will be submitted for consultation purpose to the meeting of the National Focal Points for SPAs (Marseille, 17 – 20 May 2011).

Option 1: the orientations in the present document will be proposed for adoption by the Parties to the Barcelona Convention as a tool to enable the Mediterranean region to be in line with the orientations of the CBD. Further to its adoption, the Parties would then invite the organisations concerned to help them with the implementation.

Option 2: the Contracting Parties will be invited to take note of the orientations in the present document so as to be guided by them within the framework of implementing the Aichi objectives and inviting the organisations concerned to help the countries in this matter.

During the concertation meeting it would be useful to discuss the following points:

- These orientations are meant for whom? (for the countries or for the MAP components ?)
- Can these orientations also be addressed to other organisations concerned?

1. COP 10 DECISIONS OF THE CBD

Out of the 47 decisions adopted by the COP of the CBD, the 20 following decisions are particularly relevant for the conservation of marine and coastal biodiversity in the Mediterranean:

X/1 - ccess to genetic resources and fair and equitable sharing of the benefits arising out of their utilization.

X/2 – 2011 – 2020 Strategic Plan and the Aichi objectives pertaining to biodiversity.

X/3 - resource mobilization strategy in support of achieving the Convention's three objectives

X/4 – third edition of World Perspectives of biodiversity: repercussions on the application of the Convention in the future

X/5 – application of the Convention and the Strategic Plan

X/6 – integration of biodiversity in poverty reduction and elimination and in development

X/7 - review of results-based targets and objectives and related indicators and their eventual adjustment for the post-2010 period

X/8 - United Nations decade for 2011 – 2020 biodiversity

X/11 - science – policies interface on biodiversity, the services provided by the ecosystems and human wellbeing and review of the conclusions of the intergovernmental meetings.

X/18 - communication, education and awareness-creation amongst the public and International Year of Biodiversity

X/20 – cooperation with other conventions, organisations and international initiatives

X/21 – engagement of the private sector

X/22 – Action Plan aimed at the sub-national governments, towns/cities and other local authorities for biodiversity

X/23 – pluri-annual Action Plan for South-South cooperation in the domain of biodiversity for development

X/29 – marine and coastal biodiversity

X/30 – mountain biodiversity

X/31 – protected areas

X/32 – sustainable utilization of biodiversity

X/33 - biodiversity and climate change

X/38 - invasive exotic species

X/39 - Global Taxonomy Initiative

Amongst the elements dealt with in these resolutions, the question of access to genetic resources and the 2011 – 2020 Strategic Plan are particularly important to be considered in the present note as they introduce new orientations.

The question of access to genetic resources and fair equitable sharing of benefits arising out of their utilization

The main decision of COP 10 on this issue refers to the adoption of the Protocol on the access to genetic resources and the fair and equitable sharing of benefits arising out of their utilization in connection with the Convention on Biological Diversity (Nagoya Protocol).

The Protocol's aim is to lead to a "fair and equitable sharing of benefits arising out of their utilization, namely through a satisfactory access to genetic resources and an appropriate transfer of relevant technologies, bearing in mind all the rights to these resources and technologies and through adequate funding, thus contributing to the conservation of biodiversity and sustainable utilization of its constitutive elements".

As the Protocol deals namely with research and development activities on the genetic and/or bio-chemical composition of genetic resources through the application of biotechnologies, its impact on the in situ conservation of biodiversity will not be a direct one. But it could entail a strengthening of conservation activities by orienting the benefits arising out of the utilization of genetic resources towards the conservation of biodiversity and the sustainable utilization of its constitutive elements. Such an orientation is encouraged by Article 9 of the Protocol.

This Protocol is open for signing from 2nd February 2011 to 1st February 2012 and will come into force when 50 Parties had deposited their instruments of ratification. It is thus highly unlikely to have any short or medium term impact on the conservation of biodiversity.

To prepare the ground for rapid implementation of this protocol when it comes into force, the recommendation is to promote public awareness-creation actions on the importance of genetic resources and traditional knowledge in connection with genetic resources and issues linked to the access and sharing of benefits. The importance of such awareness-creation actions is stressed in Article 21 of the said Protocol.

2011 – 2020 Strategic Plan

This is the second strategic plan for the CBD. The first one was adopted in 2002 and was based on a commitment of the Parties to the CBD to implement more effectively and more coherently the Convention's three objectives so as to achieve in 2010 a strong reduction in the depletion rate of biodiversity on a world-wide, regional and national level. From the COP 10 working documents and the declarations of the Secretariat and the delegations, it transpires that, despite the efforts deployed and the progress made, the 2010 objective has not been attained, at least not on a world-wide level. The main reasons given are linked to the lack of scientific information for the elaboration of policies and decision-making as well as the lack of financial, human and technical resources.

The 2011 – 2020 Strategic Plan for biodiversity adopted in Nagoya aims to promote a more effective implementation of the CBD. It is based on a vision, a mission, strategic goals and objectives. It provides a flexible framework for the elaboration of national and regional objectives and is also a communication tool to draw the attention of all the stakeholders and to facilitate the integration of biodiversity into global and national programmes which have a much wider scope. It is based on the following 5 strategic goals:

A. Managing the underlying causes of biodiversity depletion by mainstreaming biological diversity into the whole government structure and society
B. Reducing direct pressure on biodiversity and encouraging sustainable utilization.
C. Improving the state of biodiversity by safeguarding the ecosystems, species and genetic diversity
D. Strengthening the benefits for all arising out of biodiversity and services provided by the ecosystems.
E. Strengthening implementation through participative planning, knowledge management and capacity building.

Objectives have been determined for each of the 5 strategic goals; a total of 20 objectives; the Aichi objectives pertaining to biological diversity. The whole list of the Aichi objectives is appended to the present note. The 20 objectives and the 5 strategic goals stem from the following vision: "To live in harmony with nature", so that, by 2050, biodiversity is valorized, conserved, restored and used wisely by ensuring the sustainability of services provided by the ecosystems, by maintaining the planet in good health and providing the basic benefits for all peoples".

On the basis of this vision, the mission of the Strategic Plan is to "undertake effective and urgent measures to stop the depletion of biodiversity so as to ensure that, by 2020, the ecosystems are resilient and continue providing the basic services, thus preserving the diversity of life on earth and contributing to human wellbeing and the elimination of poverty. This means that:

- Pressures on biodiversity are to be reduced
- Ecosystems are to be restored
- Biological resources are to be used in a sustainable manner
- The benefits arising out of the utilization of genetic resources are to be shared fairly and equitably
- Adequate funding resources are to be provided
- Capacity building
- Considerations pertaining to biodiversity and the value of biological diversity are to be mainstreamed and appropriate policies to be applied effectively and
- Decision-making processes are to be based on solid scientific premises and on the precautionary approach.

2. STRATEGIC ACTION PROGRAMME FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY IN THE MEDITERRANEAN (SAPBIO)

SAPBIO was adopted in 2003 by the Contracting Parties to the Barcelona Convention in order to deal with the complex threats facing marine and coastal biodiversity in the Mediterranean. It was elaborated over a 3-year period starting in 2001 within the framework of a wider process based on concertations in the countries to make a diagnosis of the state of marine and coastal biodiversity and to identify national priorities and to establish a National Action Plan for each of the prioritary themes. The results of national concertations were compiled to elaborate a regional component of SAPBIO so as to support national action plans and their coordination.

Prioritary actions identified by SAPBIO are as follows:

- Inventory, mapping and monitoring of Mediterranean marine and coastal biodiversity
- Conservation of habitats, species and sensitive sites
- Evaluation and attenuation of the impact of threats to biodiversity
- Development of research to improve knowledge and fill in the knowledge gaps on biodiversity
- Development of competences to ensure coordination and technical assistance
- Information and participation
- Better awareness-creation

Within the framework of SAPBIO, about fifty National Action Plans have been elaborated to deal with prioritary issues identified by the national process undertaken in each country.

3. ANALYSIS OF THE COMMON POINTS AND DIFFERENCES BETWEEN SAPBIO AND THE AICHI STRATEGIC PLAN

Even though SAPBIO deals with most of the issues raised by the Aichi Strategic Plan, the latter highlights more directly a certain number of concepts, as in the case of the value of biodiversity and its mainstreaming into national policies. In this connection the Aichi Strategic Plan attaches great importance to awareness-creation amongst the decision-makers and invites action so that the Heads of State and of governments, as well as the parliamentarians of all Parties understand the value of biodiversity and the services provided by the ecosystems.

The importance of traditional knowledge and practices of the autochthonous and local communities is another concept particularly highlighted by the Aichi Strategic Plan whereas SAPBIO, which does not ignore it, does not attach much importance to it. The Aichi Strategic Plan in fact, devotes one of its 20 objectives to that and stipulates that, by 2020, such traditional practices, if they are of interest for the conservation and sustainable utilization of biodiversity, should be respected and fully mainstreamed and taken into account within the framework of applying the Convention.

SAPBIO does not fix quantitative objectives in terms of reducing the rate of loss of biodiversity or the coverage rate for protected areas, whereas the Aichi Strategic Plan contains several objectives of a quantitative nature and thus stipulates for example that by 2020, at least 10 % of the marine and coastal areas should be conserved through ecologically representative and well connected networks of protected areas which are managed effectively and equitably. Such an objective has already been fixed within the framework of the CBD for 2012 and this objective is obviously not going to be achieved by next year.

The question of financing the biodiversity conservation actions is taken up by SAPBIO and the Aichi Strategic Plan. The latter introduces two innovative notions:

- The first notion is linked to using the provisions of the new Nagoya Protocol with the intention of using the income arising out of the utilization of genetic resources for financing biodiversity conservation actions.
- The second one refers to partnership with the private sector.

Obviously SAPBIO and the Aichi Strategic Plan are not comparable in terms of their respective finalities as SAPBIO has been designed as a regional programme made up of

precise actions and priorities stemming from a detailed identification of the causes of the degradation of the marine and coastal biodiversity of the Mediterranean region, whereas the Aichi Strategic Plan was elaborated on the basis of global problems and was designed to achieve objectives on a world-wide level.

4. ACTIONS PROPOSED FOR THE MEDITERRANEAN

These actions are proposed on the basis of the Aichi objectives bearing in mind the specificities and the state of the marine and coastal biodiversity in the Mediterranean. This adaptation to the Mediterranean context is in line with the spirit of the Strategic Plan which stipulates that its goals and objectives are striving to be satisfactory on a global level and that the framework is flexible for national and regional objectives.

The following proposed actions are meant to help the region's countries to attain the Aichi objectives as adapted to the Mediterranean region and therefore their implementation could be envisaged in the short term (3 to 4 years, before the end of 2015).

A. Managing the underlying causes of biodiversity depletion by mainstreaming biological diversity into the whole government structure and society.

- To develop awareness -creation programmes for the wider public and the decision-makers on the value of biodiversity and the measures which individuals can take to conserve and use it in a sustainable manner. (Objective 1). These measures are to be implemented by the national bodies concerned. International organisations as well as NGOs can support these measures by elaborating and making available to the national bodies the necessary tools and awareness-creation material. They can also contribute towards carrying out an awareness-creation action.

- Assist those countries that request it to strengthen their national capacity to mainstream the values of biodiversity into their strategies and processes of national and local planning for development and for poverty reduction (Objective 2).

- Prepare an inventory of subsidies and other incentive systems which have, or could have, harmful effects on marine and coastal biodiversity so as to gradually reduce, eliminate or change them. This inventory is to be on a national level and is also to cover international or bilateral aid systems. The elaboration of guidelines and case studies would make it possible to help the country to reduce the negative effects of some of the subsidy systems (Objective 3). To this end, the provisions of the CBD Decision X/3 (A,7, (13)) will be also taken into consideration.

B. Reducing direct pressure on biodiversity and encouraging sustainable utilization

- Prepare an inventory of non-indigenous marine species which have established themselves recently in the Mediterranean and which have harmed biodiversity so as to strengthen the early warning system of the Action Plan pertaining to non-indigenous species (objective 9).
- Prepare an inventory of the industrial utilization of sea water sites (desalination plants etc) and assess the impact of this utilization on marine biodiversity.
- List the fishing practices which exert pressure on each type of sensitive habitat and on the species and define, within the framework of the entities concerned, the necessary measures to mitigate these pressures. The 2008 study carried out within

the framework of the CGPM on the impact of fishing gear on the marine environment could be used as a basis for this inventory (objective 6).
- Develop pilot projects for the application, for the marine environment, of spatial planning of activities (aquaculture, tourism, fishing etc.).

C. *Improve the state of biodiversity by safeguarding the ecosystems, species and genetic diversity.*

- Assessments to be made in 2012 and 2013, using a standard method, of the national and sub-regional networks of marine and coastal protected areas in terms of their representativity and effective management. Elaborate and implement, on the basis of these assessments, programmes/projects to improve the representativity of the Mediterranean network, including areas on the high seas, so as to attain the 10 % objective (objective 11).
- Strengthen the management improvement programmes for protected areas, also by including training programmes.

D. *Strengthening the benefits for all arising out of biodiversity and services provided by the ecosystems*.

- Develop post –CDP (CDP = Coastal Development Programmes) actions carried out within the framework of MAP, to implement the recommendations of these programmes which are linked to the conservation and sustainable utilization of marine and coastal biodiversity.
- Promote pilot actions to safeguard and to rehabilitate artisanal fishing (1). Such actions could serve as an example for several countries.

E. *Strengthening implementation through participative planning, knowledge management and capacity building.*

Help the countries which request this to:

- Make an inventory of the knowledge, scientific information, innovations and traditional practices of autochthonous and local communities which are of interest for the conservation and sustainable utilization of biodiversity as well as their sustainable traditional utilization. The Mediterranean Exchange Centre on biodiversity being developed by CAR/ASP (RAC/SPA) could be used as a structure for collecting and disseminating this type of information.
- Assess the state of implementation of SAPBIO: the time necessary for the implementation of the actions programmed within the framework of SAPBIO was estimated at 15 years. Now 7 years have passed since its adoption at the end of 2003. Therefore this would be a mid-term assessment with the aim of proposing any eventual necessary adjustments so that SAPBIO could make it possible for the Mediterranean region to attain the Aichi objectives by 2020.

5. MEANS OF IMPLEMENTATION

The meeting of the national focal points will be invited to review the modalities and means of implementing the propositions of the present orientation note. What is to be discussed are (i) the activities and actions to be planned for the Mediterranean within the framework of the

biodiversity decade decided at Nagoya and (ii) the organisation at the end of 2012 of a Mediterranean conference on marine and coastal biodiversity with the aim of :

- Taking stock of the SAPBIO assessment
- Informing the donors and potential sponsors of the investment portfolios stemming from SAPBIO
- Publicize the Mediterranean action for the conservation of biodiversity so as to sensitize the decision-makers and encourage the incorporation of biodiversity into national policies.

(1) The results of the support project for artisanal fishing developed by COPEMED in some southern Mediterranean countries as well as those of the DESTINATIONS project of CAR/PAP (PAP/RAC) could be used for such pilot actions.

ANNEX 1: LIST OF PARTICIPANTS AT THE CONCERTATION MEETING ORGANIZED BY CAR/ASP ON 4 AND 5 April 2011.

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ANNEX II: AICHI OBJECTIVES

(The annotations at the bottom of the page reflect the main questions raised at the concertation meeting on the relevance of the objectives and their applicability for Mediterranean marine and coastal biodiversity).

Strategic goal A. Managing the underlying causes of biodiversity depletion by mainstreaming biological diversity into the whole government structure and society.

Objective 1: by 2020 at the latest, individual persons are aware of the value of biodiversity and the measures they can take to conserve and use it in a sustainable manner.

Objective 2: by 2020 at the latest, the values of biodiversity have been incorporated into the strategies and national and local planning processes for development and poverty reduction as well as into national accounts, as need be, and into the notification systems.

Objective 3: by 2020 at the latest, the incentives, including the subsidies which are harmful for biodiversity, have been eliminated, progressively reduced or changed, so as to reduce to a minimum or to avoid negative impacts, and so that positive incentives to promote the conservation and sustainable utilization of biodiversity are elaborated and applied in a way which is compatible and in harmony with the provisions of the Convention and international obligations in force, whilst taking into account national socio-economic conditions.

Objective 4: by 2020 at the latest, the governments, enterprises and stakeholders, at all levels, will have carried out measures or implemented plans to ensure sustainable production and consumption and maintained the rate of utilization of natural resources within sure ecological limits.

Strategic goal B. Reducing direct pressure on biodiversity and encouraging sustainable utilization.

Objective 5: By 2020, the rate of depletion of all natural habitats, including forests, will have been reduced by at least a half and if possible brought down close to zero. Degradation and fragmentation of habitats should be reduced considerably.

Objective 6: by 2020, all stocks of fish, invertebrates and aquatic plants are to be managed and harvested in a sustainable and legal manner and by applying ecosystem-based approaches, so that overfishing is avoided, plans and recovery measures are in place for all depleted species, fisheries no longer have an established negative impact on threatened species and vulnerable ecosystems and the impact of fishing on stocks, species and ecosystems remains within safe ecological limits. (2).

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(2) Such objectives have already been considered by CGPM, but without fixing a timeline for achieving them.

Objective 7: by 2020, the areas devoted to agriculture, aquaculture and sylviculture are to manage sustainably to ensure the conservation of biological diversity.

Objective 8: by 2020, pollution, caused in particular by an excess of nutrient elements, is brought down to a level which has no harmful effect on the functions of the ecosystems and biodiversity.

Objective 9: by 2020, invasive exotic species and the pathways of introduction are to be identified and classified in order of priority, the prioritary species are to be controlled or eradicated and measures are to be in place to manage the pathways of penetration so as to prevent the introduction and the establishment of these species (4).

Objective 10: by 2015, the numerous anthropogenic pressures on the coral reefs and other marine and coastal vulnerable ecosystems affected by climate change or the acidification of the oceans are to be reduced to a minimum so as to preserve their integrity and functioning. (5).

Strategic goal C: Improve the state of biodiversity by safeguarding the ecosystems, species and genetic diversity.

Objective 11: by 2020, at least 17 % of land areas and internal waters and 10 % of the marine and coastal areas, including areas of particular importance for biodiversity and services provided by the ecosystems, are conserved through ecologically representative and well connected networks of protected areas which are managed effectively and equitably and other effective conservation measures per area, and integrated into the whole marine and terrestrial landscape.

Objective 12: by 2020, the extinction of known threatened species is to have been avoided and their state of conservation, in particular of those which had declined the most, is to have been improved and maintained. (6).

Objective 13: by 2020, the genetic diversity of cultivated plants, stock-farming and domestic animals and their wild relatives, including that of other species which have a socio-economic or cultural value, are to have been preserved and strategies to have been elaborated and implemented to reduce genetic erosion to a minimum and to safeguard their genetic diversity.

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(3) In the Mediterranean, the pollution caused by excess nutrient elements, without being negligible, is not the only type of pollution which threatens marine and coastal biodiversity. For example, the pollution generated by the industrial utilization of sea water is exerting ever more pressure on Mediterranean marine biodiversity.
(4) The eradication of invasive marine species is not easy in the Mediterranean.
(5) For the Mediterranean, it is more appropriate to talk of habitats on the list of types of reference habitats adopted for the inventories of sites of interest for conservation.
(6) Several Mediterranean countries have developed national plans for the conservation of some threatened marine species (marine turtles, cetaceans, monk seals etc.). It is strongly recommended to start evaluating the implementation of these action plans.

Strategic goal D. Strengthening the benefits for all arising out of biodiversity and the services provided by the ecosystems.

Objective 14: by 2020, the ecosystems which provide essential services, water in particular and which contribute towards health, to the means of subsistence and wellbeing, are to have been restored and safeguarded, taking into consideration the needs of women, autochthonous and local communities and poor and vulnerable populations.

Objective 15: by 2020, the resilience of ecosystems and the contribution of biodiversity to carbon stocks are to have been improved thanks to conservation and restoration measures, including the restoration of at least 15 % of degraded ecosystems, thus contributing towards the mitigation of climate change and adaptation to climate change as well as to combating desertification. (7).

Objective 16: by 2015, the Nagoya Protocol on the access to genetic resources and the fair and equitable sharing of benefits arising out of their utilization is to be in force and operational, in conformity with national legislation.

Strategic goal E: Strengthening implementation through participative planning, knowledge management and capacity building.

Objective 17: by 2015, all the Parties are to have elaborated and adopted, as a general policy instrument, and started implementing, an effective national action plan and strategy which are participative and updated for biological diversity. (8)

Objective 18: by 2020, the knowledge, innovations and traditional practices of autochthonous and local communities which are of interest for the conservation and sustainable utilization of biodiversity, as well as their sustainable traditional utilization, are to have been respected, subject to the provisions of the national legislation and international obligations in force, and are fully integrated and taken into account within the framework of the application of the Convention, with the full and effective participation of the autochthonous and local populations at all relevant levels.

Objective 19: by 2020, the knowledge, the scientific base and technologies associated with biodiversity, its values, its functioning, its state and its tendencies, and the consequences of its depletion, are to have been improved, widely shared, transferred and applied.

Objective 20: by 2020 at the latest, the mobilization of financial resources, from all possible sources, necessary for the effective implementation of the 2011 – 2020 Strategic Plan for biological diversity, in conformity with the consolidated and agreed upon mechanism of the Resource Mobilisation Strategy, will have been increased considerably compared with present levels. This objective will be subject to modification depending on the assessments of the needs in terms of resources; these assessments will be carried out and notified by the Parties.

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(7) In view of the extent of coastal wetlands in the Mediterranean, they are likely to play an important role in carbon sequestration. The preservation of these environments is likely to effectively contribute towards the mitigation of climate change. Collaboration is necessary between CAR/ASP and MedWet on this aspect.
It is strongly recommended to promote research work to assess the potential of Posidonia meadows for carbon sequestration.

(8) National strategies for the conservation of biodiversity need updating in several Mediterranean countries.

Annex V – DRAFT GUIDELINES FOR THE STANDARDIZATION OF MAPPING AND MONITORING METHODS OF MARINE MAGNOLIOPHYTA IN THE MEDITERRANEAN

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Study Context

Any attempt at management means that a prior assessment has to be made to appraise the state of knowledge concerning the resources to be managed. Therefore marine magnoliophyta distribution maps are an absolute prerequisite to any conservation activity for these assemblages, but an enlightened decision is not to be limited to the sole information of knowing that it is present or absent (Mc Kenzie *et al.*, 2001) and thus additional data is required such as the typology of the seagrass, its abundance, its state of health and/or conservation and a suitable monitoring system being set up.

These elements are indeed amongst the priority activities to be undertaken within the framework of the Action Plan for the Conservation of Marine Vegetation in the Mediterranean, adopted in 1999 by the Contracting Parties to the Barcelona Convention (UNEP-MAP-RAC/SPA, 1999). During the implementation evaluation of this Action Plan in 2005 (UNEP-MAP-RAC/SPA), it transpired that very few countries were able to set up this monitoring system, and even if some mapping programmes had been initiated in several sites, the areas which had really been mapped were very few in view of the potential surfaces occupied by the seagrasses in the Mediterranean (over 35 000 km² just for the *Posidonia oceanica* seagrass; Pasqualini *et al.*, 1998).

A round table on the mapping and monitoring methods was organized, to improve this situation, at the Third Mediterranean Symposium on Marine Vegetation in Marseilles in March 2007. The managers present expressed their need for “Practical Guides” so as to harmonize the methods and comparison of results which had been obtained on a regional level, so as to facilitate decision making for the management of coastal environments (UNEP-MAP-RAC/SPA, 2007). Using the marine vegetation as an environment evaluation tool was also pointed out and a suggestion was made to propose specific protocols to create a “tool box” which could cater for their needs (UNEP-MAP-RAC/SPA, 2007).

Thus at their 15thOrdinary Meeting in Almeria (January 2008), the Contracting Parties asked the Regional Activity Centre for Specially Protected Areas (RAC/SPA) to improve the existing inventory tools and to propose a standardization of the mapping and monitoring techniques for these assemblages.

In September 2009, RAC/SPA organized within the framework of the Second Workshop on Mediterranean Marine Magnoliophyta in Hvar from 6 to 10 September 2009, a round table on the “standardization of mapping and monitoring methods of marine magnoliophyta in the Mediterranean region” so as to obtain the views of the scientists concerned and also to elaborate the guidelines.

Approach adopted

The approach adopted consisted of two parts: first the organization of a round table to assess the experiences in this domain in the Mediterranean and then an analysis of the international literature.

1. Synthesis of the roundtable

The round table took place at the 2nd workshop on Mediterranean marine magnoliophyta in Hvar, Croatia, from 6 to 10 September 2010. A brief presentation of the theme (Annex 1) made it possible to have a fruitful exchange between approx. sixty participants (Annex 2).

At the end of the discussions (Annex 2) it transpired that:
For mapping:

- There are numerous methods which have proved their worth and several specific programmes have already been devoted to this (e.g. the Interreg IIIB "POSIDONIA" Programme; MESH programme).
- These methods are well known and therefore standardization can be envisaged.
- All the methods are usable in the region but some of them are more suitable for a given species (e.g. large-sized species) or particular assemblages (dense seagrasses).
- The available methods can be used in most of the Mediterranean countries even though there are implementation problems due to the absence of training, competence and/or specific financing. Efforts must therefore be in an order of priority (e.g. sites to be studied as a priority) and equilibrium is to be ensured between the mapping objectives and the method(s) implemented.

There is however a wide consensus to propose common tools which are applicable everywhere and by everyone.

Monitoring:

- Today there are several monitoring systems for marine magnoliophyta backed up by several years of experience and which have been successfully implemented worldwide and in the Mediterranean (e.g. SeagrassNet, MedPosidonia programme, Posidonia national monitoring networks).
- Even though the monitoring methods are similar (regular follow-up in the course of time with very often the establishment of fixed markers), the monitoring objectives and the descriptors taken into account during these operations are quite diverse. These descriptors are to provide information on the state of the seagrass, the plant or the interactions between the latter and its environment.
- Some descriptors are used by all the Mediterranean scientific community (e.g. seagrass density) but the measuring techniques are often very different, so that, even though a precise standardization is technically feasible, it seems to be difficult to promote.
- The Mediterranean monitoring systems are highly specific inasfar as they are mainly dedicated to *Posidonia oceanica*. In contrast, the SeagrassNet has the advantage of being able to be used for almost all the magnoliophyta species but is less relevant for some genera (e.g. *Posidonia*) or some sectors (deep bathymetric tranche).
- The experience with the MedPosidonia programme shows that the different monitoring methods implemented seem to be applicable to all the Mediterranean countries in asfar as those persons responsible for the monitoring receive appropriate training in this domain.

Even though there is no clear consensus as in the case of the mapping methods, it seems desirable, in view of the strong demand expressed by the managers, to try and come up with some common and standardized tools. These tools should be selected from the existing monitoring systems and could be classified according to their relevance depending on the monitoring objectives and their ease of implementation.

2. Analysis of available data

In the light of the round table discussion results, an additional bibliographical research was undertaken to take into account the latest techniques and recent works carried out by the scientific community on an international level in this domain.

This approach was based mainly on data published in indexed international reviews and on databases being consulted online (e.g. Web of Science).

Proposals for Guidelines for Mapping Magnoliophyta Seagrasses in the Mediterranean

1. Problem

Today it is commonly recognized that the Mediterranean shallow coastal sea beds (between 0 and -50 m) host important ecosystems, such as the calcareous bio-concretions and magnoliophyta meadows (UNEP-MAP-Blue Plan, 2009).

These magnoliophyta are flowering plants of terrestrial origin which returned to the marine environment approx. 120 to 100 million of years and there are about sixty species throughout the world, five of which are in the Mediterranean (*Cymodocea nodosa*, *Halophila stipulacea*, *Posidonia oceanica*, *Zostera marina* and *Zostera noltii*; Fig. 1). They form extensive stretches of submarine prairies (still called meadows) between zero and about fifty m depth in the open sea, coastal lagoons (brackish and hyperhaline) and play an important ecological (primary production, spawning areas and nurseries) and sedimentary role (fixation of sediments & protection of the littoral: Pergent, 2006). It is believed that on a worldwide level the submarine prairies, in view of their usefulness, have a major economic value (over 17 000 $ per ha and per annum, *in* Costanza *et al.,* 1997).

Despite this it must be admitted that the available information on the exact geographical distribution of these meadows is still very fragmentary on a regional level (UNEP-MAP-RAC/SPA, 2009) and that very little of the coastline has been inventoried as only 5 States out of the 21 have a mapped inventory covering at least half of their coasts (UNEP-MAP-Blue Plan 2009). To explain this situation, one of the reasons given is i) the often high cost of these inventories, ii) absence of specific technical means, iii) gaps in terms of competence on a local level and also iv) the multiplicity of tools available and the difficulty in identifying the most suitable methods to deal with a given situation.

Cymodocea nodosa (Ucria) Ascherson – Lesser Neptune grass

This warm-water species is present throughout the Mediterranean and in the Atlantic (from Senegal to southern Spain).

It develops in the open sea between 0 and 10 m in depth (exceptionally until – 50 m) and in lagoons.
Its serrated apex leaves (20 to 40 cm long and 3 to 4 mm wide) are regrouped in leaf bundles, its brown reddish rhizomes are fine with foliar scarring.

Halophila stipulacea (Forsskål) Ascherson

A tropical affinity species, originating from the Red Sea and introduced into the Mediterranean via the Suez Canal.

It is present throughout the whole Eastern basin, in the open sea, between 1 and 35 m depth.
Its small leaves (3 to 6 cm long and 3 to 8 mm wide) are regrouped in foliar bundles; its mainly horizontal rhizomes are fine and clear.

Posidonia oceanica (Linnaeus) Delile – Posidonia

A Mediterranean endemic species which forms huge meadows between 0 and 43 m depth. It is present throughout the whole Mediterranean except in the extreme South-east, Upper Adriatic and the Gibraltar sector.

On average its leaves are 30 to 80 cm long and 1 cm wide and are regrouped in foliar bundles, its brown rhizomes and its roots constitute a particular structure: a mat.

Zostera marina Linnaeus – Marine Zostera

A cold-water, widely distributed species (Atlantic, Pacific, Black Sea)- it is basically to be found in the Northern Mediterranean.

It develops on the high seas and in lagoons, between 0 and 12 m depth.

Its ribbon-shaped leaves (40 to 60 cm long on average and 4 to 8 mm wide) are regrouped in foliar bundles; its yellow and brown rhizomes are very fine.

Zostera noltii Hornemann – The dwarf eelgrass Zostera

A more temperate species, it is present throughout the whole Mediterranean and in the Atlantic (from Mauritania to Scandinavia) and the Black Sea.

It develops in the open sea and in lagoons at a depth of 0 to 3 m and can tolerate lengthy exposure.

Its ribbon-shaped leaves (10 to 20 cm long and 1 to 2 mm wide) are regrouped in foliar bundles, its light yellow to beige rhizomes are very fine.

Fig. 1: Presentation of Mediterranean magnoliophyta species. Distribution maps according to Green & Short (2003) updated. Some data represent previous findings and have to be confirmed. On the other hand, more recent findings may be missing from the data.

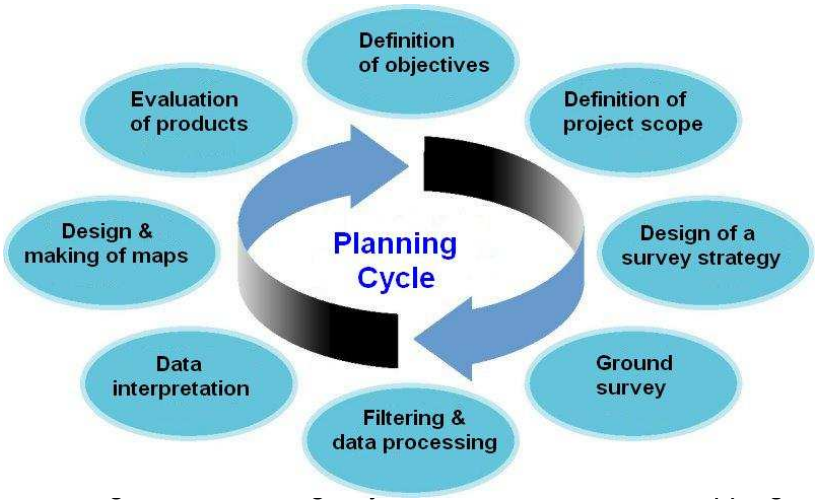
2. Which approach to be taken?

The approach advocated for mapping the marine magnoliophyta meadows in the Mediterranean is similar to that established for the mapping of the marine habitats within the framework of the European MESH programme (Mapping European Seabed Habitats: MESH project 2008).

The different actions to be undertaken (Fig.2) are detailed below and can be regrouped into three main stages:

- Initial planning
- Proper surveys
- Processing and interpretation of data

Initial Planning means the identification of the objective so as to determine the surface to be mapped and the necessary precision to achieve the targeted objective. These are two fundamental elements to determine the tools to be used in the later phase & to evaluate the effort (and thus the human, material & financial costs) necessary to produce the mapping.
This is the key-phase for a successful mapping approach.



programme (according to the MESH project, 2008).

The survey phase is the practical phase for data collection. It is often the most costly phase as it generally requires in situ interventions with their attendant constraints (such as availability of personnel and technical means, competences, weather conditions etc.) which must be met to obtain reliable and reproducible data. There must also be a prior inventory phase of the already existing data for the sector being studied so as to reduce the amount of work or to have a better targeting of the work to be done.

The processing and data interpretation phase is doubtlessly the most complex phase as it necessitates knowledge and experience so that the data gathered can be usable. The products obtained must be evaluated to ensure their coherence and the validity of the results obtained.

a) What precision for what surface area to be mapped?

Selecting an appropriate scale is a critical stage in the planning phase (Mc Kenzie *et al.*, 2001). Even though there is no technical impossibility in using a high precision over large surface areas (or inversely), there is generally an inverse relationship between the precision used and the surface area to be mapped (Mc Kenzie *et al.*, 2001; Fig. 3.).

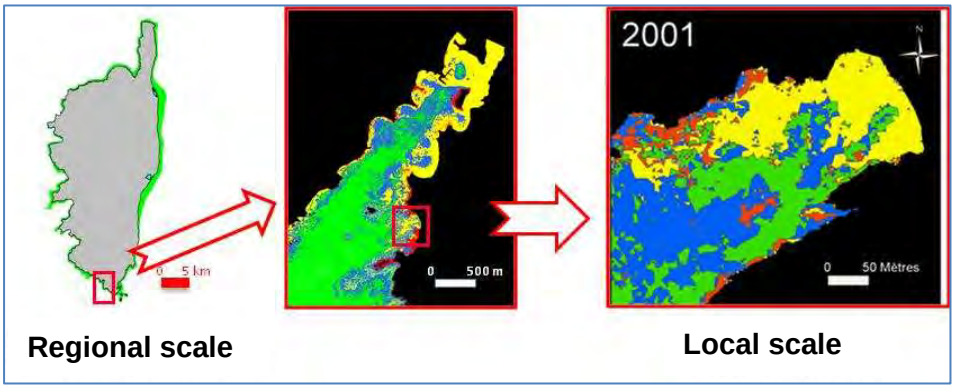


Fig. 3: scale and precision of a map

Thus the mapping objectives for large surface areas means using average precision levels inasfar as what is wanted is a global approach and even a probable habitat distribution or an identification of its extension limits. This type of approach is used for national or sub-regional studies and the minimum mapped surface area is 25 m² (Pergent *et al.*, 1995a). Inversely, mapping objectives for smaller surface areas often necessitate a much higher precision level (minimum surface area below or equal to square-meter: Pergent *et al.*, 1995a). What is sought here is an accurate localization of the habitat for control and monitoring purposes over a period of time. This type of approach is used for test-zones or remarkable sites to be most accurately monitored. As highlighted by the MESH Project (2008), most of the environment management and marine area planning activities require a range of habitat maps between these two extremes.

b) What available tools for mapping surveys?

In less than half a century the mapping survey techniques have become highly diversified and several of them have been successfully applied to marine magnoliophyta meadows (see synthesis in Walker, 1089: Pergent *et al.*, 1995a; McKenzie *et al.*, 2001; Dekker *et al.*, 2006; POSIDONIA project, 2007). In as far as the mapping of these meadows was in shallow depths (0 to 50 m), it is possible to use optical imaging techniques (satellite images, multi or hyper spectral imaging, aerial photography) and acoustic techniques (side-scan sonar, mono- or multi-beam sonar). The simultaneous use of several instruments makes it possible to optimize the results as the information obtained is different but can be complementary (Tab. 1).

Tab.1: Synthesis on main survey tools used for mapping marine magnoliophyta. Whenever possible, the bathymetric tranche and the surface area being used, accuracy, the area mapped per hour, the main interest or the limits of utilization are to be indicated with the corresponding bibliographical references.

Survey tool	Depth	Surface area to be mapped	Geometrical precision	Area mapped in km²/hour	Interest	Limit
Satellite images	from 0 to -20 m but adapted to tranche 0 to 10 m	Starting with a few km² but esp. adapted to large surface areas (over 100 km²)	From 0.5 m	Over 100 (Kenny *et al*., 2003)	Usable everywhere without authorization, high geometric precision. Possible to find free access images with low resolution but useful for superficial areas.	Good weather conditions required (no clouds & no wind).Possibility of confusion between close tonality population (e.g. seagrass on rock & photophilic population on rock. Interpretation error due to bathymetric variations (the same meadow may have different tonalities depending on whether it is at -3 m or at -10 m).
Multispectral and/or hyperspectral images	From 0 to -25 m (Mumby & Edwards, 2002) but adapted to superficial tranches (up to -15 m; Gagnon *et al*., 2008)	CASI used on surface areas of 50 km² to 5000 km² (Mumby & Edwards, 2002)	from 1 m (Mumby *et al*., 2003)		Very high spectral resolution which makes it possible to distinguish the magnoliophyta species (Dekker *et al.*, 2006). Possible to obtain data in bad weather.	Complex acquisition & processing procedures requiring the presence of specialists. Necessary to obtain field data & spectral data at the same time & to possess plenty of data to validate the observations. Identification difficulty in case of very fragmented populations (Dekker *et al.*, 2006).

Tab.1: Synthesis on main survey tools used for mapping marine magnoliophyta – next.

Survey tool	Depth	Surface area to be mapped	Geometrical precision	Area mapped in km²/hour	Interest	Limit
Aerial photos	from 0 to -20 m but adapted esp. to tranche of 0 to -10 m	Adapted to small surface areas (10 km² ; *in* Diaz *et al.*, 2004) but can be used for surface areas over 100 km²	from 0.3 m (Frederiksen *et al.*, 2003)	over 10 (Kenny *et al*., 2003)	Possible to adapt image precision to sought after objective (Pergent *et al*., 1995a) Manual, direct & easy interpretation possible. Sizeable images library with access to chronological series. Good identification of limits between populations.	Same limit as for satellite imaging. Difficult geometrical corrections and strong deformations if verticality is not respected or if image covers a small area (low altitude view). Authorisations for imaging difficult to obtain in some countries.
Side-scan sonar	over -8 m (Clabaut *et al*.,2006)	Can be used for large surface area but adapted to medium surface areas (some dozens of km²).	From 0.1 m (Kenny *et al*., 2003)	0.8 to 3.5 (Kenny *et al*., 2003)	Realistic representation of seabed & good identification of limits of facies & quite dense meadows. Quick execution.	Small forms (under m²) or low surface density cannot be distinguished (Paillard *et al*., 1993). Loss of definition at image edge & slight adjustment between profiles necessary. Great signal amplitude variations (levels of grey) which can lead to interpretation errors (same population may appear in different levels of grey; Kenny *et al*., 2003)

Tab.1: Synthesis of main survey tools used for mapping marine magnoliophyta – next.

Survey tool	Depth	Surface area to be mapped	Geometrical precision	Area mapped in km²/hour	Interest	Limit
Acoustic sonar mono-beam acoustic sonar	beyond -10 m (Riegl & Purkis, 2005)		From 0.5 m (Riegl & Purkis, 2005)	1.5 (Kenny *et al.*, 2003)	Good geo-referencing	Low discrimination between habitats & less reliable than satellite techniques
Multi-beam sonar	from -2m to -8m (Komatsu *et al*., 2003)		From 1m (Kenny *et al*., 2003)	0.2 (Komatsu *et al*., 2003)	Possible to obtain 3 D image of meadows & gain biomass information per surface area unit.	Huge amount of data necessitating very efficient computer systems for processing & archiving. Complex data processing.
Transect or permanent square	Bathymetric tranche easily accessible with scuba diving (0-20 m) but esp. adapted to 0 to -10m tranche	Surface areas under km², generally 25 m to 100 m² for permanent squares (Pergent *et al*., 1995a)	from 0.1 m	0.01	Very great precision in identifying small structures (tufts of seagrass) & localisation of population limits	Many working hours or necessitating numerous observers
Video camera	Whole bathymetric tranche of seagrass distribution	Adapted to small surface areas under km²	from 0.1 m (Kenny *et al*., 2003)	0.2 (*in* Diaz *et al.*, 2004)	Easy to use & possible to record seabed images for later interpretation	Long time to gain & process data Positioning error due to gap between boat's position & camera when dragged (POSIDONIA project, 2007)

Tab.1: synthesis on main survey tools for mapping marine magnoliophytes - next.

Survey tool	Depth	Surface area to be mapped	Geometrical precision	Area mapped in km²/hour	Interest	Limit
Laser-telemetry	Bathymetric tranche easily accessible in scuba diving (0-20 m)	Adapted to small surface areas under km²	Some centimetres (Descamp *et al.*, 2005)	0.01	Very accurate localisation of population limits or remarkable structures. Monitoring possible in course of time.	Range limited to 100m in relationship to base so not possible to work over large surface areas. Necessity for markers on seabed for positioning of base if monitoring over time is envisaged Possible acoustic signal perturbation due to great variations in temperature or salinity. Specific training needed for equipment. (Descamp *et al*., 2005)
GIB	Bathymetric tranche easily accessible in free scuba diving (0-20 m)	Adapted to small surface areas under km²			Same characteristic as acoustic telemetry but greater range (1.5 km) c	Quite cumbersome technique (a lot of equipment, team of divers and related equipment ; POSIDONIA project, 2007)

Once the surveying is finished, the data obtained needs to be organized (type of data, the whole point of obtaining the data, producer organism, method used, site studied and acquisition date) so that the data can be used later on as well and be appropriately archived so that it can be easily consulted, does not deteriorate with time and can be easily integrated into similar data from other sources (MESH project, 2008).

1) Optical data

Satellite images are from satellites in orbit around the earth. Data is obtained continuously and today it is possible to buy data which can be of great precision (Tab. 2).

Satellite	Panchromatic precision	Bibliographical reference on marine magnoliophyta
Landsat 7	15 m	Cerdeira-Estrada *et al*., 2008
SPOT 5	2.5 m	Pasqualini *et al*., 2005
IKONOS (HR)	1.0 m	Mumby & Edwards, 2002
QuickBird	0.7 m	POSIDONIA project, 2007
Geoeyes	0.5 m	-

Tab. 2: Types of satellites & precision of sensors used for mapping of marine magnoliophyta - : absence of data

It is also possible to ask for a specific programming of the satellite (programmed passing over an identified sector with specific requirements) but this entails a much higher cost.
The rough data must undergo a prior geometrical correction to compensate for errors due to the methods the images are obtained (e.g. errors of parallax, inclination of the satellite) before it can be used. Images already geo-referenced should also be obtained even if their cost is much higher than the rough data.

In view of the changes of the light spectrum depending on the depth, these techniques should be reserved for superficial bathymetric tranches (Tab. 1). In clear water it can be said that:

- With the blue channel it is possible to see up to approx. 20 to 25 m depth
- With the green channel up to 15 to 20 m
- With the red channel up to 5 to 7 m
- Channel close to infra-red – approx. tens of cm (POSIDONIA project, 2007) and experience in the Mediterranean has shown that for types of well differentiated seabeds (e.g. loose substrate/meadow) they can be used with no problem up to a depth of about twenty meters (UNEP-MAP-RAC/SPA 2009b).

Multispectral or hyperspectral imaging is based on obtaining simultaneously images composed of numerous close and contiguous spectral bands (generally 100 or more). There is a wide variety of airborne sensors (CASI1[1], Deaedalus Airborne Thematic Mapper; Godet et al 2009) which provide data in real time and under unfavourable lighting conditions (Tab. 1). It is possible to create specific spectral response libraries so that measured values can be compared and this makes it possible to appraise the vegetation cover and even to differentiate the component species (Ciraolo *et al.*, 2006; Dekker *et al.*, 2006).

Aerial photographs obtained through various means (e.g. aeroplanes, drones, ULM etc.) may have different technical characteristics (e.g. Shooting altitude, verticality, optical quality…). Even though more expensive, shooting films from a plane which is equipped with an altitude and verticality control system and using large size negatives (24 x 24) makes it possible to make better use of the results (e.g. geometrical precision). For example, on a photo at

[1]CASI: Compact Airborne Spectrographic Imager

1/25000 the surface area covered is 5.7 km x 5.7 km (Denis *et al.*, 2003). In view of the progress made in the last few decades in terms of shooting (e.g. the quality of the film, filters, lens etc.) and later processing (e.g. digitalization, geo-referencing), aerial photographs today constitute one of the most preferred surveying methods for mapping marine magnoliophyta meadows (Mc Kenzie *et al.*, 2001; POSIDONIA project 2007).

2) Acoustic data

Sonar provides images of the seabed through the emission and reception of ultrasound. Amongst the main seabed acoustic mapping technologies, Kenny *et al*. (2003) distinguish: (1) wide acoustic beam systems like the side-scan sonar, (2) single beam sounders (e.g. RoxAnn®QTC-View®), (3) multiple narrow beam bathymetric systems and (4) multi-beam sounders (Fig. 4).

The side-scan sonar towfish with its fixed recorder emits acoustic signals. The images, or sonograms, obtained, indicate the distribution and the limits of the different entities over a surface area of 100 to 200 m along the pathway (Clabaut *et al.*,2006); Tab. 1). The precision of the final mapped document partly depends on the means of positioning used by the boat (e.g. radio localisation or satellite positioning). The existence of a sonogram atlas (Clabaut *et al.*,2006) could be helpful in interpreting the data.

Single-beam acoustic sounderis based on the simultaneous emission of two frequencies separated by several octaves (38 kHz and 200 kHz) so that information can be obtained about the seafloor characterization.
The sounder's acoustic response is different depending on whether the sound wave is reflected from an area covered or not covered by vegetation. (POSIDONIA project, 2007).

The multi-beam sounder (Fig. 4) makes it possible to precisely and rapidly obtain: (i) topographical images of the submarine relief (bathymetry), (ii) sonar images representing the local reflectivity of the seafloor and thus its nature (imagery). The instrument simultaneously measures the depth in several directions, determined by the system's receiver beams. These beams form a beam perpendicular to the axis of the ship. The seafloor can thus be explored over a wide band (5 to 7 times the depth) with a high degree of resolution (POSIDONIA project, 2007). 3D images of the seafloor are thus obtained and the meadows can be visualized and the biomass can be evaluated too (Komatsu *et al.*,2003).

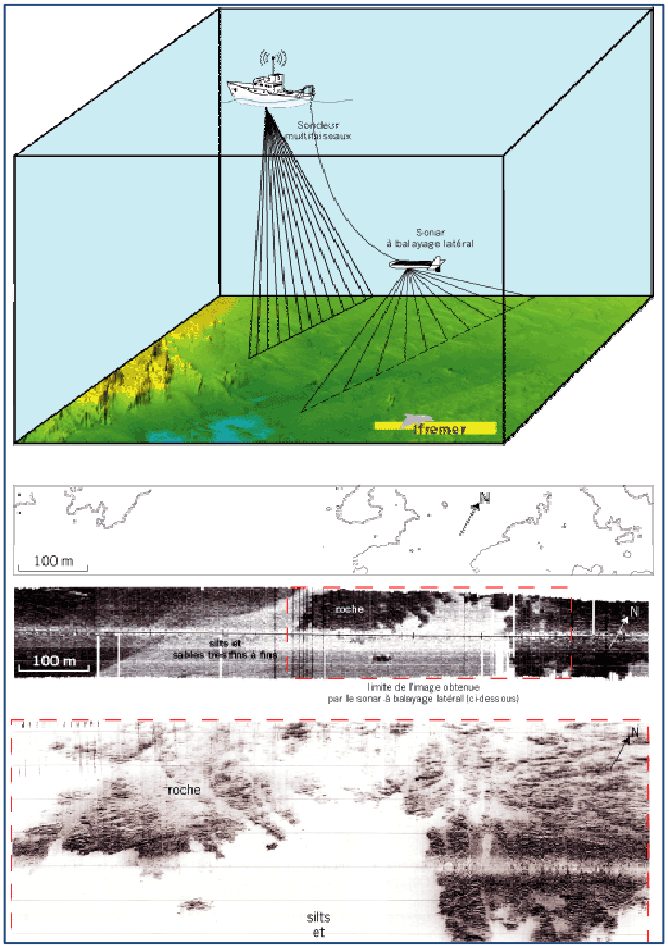


Fig.4. Multi-beam sonar working principle and examples of bathymetric recording (multi-beam sounder) and acoustic images (multi-beam sounder and side-scan sonar); www.ifremer.fr

3) Samples and observations in situ

Field samples and observations provide discrete data (sampling of distinct points regularly spread out in a study area). They are vital for the validation of continuous information (complete coverage of surface areas on portions of the study sectors or along the pathway) obtained through the different survey instruments and must be sufficiently numerous and distributed appropriately so as to obtain the necessary precision and also in view of the heterogeneity of the habitats. As for the mapping of meadows such as *Cymodocea nodosa*, *Posidonia oceanic*, *Zostera marina* or *Zostera noltii*, destructive sampling (using dredger buckets, core samplers, trawls, dredgers) must be forbidden in view of the protected character of these species (UNEP-MAP 2009) and direct samples being taken by hand should be limited as much as possible.

Surface observations can also be made (e.g. *bathyscope*) by observers diving in or by using submarine imagery techniques such as photography and video. Photographic equipment and cameras can be mounted on a vertical structure, a sleigh or remotely-controlled vehicle (ROV). The cameras on a vertical structure are submerged over the side of the ship as it advances very slowly (under 1 knot), the sleighs are at the back of the ship and the ROVs have their own propulsion system and are remotely controlled from the surface (MESH project, 2008).

The use of video cameras (or ROVs) during the survey operations makes it possible to see the images on the screen in real time, to identify or to locate any changes in the facies and any other characteristic element of the seafloor. After the maritime operations, the images are reviewed to have a cartographical restitution using GIS for each of the areas surveyed (POSIDONIA project, 2007). To facilitate and to improve the results obtained with these cameras, joint acquisition modules integrating the depth, images of the seafloor and geographical positioning have been developed (e.g. the TRITONE system or MOBIDIC; POSIDONIA project, 2007).

In situ observations can in fact constitute proper surveying techniques when they are used along the lines (transect) or over small surface areas (permanent square) marked accurately on the seabed and also to follow the limits of a population.

The transects consist of lines marked on the seafloor by means of graduated ribbons stretched from fixed points on the coast and in a precise direction (Boudouresque *et al.*,1980 in Pergent *et al.,* 1995a). Any changes in the populations and types of seafloor over a surface area of 1 to 2 m on each side of the line are recorded. The information report makes it possible to prepare a precise map of the sector studied (Tab. 1).

Demarcating the limits of a meadow also makes it possible to obtain a distribution map. Laser-telemetry is a useful technique for highly precise mapping surveying over small surface areas (Descamp *et al.,*2005). The GIB system (GPS Intelligent Buoys) has 4 buoys with hydrophones and GPS and a submarine acoustic emitter is quite comparable. The buoys measure the arrival time of an acoustic signal whose emission is synchronous with the GPS time. Knowing the moment of emission of these signals and the sound propagation speed in the water, it is possible to directly calculate the distances between the pinger and the 4 buoys. The depth is indicated by the pressure sensor. To optimize the meadows mapping operations, the pinger can be fixed on a submarine scooter driven by a diver. The maximum distance of the pinger in relationship to the center of the polygon formed by the 4 buoys can be approx. 1500 m (POSIDONIA project, 2007).

Free diving monitoring with a differential GPS can also be envisaged to locate the upper limits of the meadows. The diver follows precisely the contours of the limits and the DGPS continuously records the diver's geographical data. The mapping data is integrated under

GIS using the route followed. The acquisition speed is 2-3 km/hour; the sensor precision can be sub metric (POSIDONIA project, 2007).

c) What methods of analysis to interpret the data?

The MESH (2008) project identified three prior stages for the production of a habitats map:

- Processing, analysis and classification of the biological data,
- Selecting the most appropriate physical layers (e.g. substrate, bathymetry, hydro dynamism)
- Integration and modeling of data by collating biological habitats classes and physical layers and then regrouping similar corresponding groupings, direct interpretation of acoustic and optical images by having recourse to the practical experience of the experts or statistical modeling.

The map thus produced must then be evaluated for its accuracy, i.e. its capacity to represent reality as it truly is, its accuracy and therefore its reliability.

During the processing analysis and classification stage, the reference list of the Mediterranean habitat types should be consulted (UNEP-MAP-RAC/SPA, 1999) which was adopted by the Contracting Parties to the Barcelona Convention at their 11th ordinary meeting. This list identified the specific “meadow” habitats which are also to be found in the annex of the Habitats Directive (Directive 92/43/EEC of the 21 May 1992 Council) and which must be taken into consideration within the framework of the NATURA 2000 programmes (Fig. 5).

A precise description of the reference habitats and the criteria to identify them are also available (Bellan-Santini *et al.*, 2004). In view of this classification, the habitats which could be on the map are as follows:

- *Cymodocea nodosa* meadows
- *Halophila stipulacea* meadows
- *Posidonia oceanic* meadows
- *Zostera marina* meadows
- *Zostera noltii* meadows
- Mixed meadows (a mix of the preceding species)

As for *Posidonia oceanica* meadows, the discontinuous meadows (on a rock or sand) should be identified, the dead mats and natural monuments such as:

- Striped meadows
- Barrier reefs and reef platforms
- Atolls (micro or macro-atolls)

I.SUPRALITTORAL
I.1. MUDS
I.2. SAND
I.2.1. Biocenosis of supralittoral sands
I.2.1.5. Facies of phanerogams which have been washed ashore (upper part)
I.3. STONES AND PEBBLES
I.4. HARD BEDS AND ROCKS
II. MEDIOLITTORAL
II.1. MUDS, SANDY MUDS AND SANDS
II.2. SUNDS
II.3. STONES AND PEBBLES
II.3.1. Biocenosis of mediolittoral coarse detritic bottoms
II.3.1.1. Facies of banks of dead leaves of *P. oceanica* and other phanerogams
II.4. HARD BEDS AND ROCKS
III.INFRALITTORAL
III.1. SANDY MUDS, SANDS, GRAVELS AND ROCKS IN EURYHALINE AND EURYTHERMAL ENVIRONMENT
III.1.1. Euryhaline and eurythermal Biocenosis
III.1.1.4. Association with *Zostera noltii* in euryhaline and eurythermal environment
III.1.1.5. Association with *Zostera marina* in euryhaline and eurythermal environment
III.2. FINE SANDS WITH MORE OR LESS MUD
III.2.1. Biocenosis of fine sand of high level
III.2.2. Biocenosis of well sorted fine sands
III.2.2.1. Association with *Cymodocea nodosa* on well sorted fine sands
III.2.2.2. Association with *Halophila stipulacea*
III.2.3. Biocenosis of superficial muddy sands in sheltered waters
III.2.3.4. Association with *Cymodocea nodosa* on superficial muddy sands in sheltered waters
III.2.3.5. Association with *Zostera noltii* on superficial muddy sands in sheltered waters
III.3. CORSE SAND WITH MORE OR LESS MUD
III.4. STONES AND PEBBLES
III.5. *POSIDONIA OCEANICA* MEADOWS
III.5.1. *Posidonia oceanica* meadows (association with *Posidonia oceanica*)
III.5.1.1. Ecomorphosis of stripped meadows
III.5.1.2. Ecomorphosis of “barrier-reef” meadows
III.5.1.3. Facies of dead matte of *Posidonia oceanica* without important epiflora

Fig. 5. Extract from Reference list of Mediterranean habitats (UNEP-MAP-RAC/SPA. 1999), only those habitats in connection with marine magnoliophyta are indicated.

As these assemblages are generally small in size, they can only be identified with high (metric) precision mapping.

The selection of physical layers may been to be an interesting approach within the general framework of mapping marine habitats so as to reduce the processing time but it is of little use for the Mediterranean meadows in asfar as none of the classical physical parameters (e.g. substrate, depth, hydro dynamism, or salinity) are discerning enough to forecast the distribution of species (Fig. 6).

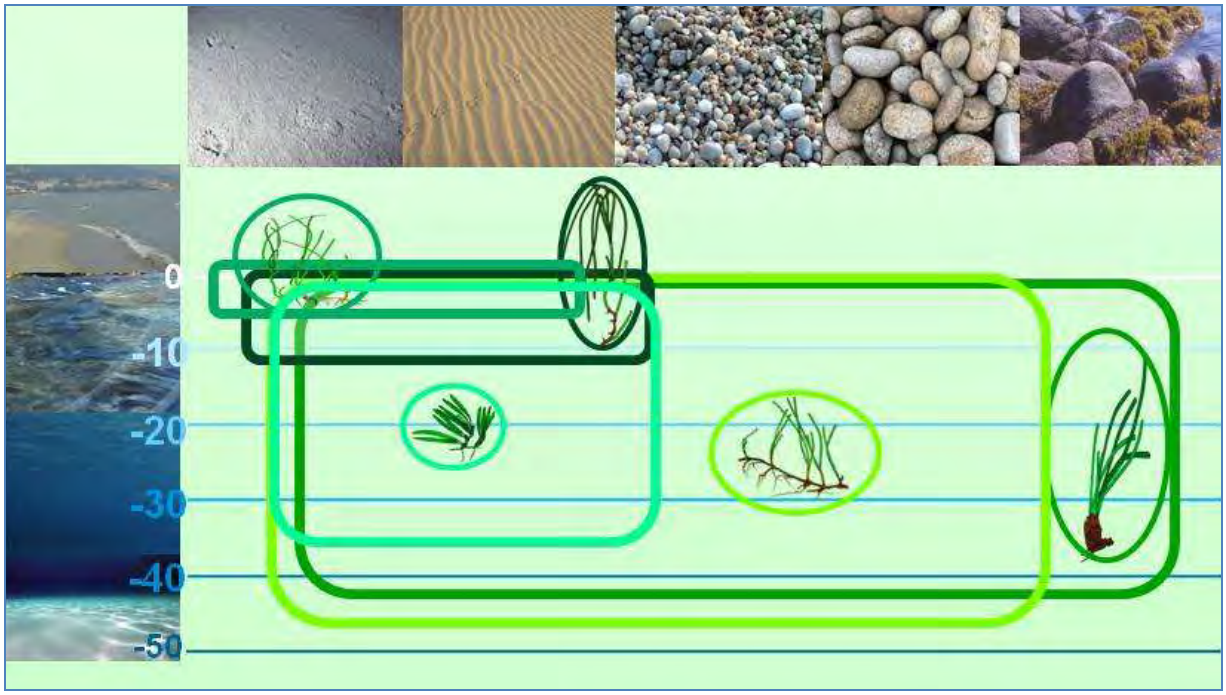


Fig. 6.Distribution of the marine magnoliophyta species depending on the nature of the substrate and the depth in the Mediterranean.

The data integration and modeling stage will differ depending on the survey tools and the acquisition strategy used. In view of their acquisition rapidity, aerial techniques usually make it possible to completely cover the littoral and the shallow intertidal zones which are to be mapped and this greatly reduces interpolation. Inversely, surveys from vessels which are often limited because of the time factor and costs involved, only rarely make it possible to obtain a complete coverage of the site. Coverage under 100 % automatically means that it is impossible to obtain high resolution maps and therefore interpolation techniques have to be used so that from partial surveys a lower resolution map can be prepared (MESH project 2008, Fig. 7).
An “overlapping” survey strategy combining a partial coverage of a large surface area and a more detailed coverage of smaller zones of particular interest could be an interesting compromise.

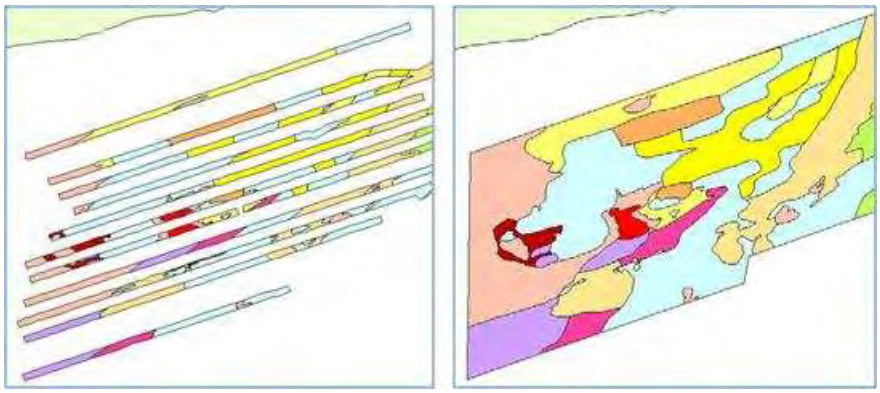


Fig. 7: Example of partial coverage survey (left) and produced through interpolation (right). The area surveyed was approx. 20 km wide (MESH project, 2008).

To obtain a potential meadows distribution map, it might be useful to have precision mapping only of the extension limits (upper and lower) of the population, and the presence between these two limits could be reduced to occasional investigations and interpolation could play its part. (Pasqualini *et al*., 1998).The processing and digital analysis of data (whether optical or acoustic) makes it possible on the basis of in situ observations to create plots which associate tonalities of grey, facies or textures with a type of population and to generalize this information to the whole image thus creating the map which in turn should at least make it possible to identify the loose substrates, hard substrates and the magnoliophyta meadows. Specific processing (e.g. analysis of the roughness, filtering and thresholding) make additional information accessible such as the seagrass cover or the presence of anthropogenic traces (Pasqualini *et al.,*1999).

To facilitate a comparison of the sites, a single graphic representation should be adopted for each type of population (Fig. 8). When the cartographical precision is good enough, it is possible to indicate the discontinuous meadows which are characterized by a coverage below 50 %, (the colour of the spots makes it possible to identify the species concerned) or the two main species which constitute a mixed meadow. As for *Posidonia oceanic* striped meadows and the atolls, no representative plan is envisaged as these are typical forms (bands, circular structures) which are easily identifiable.

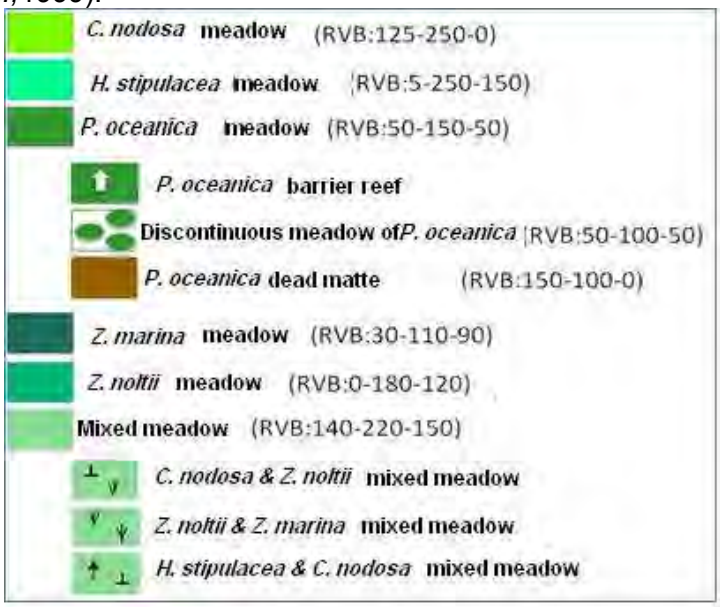


Fig.8: graphic representation of the main marine magnoliophyta assemblages. RVB: values in red, green and blue for each type of meadow.

The results should be integrated into the GIS (Geographical Information System) so that they can be consulted and used later on much more easily.

Thus by making a comparison with previous data (bibliographical data), it is possible to note any changes in some of the populations over a period of time (Mc Kenzie *et al.,* 2001; Barsanti *et al.*, 2007).

The reliability of the map produced should also be questioned. Several evaluation scales have already been proposed and may be useful for the magnoliophyta meadows. Denis *et al.*, 2003, propose a reliability index of the bibliographical cartographical data based on the map scale (scale of 5; Fig. 9), the mode of positioning (scale of 5; Fig. 9) and the observation acquisition method (scale of 10; Tab. 3).

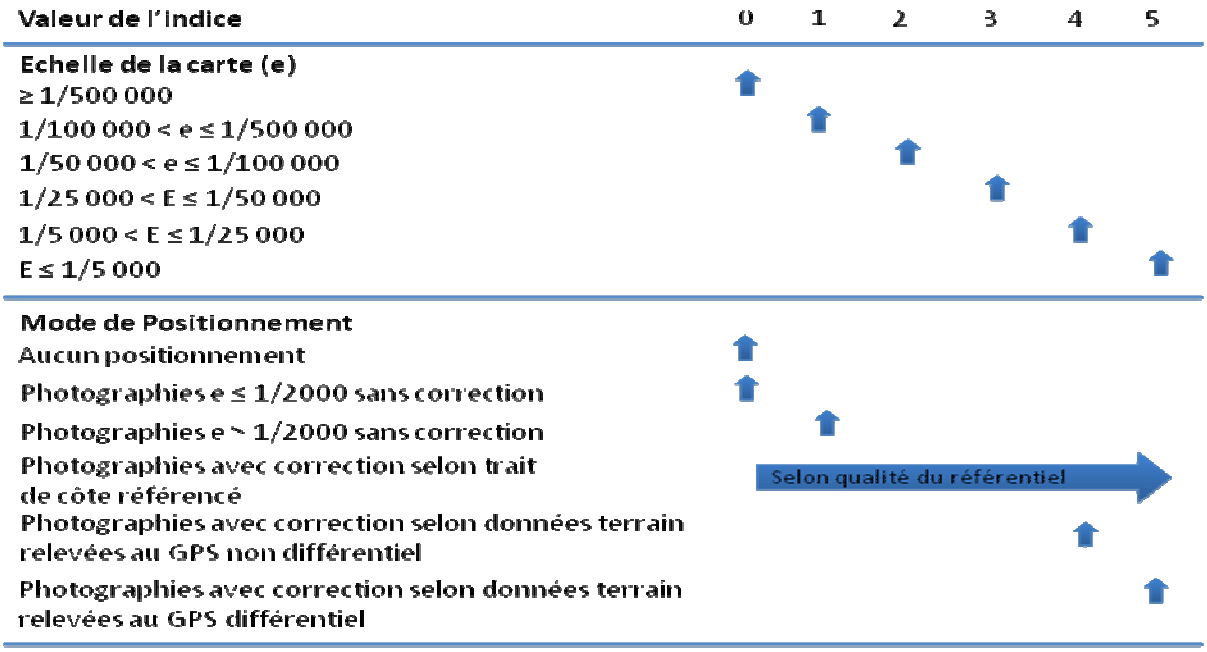


Fig. 9: Attribution criteria of the scale/rating corresponding to the parameter "map scale" and to the "mode of positioning" parameter of the reliability index of old maps (according to Denis *et al.*, 2003 modified).

The reliability index (from 0 to 20) can vary from one point to another of the map depending on the bathymetry or the technique used. Pasqualini (1997) proposes a reliability scale in relationship to the image processing of the aerial photos (Tab. 4.) which can also be applied to satellite images or another one in relationship to the processing of sonograms (Tab. 5). Reliability lower than or equal to 50 % means that the author should try to improve the reliability (increasing the number of segments during image processing for example) or else the scale needs to be adapted. Even though this is hardly ever mentioned, apart from the map, it seems to be important to provide information on the distribution, the number and the percentage of data acquired so as to distinguish between what is interpolation and what is the actual field data.

Tab. 3: Attribution criteria of the scale corresponding to the "data acquisition mode" parameter of the reliability index of old maps (Denis *et al.,* 2003).

Profondeur de 0 à 5 m						
Mode d'acquisition	**Sonar**	**Prélèvement, observations ponctuelles, balisage, etc.**		**Images satellites**	**Photographies aériennes ou Images satellites + vérités-terrain**	**Photographies aériennes + vérités terrain**
Note (/10)	0	0 à 6 selon la maille (M)		6	8	10
		M ≥ 1000 m	0			
		1000 m > M ≥ 500 m	1			
		500 m > M ≥ 250 m	2			
		250 m > M ≥ 100 m	3			
		100 m > M ≥ 50 m	4			
		50 m > M ≥ 20 m	5			
		20 m > M	6			
PROFONDEUR DE 5 A 15 m						
Mode d'acquisition	**Prélèvement, observations ponctuelles, balisage, etc.**		**Images satellites**	**Photographies aériennes ou Images satellites + vérités-terrain**	**Sonar**	**Photographies aériennes et/ou sonar+ vérités terrain**
Note (/10)	0 à 6 selon la maille (M)		4	6	8	10
PROFONDEUR DE 15 A 40 m						
Mode d'acquisition	**Photographies aériennes**	**Images satellites**	**Prélèvement, observations ponctuelles, balisage, etc.**		**Sonar**	**Sonar+ vérités terrain**
Note (/10)	0	0	0 à 6 selon la maille (M)		8	10

Tab. 4: Attribution criteria of the reliability index of maps produced through image processing from aerial photos. *: Criterion subdivided into two elements, each being weighted with a coefficient of 0.5 (Pasqualini, 1997).

Reliability scale	**3 points**	**2 points**	**1 point**	**0 point**
CRITERIA				
Site studied				
Topography : slope Bathymetric tranche Water turbidity ; : Visualisation of populations & types of seafloors Nature of populations & types of seafloors	Low & constant 0 à 5 m 100 % of bathymetric tranche studied Very different	Low & irregular 0 à 10 m 75 % of bathymetric tranche studied Different	Strong & constant 0 à 20 m 50 %of bathymetric tranche studied Close	Strong & irregular 0 to over 20 m < 50 % of bathymetric tranche studied Very close
Film shooting				
Quality Surface effects :lens réflexion wave	Very good No surface effect	good Surface effect far from site	medium Surface effect close to site	Poor Surface effect on site
Digitalisation				
pixel size	Pixel ≤ 2m	2m < Pixel ≤ 5m	5m < Pixel ≤ 10m	Pixel > 10m
Geometrical correction				
*Control points : Number Distribution Referentiel scale / image scale	Number ≥ 20 In 4 directions Referentiel > image	20 > Number≥ 10 In 3 directions Referentiel = image	10 > Number ≥ 4 In 2 directions Referentiel < image	Number < 4 In 1 direction Referentiel << image
Field data				
Surface covered by field data / study surface area	Surface ≥ 10 %of study surface area	10 % > Surface ≥ 5 % of study area	5 % > Surface ≥ 1 % of study area	Surface < 1 % of study area
Classification				
No. of polygons per population or type of seafloor	number > 30	30 ≥ number > 15	15 ≥ number > 5	number < 5
Total	**33**			

Tab. 5: Attribution criteria of reliability index of maps prepared through sonogram processing (Pasqualini, 1997).

Reliability scale	**3 points**	**2 points**	**1 point**	**0 point**
CRITERIA				
Site studied				
Nature of populations & types of seafloors	Very different	Different	Close	Very close
Topography : slope	Low & constant	Low & irregular	Stropng & constant	Strong & irregular
Acquisition of sonograms				
Quality Présence of artéfacts	Very good No artéfact	Good Some artifacts on edges of sonogram	Medium Some artifacts over whole sonogram	Poor many artifacts over whole sonogram
Positioning of sonograms				
Precision	Precision = 1 m	1m < Precision ≤ 10m	10m < Precision ≤ 20m	Precision > 20m
Recovery of sonar profiles				
Surface prospected with sonar / Surface area studied	100 % of study area	Over 50 % of study area	Over 25 % of study area	Less than 25 % of study area
Field data				
Surface area covered by field data / study surface area	Surface ≥ 10 % of study area	10 % > Surface ≥ 5 % of study area	5 % > Surface ≥ 1 % of study area	Surface < 1 % of study area
Interpretation precision				
Manual Interpretation (scale of sonograms)	1/500	1/1 000	1/2 000	1/4 000
Or image processing (digitalisation)	Pixel ≤ 1m	1m < Pixel ≤ 2m	2m < Pixel ≤ 3m	Pixel > 3m
TOTAL	**24**			

3. Case Studies

The following summarized case studies do not constitute “turnkey solutions” for the managers and decision-makers who want to map the magnoliophyta meadows, in asfar as preparing a map is always the result of a compromise between:

- The surface area to be processed (country, region, site)
- The desired precision, not only for the surface area but also in view of the mapping objectives and the means available
- The bathymetric tranche concerned
- The technical means available, the necessary competences to implement the techniques, the time required and the available budget
- Regulatory constraints (e.g. fly-over authorization, navigation restriction)

- Later use of data (e.g. integration into a GIS, scheduled monitoring in time, comparison with other existing or programmed cartographical data).

All these, however, are practical operations carried out in the Mediterranean for which the implementation costs are available for the sake of information. Even though several authors tried to assess the economic costs pertaining to the use of one or other of the surveying techniques (Mumby *et al.*, 1999; Denis *et al.*, 2003; Pin *et al.*, 2008; Godet *et al.*, 2009), the values obtained are difficult to transpose to other sites.

a) Distribution of *Posidonia oceanica* meadows along the coast of Corsica (Pasqualini, 1997)

Objective: Management and planning of the area - to have a general distribution map of the *P. oceanica* meadows and the main types of seafloors along the coast of Corsica.

Surface area to be mapped: whole coastline (1000 km)
Bathymetric tranche: 0 to -40 m
Expected precision: from 10 to 50 m linear
Regulatory constraints: presence of several protected areas and a military base

Surveying Tools:
- Superficial tranche (0 to -15 m): 650 aerial photos at 1/20 000 + field data.
- Deep tranche (20 to -40 m): 2 oceanographical seasons using side-scan sonar (i.e. approx. thirty mission days and 1200 km of profile) + field data.

Data Processing:
Aerial photographs (24 x 24) digitalized with an A3 scanner in 16.8 million colour, with a pixel of 5 m (102 dpi). Image processing with the Multiscope (® Matra CapSystem) software. Supervised classification. Geographical referential: BD-Ortho (®IGN).
Manual processing of sonograms for the position of the lower limit and image processing for the coverage and the presence of anthropogenic traces. Geographical referential: route of vessel – Differential GPS.
Implementation Time:
36 man/months - work of a thesis student + supervision.
Cost: 130 000 €
Results:
Identification of soft substrates, hard substrates, continuous *P. oceanica* meadows and meadow mosaics (weak coverage degraded meadow or mixed meadows with *P. oceanica* and other magnoliophyta).

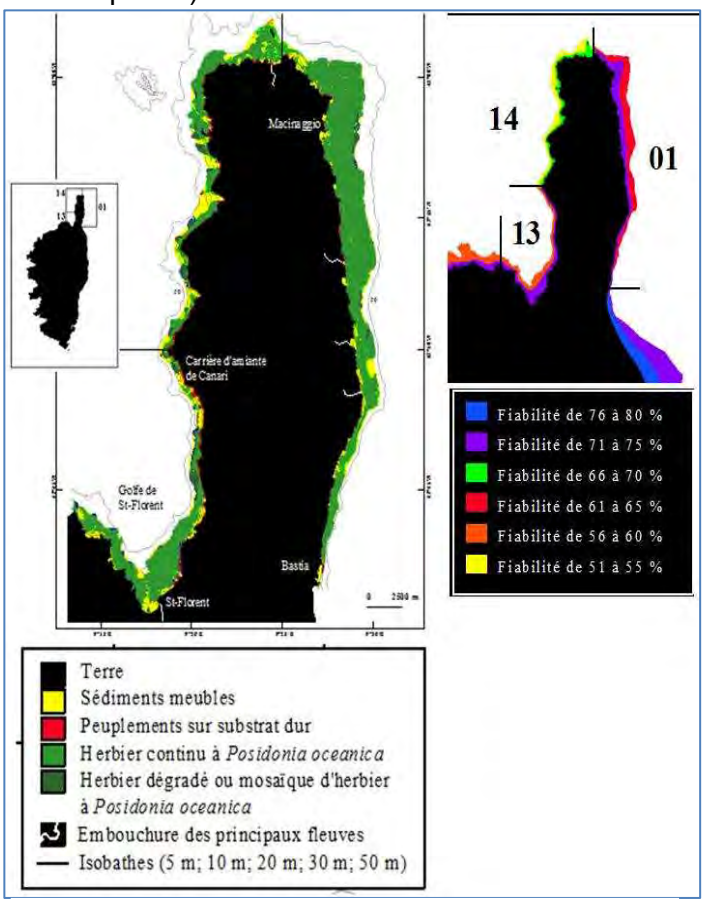


Fig. 10: Map of main populations and types of seafloors (left) and Reliability map (right) of Cap Corse (Pasqualini, 1997).

b) Cartographie de la limite supérieure des herbiers de Tunisie (PNUE-PAM-CAR/ASP, 2009b)

Objective: Management and development of an area: - to have a fairly precise map of the upper limits of magnoliophyta meadows for the medium term monitoring of anthropogenic pressures.

Surface area to be mapped: sector between Port El Kantaoui and Monastir (25 km)
Bathymetric tranche: 0 to -15 m
Expected precision: from 5 to 10 m linear
Regulatory constraints: administrative authorizations
Surveying Tools:
Satellite images SPOT 5 in 2.5. m and Google Earth + surface observations (*bathyscope*) and free diving.
Data processing:
Image processing with the ENVI IV® software supervised classification. Geographical referential. GPS points for limit monitoring.
Implementation time: 8 man/days
Costs: 6 000 €

Results:
Identification of natural and anthropogenic impacts, soft substrates, hard substrates, *C. nodosa* and *P. oceanic* meadows.

Preparation of a reference map (Fig. 11).

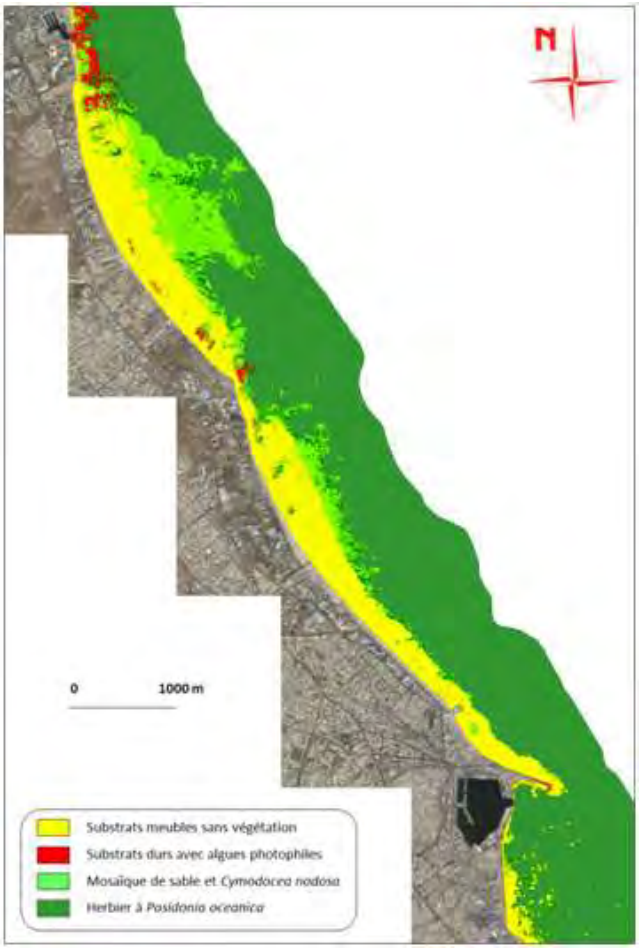


Fig. 11: Map of main populations and types of seafloors of the littoral towards Port El Kantaoui (UNEP-MAP-RAC/SPA, 2009c).

c) Mapping of magnoliophyta meadows at the aquaculture installation in the Balearic Islands (Delgado *et al.*, 1999)

Objective: Monitoring of impact of anthropogenic activity – To have a precise map of the seafloors at the aquaculture installations set up on the meadows so as to evaluate any impacts.

Surface area to be mapped: 100 m transects in the area where aquaculture structures were set up (< 2000 m2).

Bathymetric tranche: from -5 to -8 m
Expected precision: from 1 to 2 m linear

Regulatory constraints: authorizations required from the operator

Surveying Tools: Transects dealt with using free scuba diving + samples taken

Data Processing: Manual data processing (Fig. 12).

Implementation time:2 men/days per year, with monitoring over several years.
Cost: 5 000 €

Results:
Identification of loose substrates, *C. nodosa* and *P. oceanica* meadows and their state of health (Fig. 13).Visualization of impact of aquaculture activity on the meadows over several years.

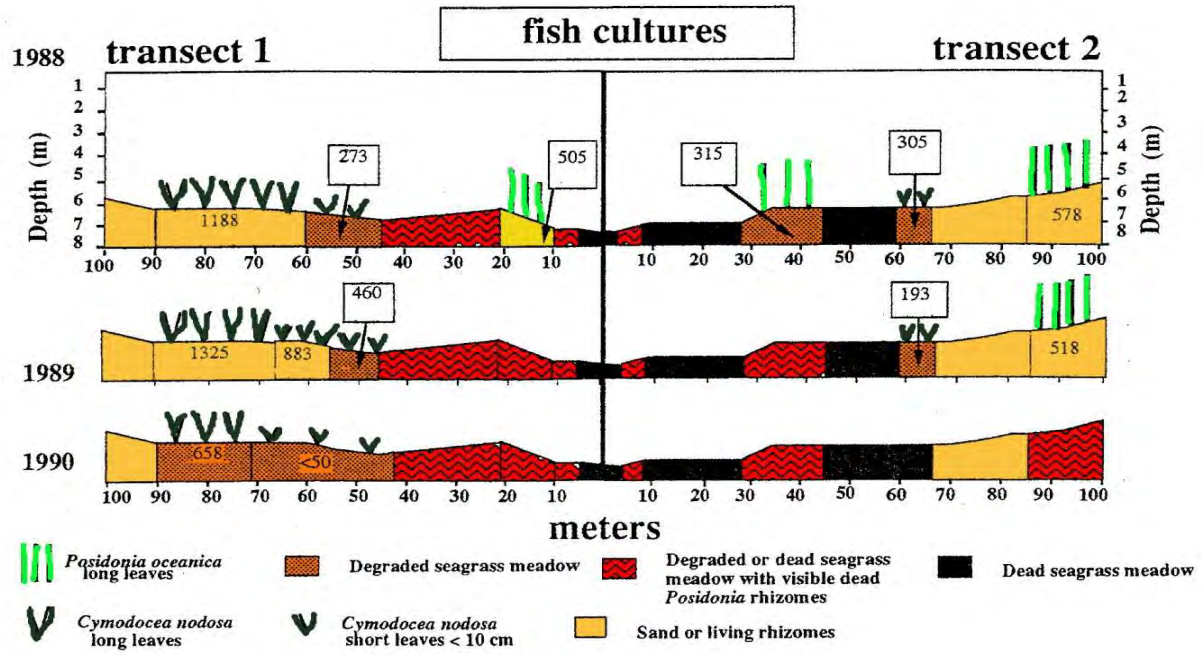


Fig. 12: Representation of populations and types of seafloors at the aquaculture installations and changes in 1988, 1989 to 1990 (Delgado *et al.*, 1999).

d) Mapping of magnoliophyta meadows in view of the organized berthing in Corsica (Salivas-Decaux *et al.*, 2008).

Objective:
Reducing the impact of an anthropogenic activity – to have a precise map of the meadows so as to prepare a sensitivity map of the populations vis-à-vis foreign berthing and to propose installing organized berthing in less sensitive sectors.
Surface area to be mapped: 0.03 km² bay
Bathymetric tranche: from 0to -15 m
Expected precision: 1 to 2 m linear
Regulatory constraints: none
Surveying Tools: Aerial photos at 1/5 000 + field data from the surface (*bathyscope*) and free scuba.

Data Processing:
Aerial photos (24 x 24) digitalized with an A3 scanner in 16.8 million colors, with a pixel of 1 m (127 dpi). Image processing with ENVI IV® software.
Implementation time: 10 man/days
Cost: 4 000 €
Results:
Identification of loose substrates, *C. nodosa* and *P. oceanic* meadows and their state of health (degraded meadows and dead mats (Fig. 13). To prepare a sensitivity map to berthing impacts and to propose an installation plan for organized berthing.

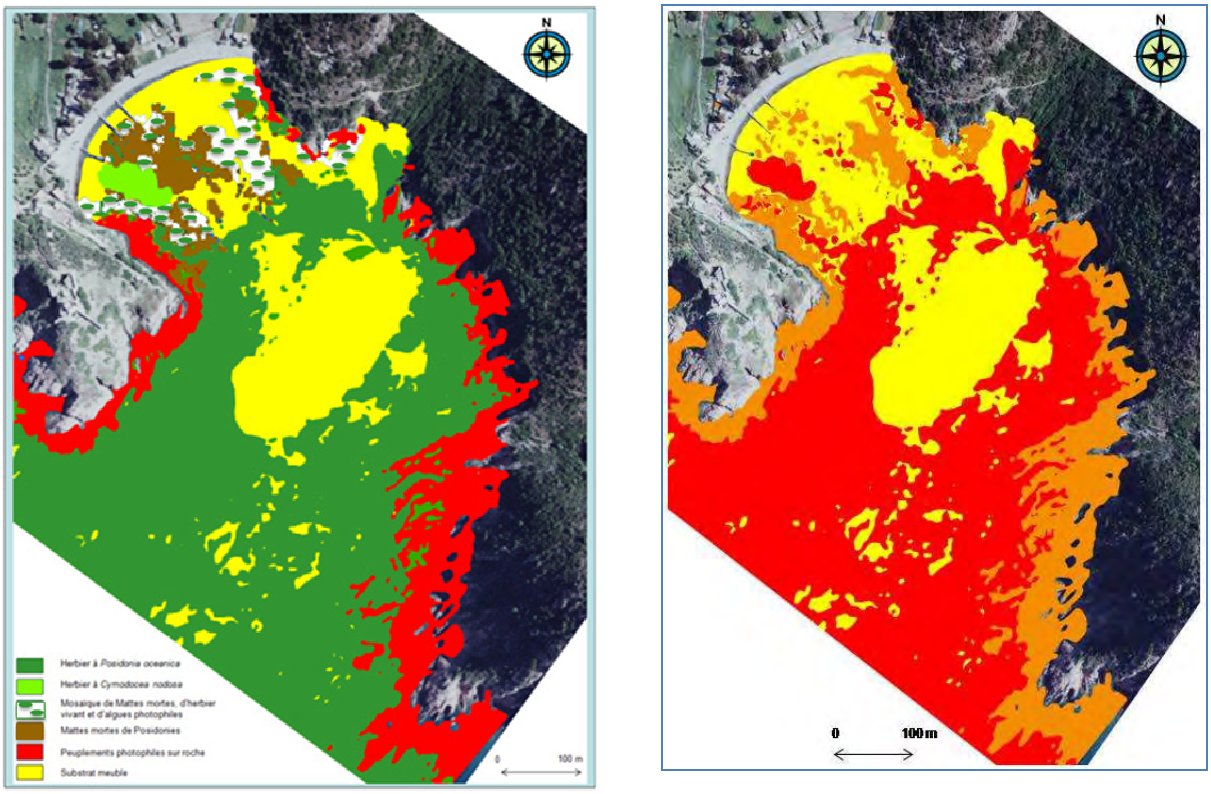


Fig. 13: Map of main populations and types of seafloors at the Girolata bay (left and map of sensitivity to berthing (right). Setting up berthing installations should be considered in the yellow sectors - Salivas-Decaux *et al.*, 2008).

Proposals for Guidelines for monitoring magnoliophyta meadows in the Mediterranean

1. Problem

The monitoring of marine magnoliophyta has today become a necessity and even an obligation for numerous Mediterranean countries due to the fact that:

- Four out of the five species present in the Mediterranean (*C.nodosa*, *P. oceanica*, *Z. marina* and *Z. noltii*) are in Annex 2 (List of endangered or threatened species) of the Protocol concerning Specially Protected Areas and Biological Diversity (Decision of the 16thOrdinary meeting of the Contracting Parties, Marrakech, 3-5 November 2009; UNEP-MAP, 2009),

- Three (*C. nodosa, P. Oceanica* and *Z. marina*) are in Annex 1 (strictly protected flora species) of the Bern Convention concerning the Mediterranean geographical region and

- The marine magnoliophyta meadows constitute one of the priority natural habitats of the European Directive No. 92/43 (EEC, 1992).

This regulatory “recognition” also means that efficient management measures are required to ensure that these habitats and the constituent species are and remain in a satisfactory state of health to look after them.

2. What steps to be taken?

What is to be done next is to set up a marine magnoliophyta meadows monitoring system comparable to that for mapping with the following stages:

- Initial planning
- Setting up the monitoring system
- Monitoring over time and analysis

The initial planning is to define the objective(s) and to determine the duration, identify the sites to be monitored, choose the parameters to be implemented with their acquisition modalities (sampling strategy) and evaluate the human, technical and financial needs to ensure implementation and sustainability. This phase therefore is not to be minimized.

The setting-up phase constitutes the actual operational phase as this is when the necessary monitoring structures will be set up (e.g. fixed markers) and may turn out to be expensive (equipment necessary for going out to sea, equipment and human resources) especially under difficult weather conditions.

This must be planned for a favorable season especially as depending on the parameters chosen for monitoring purposes, return trips must be undertaken during the same period. This phase might be quite long especially if numerous sites are to be monitored.

Monitoring over a period of time and the analysis phase seem to be easy as data acquisition is a routine operation with no major difficulties if the preceding phases had been carried out correctly (e.g. evaluation of needs). It often constitutes the key element of the monitoring system as it makes it possible to:

- Interpret the acquired data
- Demonstrate its validity and interest and
- Check that the monitoring objectives have been attained.

This phase may be quite complex as the data analysis necessitates clear scientific competence and in order to be useful, it must be envisaged over the medium term at least.

a) Monitoring – why and how?

The aim of monitoring the marine magnoliophyta is generally to:

- Monitor to preserve and conserve the heritage, with the aim of ensuring that the meadows as priority habitats are in a satisfactory state of conservation and also identify as early on as possible any degradation of these priority habitats or any changes in their distribution.

- Initiate a global monitoring of the quality of the environment. The magnoliophytaare used as indicators of "biological quality "(according to the European Water Framework Directive, DCE/2000/60 CE). The "good state of the meadows" makes it possible to measure the efficacy of local or regional policies in terms of the management of the coastal environment (e.g. water treatment to be improved, less contaminants etc. Boudouresque *et al.,*2006).

- Exercise control over development works. This type of monitoring aims to establish a "zero" state before the works began, then monitor the state of health of the meadow during the development works phase or at the end of the phase to check any likely impacts.

These objectives can converge, as in the case of the Posidonia Monitoring Networks, initiated in the Region Provence-Alpes-Côte d'Azur since 1984, where the objective was the conservation of the *Posidonia oceanica* meadows and also their use as a global indicator of the quality of the marine waters (Boudouresque *et al.*,2000). The objective(s) chosen will then be the parameters of the other stages (.e.g. duration, sites to be monitored, parameters for measuring, no sampling; Tab. 6).

In general and irrespective of the objective advocated, it is judicious initially to focus on a small number of sites which are easily accessible and which can be regularly monitored (Pergent & Pergent-Martini, 1995).

Tab 6.: Monitoring criteria depending on the objectives.

Monitoring objective	Sites to be studied	Parameters to be taken into account	Monitoring duration & no data acquisition time
Heritage monitoring	Monitoring of site with little anthropogenic disturbances or reference site (i.e. Protected Areas) to glean information on the natural evolution of the environment (Pergent & Pergent-Martini, 1995)	Geographical extension limit of meadow. Parameters of state of health of meadow (e.g. cover, density, div. into plots)	Medium and long term monitoring (min. 10 years). Data acquisition at least annually for non persistent species and 2 to 3 years for perennial species. (Boudouresque *et al*.,2000)
Monitoring of quality of environment	Identify anthropogenic pressures likely to affect the quality of the environment and initiate monitoring in at least 2 sites, one reference site and one site with anthropogenic pressures most representative of the littoral studied (Pergent & Pergent-Martini, 1995)	Meadow parameters indicating the quality of the environment (e.g. turbidity, depth of lower limit, enhancement in nutrients, nitrogen content of leaves, chemical contamination, trace metals in plant.)	Medium term monitoring (at least 5 to 8 years) Data acquisition is variable depending on the species concerned (one to three years)
Impact control of development works	Monitoring of site subject to development works	Specific parameters to be defined depending on the probable consequences of the development works.	Short term monitoring (generally 1 to 2 years) Initiated before the works (« zero state ») it can be continued during, or just after, & control to be made one year after the end of the works. No data acquisition, generally reduced (monthly or occasionally before and after the development works.

The sites chosen must be i) representative of the portion of the coast studied (nature of the substrate), ii) cover the most complete possible range of situations and iii) regroup sensitive zones, stable zones or reference zones. Then, with the experience gained by the actors and the means available, this network could be extended to a greater number of sites.

Taking the marine magnoliophyta as an indicator of biological quality within the framework of the European Water Framework Directive, means that there has been an increase in the diversity of the descriptors to appraise the state of health of a meadow and thus these are parameters which can be measured. (Pergent-Martini *et al.,* 2005 ; Foden & Brazier, 2007 ;Romero *et al.*, 2007 ; Orfanidis *et al.,*2010). Some of the most common descriptors (Tab. 7) use a standardized method (especially for *P. oceanica*; Pergent-Martini *et al.,*2005),

but there are still many disparities in data acquisition despite efforts to propose a common approach (Short & Coles, 2001; Buia *et al.,* 2004; Lopez Y Royo *et al.,* 2010a).

The requirements have to be evaluated to ensure the setting up and sustainability of the system and this constitutes the ultimate stage of the planning phase and it is also the most crucial phase. To ensure the sustainability of the system means:

- Identifying the partners, competences and means available
- Planning the partnership modalities (who is doing what? when? and how?)
- Ensure training for the stakeholders so that they can set up standardized procedures to guarantee the validity of the results, and so that comparisons can be made in the course of time for a given site and also from one site to another.
- To co-opt a regional or national coordinator depending on the number of sites concerned for monitoring and their geographical distribution and
- To budgeter the minimum funding necessary for the running of the network (such as permanent payroll, procurement costs and cost of running the equipment, data acquisition, processing and analysis costs).

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta. Whenever possible, the measuring method (2), the expected response in case of increased anthropogenic pressure and the main factors likely to affect the descriptor (3), the destructive character of data acquisition (4), the species targeted (5), interest (6) or the limits of use (7) are indicated with the corresponding bibliographical references. The targeted species are: Cn - *Cymodocea nodosa*, Hs - *Halophila stipulacea*, Po - *Posidonia oceanica*, Zm - *Zostera marina*, Zn - *Zostera noltii*.

1 - Descriptor	2 - Measuring method	3 - Expected response/ factors of degradation	4 - Destruc charact	5 - Target species	6 - Interest	7 - Limits
Population information						
Extension meadow surface area	Meadow mapping (Cf. Part I of present document) &/or identification of limits (Foden & Brazier, 2007)	Diminution / Coastal developments Turbidity Mechanical effects	No	All	Descriptor integrator Usable everywhere in view of multiplicity of techniques available and for whole bathymetric tranche of distribution of meadows.	For slow growing species (Po) impossible to observe any increase in surface area in the absence of pre-positioned markers and long response time (several years). Obliged to always work during season where distribution is maximal for species with marked seasonal growth (generally in summer).
Bathymetric position of upper limit of meadow (in m)	Highly precise mapping of seagrass extension limit towards surface (Cf. Part I of present document)or placing of fixed markers (e.g. permanent transects, plots, acoustic system & measuring of depth	increase / Littoral developments	No	All	Easy-to-measure parameter. Interpretation scale available for Po (Pergent *et al*., 2008)	For Cn, Hs & Zn, strong seasonal variability necessitating quarterly monitoring or observations at same season for all sites monitored. Fixed markers might disappear if site is strongly frequented.

Tab.7: synthesis of main descriptors (1) used for monitoring marine magnoliophyta - next

1 - Descriptor	2 - Measuring method	3 - Expected response/factors of degradation	4 - Destruc. charact.	5 - Target species	6 - Interest	7 - Limits
Bathymetric position of lower limit of meadow (in m)	Highly precise mapping of meadow extension limit in depth (Cf. Part I of present document) or recording of fixed markers (e.g. permanent transects buoys, acoustic system & depth measuring.	Diminution / Turbidity	No	All	Easy-to-measure parameter not requiring any particular competence & using free scuba diving, except if acoustic system is used Interpretation scale available (Po : Pergent *et al*., 2008)	For Cn, Hs et Zn, strong seasonal variability necessitating quarterly monitoring or observations at same season for all sites monitored. Beyond 30 m depth, acquisition difficult & costly (limited submersion time, need for experienced divers and numerous interventions) fixed markers may disappear (e.g. trailing equipment). For slow growing species (Po) long time required to see any progress (several years).
Meadow lower limit type	in situ observations	Change/ Turbidity Mechanical effects (e.g. trailing equipment)	No	Po	Well studied parameter & several types described & interpretation scales (Boudouresque & Meinesz, 1982 ; Pergent, 2007 ; Monte-falcone, 2009).	Good knowledge of Po meadows necessary to identify some types of limits. Difficult & costly acquisition in great depth (> 30 m)

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta – next.

1 - Descriptor	2 - Measuring method	3 - Expected response/factors of degradation	4 - Dest. charact.	5 - Target species	6 - Interest	7 - Limits
Density (number of bundles m^{-2})	No. of beams (bundles) inside quadrant (fixed dimension & depth).quadrant size depends on species concerned. (Po see *in* Pergent-Martini *et al.*, 2005) & supposed meadow density (Duarte & Kirkman, 2001)	Diminution / Turbidity Mechanical effects (e.g. anchoring)	No	All	Easy-to-measure & inexpensive parameter. Can be used for whole bathymetric tranche of meadow distribution Interpretation scale available for Po (Pergent *et al*., 2008 ; Annex C)	Strong variability depending on depth. Long acquisition time for densities over 800 beams (bundles) Replicas necessary or sampling minimum surface area to evaluate meadow heterogeneity. Considerable risk of error if: a) manipulator is inexperienced, b) high density , c) small sized species & in such a case in situ counting can be replaced by sampling in a given area and the counting can be done in the lab. (Destructive technique).
coverage (in %)	Average percentage of surface area occupied (in vertical projection) per meadow in relationship to surface area studied. Diverse techniques to measure this parameter in situ measuring by diver or in lab. Using submarine photos or video, variable observation surface area (0.16 to 625 m^2), represented by quadrant or translucid plaque ; Pergent-Martini *et al*., 2005 ; Boudouresque *et al*., 2006 ; Romero *et al*., 2007)	Diminution / Turbidity	No	All	Rapid acquisition. If evaluation on basis of photographic data, then possibility of comparison over time period& less variability due to manipulator. Applicable to whole bathymetric tranche of seagrass distribution. Can be estimated over large surface areas based on aerial photos or sonograms (side-scan sonar)	Strong seasonal & bathymetric variability (e.g. for Po coverage of 100 % at upper limit at 40 % for lower limit for healthy meadow *in* Boudouresque *et al*., 2006). Multiples methods used do not always allow comparisons to be made of the results obtained as observation surface areas are very diverse & coverage is fractal. (Romero, comm. pers.). Sampling plan must be adapted to include spatial variability.

1 - Descriptor	2 - Measuring method	3.- Expected response/factors of degradation	4 - Destruc. charac.	5 - Target species	6 - Interest	7 - Limits
Percentage of plagiotropic rhizomes (in %)	Counting of plagiotropic rhizomes in a given surface area (which can be represented by a quadrat)	Increase/mechanical effects (anchoring, fishing gear)	No	Cn, Po	Easy, rapid & inexpensive parameter in shallow depths (0 to 20 m).interpretation scale available for Po (Charbonnel *et al*., 2000 *in* Boudouresque *et al*., 2006)	
Presence of inter-mat channels & dead mats	Highly precise mapping of site (Cf. Part I of present document, permanent square) &/or in situ observations Percentage of dead mats & live meadow can be used as a perturbation index. (CI = L/(L+D) ; CI : index of conservation, L : meadow surface area , D :surface area dead mats ; Moreno *et al.*, 2001 *in* Boudouresque *et al*., 2006).	Increase/mechanical effects anchoring, fishing gear	No	Po	Easy-to-use parameter. Possible to quantify surfaces areas in view of mapping techniques used	Dead mats are natural components intrinsic to some types of seagrasses (e.g. striped meadows) & do not reflect systematically a regression of seagrasses in response to anthropogenic pressures. (Boudouresque *et al*., 2006)

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta – next.

1 - Descriptor	2 - Measuring method	3 - Expected response/factors of degradation	4 - Dest. charac ter	5 - Target species	6 - Interest	7 - Limits
Plant information						
Foliar surface area (cm².bundle), & other phenological characteristics	Counting & measuring the length & width of different types of leaf bundles. (Po : Giraud, 1979 ; Cn : Orfanidis *et al*. 2010)	Foliar surface area (Po) - Diminution / Overgrazing &anthropogenic impacts. Length of leaves.(Po & Cn) – Augmentation / nutriments enhancement	Yes	All	Easy-to-measure & inexpensive parameter. Possible to measure length of adult leaves type 1 or 2 (most external leaves) in situ & this avoids destruction of plant. ; Lopez Y Royo *et al*., 2010b)	Strong seasonal variability. Strong individual variability so necessary to measure an adequate number of bundles.
Necrosis on leaves (in %)	Percentage of leaves with necrosis, through observation in lab. (Romero *et al*., 2007)	Augmentation / More contaminants	Yes	Po	Easy-to-measure & inexpensive parameter	Necrosis very rare in some sectors of the Mediterranean (e.g. Corsica littoral)
State of apex	Percentage of leaves with broken apex	Augmentation / overgrazing	No	Po	Easy-to-measure & inexpensive parameter.	Of little use in case of strong hydrodynamism & on old leaves
Foliar production (in mg dry weight. bundle.$^{-1,}$ .yr^{-1})	With Po: possibility, thanks to lepidochronology, to ascertain number of leaves produced in a year, at present or in the past. (Pergent, 1990). Other species, measuring leaves through markings or by using the relationship length/foliar growth of bases/ (Zm; Gaeckle *et al*., 2006).	Diminution / en nutrients deficit, increase in interspecific competition	Yes & No (Zm)	All	For Po lepidochronology makes it possible to work over whole bathymetric tranche & interpretation scale is available (Pergent *et al*., 2008). For Zm the relationship length of bases & foliar growth makes it possible to have in situ non destructive measuring.	For other species parameter takes long to acquire & necessitates monthly monitoring or at least for 4 seasons. (Gaeckle *et al*., 2006).

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta – next.

1 - Descriptor	2 - Measuring method	3 - Expected response/factors of degradation	4 - Dest. charac ter	5 - Target specie s	6 - Interest	7 - Limits
Production of rhizomes (in mg dry weight. bundle.-1, .yr-1)	With Po: possibility, thanks to lepidochronology, to ascertain rate of growth or biomass per year.	Augmentation / Accumulation of sediments due to littoral developments	Yes	Po	Parameter independent of season	Interpretation sometimes difficult as rhizome production increase can be observed in reference sites in the absence of anthropogenic impact.
Recession or burying of rhizomes	Measuring degree of recession or burying of rhizomes measured (value in mm) or percentage of buried or receded bundles on a given surface area	Augmentation in burying / Accumulation of sediments due to littoral developments urban effluent discharge, presence of marine farms and dredging rejects, Recession increase / Deficit in sediments due to littoral developments	No	All	Recession or burying easy to measure in situ, non destructive & inexpensive Parameter independent of the season	

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta – next.

1 - Descriptor	2 - Measuring method	3 - Expected response / factors of degradation	4 - Destruct. charact	5 - Target species	6 - Interest	7 - Limits
Epiphytes of leaves (in mg dry weight bundle.-1 or % dry weight bundle.-1).	Several measurements possible : evaluation of biomass (µg bundle-1, after scraping, drying & weighing), of nitrogen content (in % dry weight ; measure using simple analyser CHN ; Romero *et al*., 2007)	Augmentation / Increase in nutrients contribution of rivers, (Fernandez-Torquemada *et al.*, 2008)	Yes	All	Easy-to-measure & inexpensive parameter (biomass).Interpretation scale available (Morri, 1991 in Pergent-Martini *et al*., 2005)	Parameters with strong seasonal & spatial variations. Parameters necessitating specific analytical equipment (nitrogen content)
Physiological or cellular information						
Nitrogen & phosphorus content of plant phosphorus (in % dry weight)	Dosage through mass spectrometry & plasma torch in different plant tissue after acid mineralisation (e.g. rhizomes of Po ; Romero *et al*., 2007)	Augmentation / Nutrient increase	Yes	All	Short response time to environmental changes	Very expensive parameter, necessitating analytical equipment & specific competence
carbohydrates content(in % dry weight)	Dosage through spectrophotometry after alcohol extraction in different plant tissues (e.g. rhizomes of Po ; Alcoverro *et al*., 1999, 2001b *in* Romero *et al*., 2007)	Diminution / anthropogenic Impact	Yes	All	Short response time to environmental changes	Expensive parameter necessitating analytical equipment and specific competence

Tab.7: Synthesis of main descriptors (1) used for monitoring marine magnoliophyta – next.

1 - Descriptor	2 - Measuring method	3 - Expected response/factors of degradation	4 - Destr. charact	5 - Target species	6 - Interest	7 - Limits
Trace metal content (in µg.g-1)	Dosage through spectrometry in different plant tissues after acid mineralisation (Salivas-Decaux, 2009).	Augmentation / More metallic contaminants	Yes	All	Short response time to environmental changes	Expensive parameter necessitating analytical equipment & specific competence
Nitrogen isotopic relationship ($\delta\ ^{15}N$ in ‰)	Dosage through mass spectrometer in different plant tissues after acid mineralisation (e.g. rhizomes of Po ; Romero *et al*., 2007)	Augmentation / Increase in nutrients from marine farms & urban effluents Diminution / Increase in nutriments from fertilizers	Yes	Po	Short response time to environmental changes	Very expensive parameter necessitating analytical equipment & specific competence
Sulphur isotopic relationship ($\delta\ ^{34}S$ in ‰)	Dosage through mass spectrometer in different plant tissues (e.g. rhizomes of Po ; Romero *et al*., 2007)	Diminution / anthropogenic Impact	Yes	Po	Short response time to environmental changes	Very expensive parameter necessitating analytical equipment & specific competence

b) What monitoring system?

Setting up a monitoring system means starting with the data acquisition phase. The observations and sampling during the acquisition phases or data validations of the cartographical surveys, could also constitute the outline of a monitoring system (Kenny *et al.,* 2003) even if it is not just limited to that and cartography could also constitute a monitoring tool (Tab.7; Boudouresque *et al*., 2006).

On a regional geographical level today there are two main types of monitoring systems: the marine magnoliophyta monitoring system (SeagrassNet) which was established on a worldwide level at the beginning of the year 2000 and which covers all the species of marine magnoliophyta (Short et al 2002 and the "Posidonia" monitoring network initiated in the Mediterranean at the beginning of the 1980s (Boudouresque *et al*., 2006) and which is specific to the *Posidonia oceanic* species but which can be adapted to other Mediterranean species and to the genus Posidonia in general. The Posidonia monitoring system is used today, with a degree of variability from one country to another and even from one region to another within the same State (Buia *et al.*, 2004; Boudouresque *et al.*, 2006, Romero et al 2007; Fernandez-Torquemada *et al.,*2008; Lopez y Royo, 2010a) in at least nine Mediterranean countries and in over 350 sites. After the work carried out within the framework of the Interreg IIIB MEDOCC programme "coherence, development, harmonization and validation of evaluation methods of the quality of the littoral environment by monitoring the *Posidonia oceanica* meadows, and the "MedPosidonia" programme set up by RAC/SPA, an updated and standardized approach for the P. monitoring network has been tested and validated (UNEP-MAP-RAC/SPA). The main differences between these two great systems are:

- Within the framework of SeagrassNet, monitoring is done along the three permanent transects, parallel to the coast and positioned respectively (i) in the most superficial part of the meadow, (ii) in the deepest part and (iii) at an intermediate depth between these two positions. The descriptors chosen (Short *et al.*, 2002; Tab.8) are measured on precise and fixed points along each of the transects every three months.

- Within the framework of the "Posidonia" monitoring system, the measurements are taken (i) at the fixed markers placed along the lower limit of the meadow, (ii) at a portion of the upper limit and (iii) at an intermediate fixed depth of -15 m. The descriptors (Tab. 8) are measured only every three years if after visual control there are no changes in the geographical position of the limits.

If the SeagrassNet makes it possible to compare the data obtained in the Mediterranean with the data obtained in other regions of the world, as it has a world coverage of over 80 sites distributed in 26 countries (www.seagrassnet.org), it is not that suitable for large-size species (Posidonia genus) and for meadows whose lower limit is beyond 25 m depth and which was set up only for one site in the Mediterranean (Pergent *et al.,* 2007).

The descriptors measured basically provide information on the state of health of the meadow concerned. The "Posidonia" monitoring system, in view of the multiplicity of descriptors identified (Tab. 7), makes it possible to compare the different meadows in the Mediterranean and also to evaluate the plant's vitality and the quality of the environment in which it grows (so that the plant is then used as a global bio-indicator). Monitoring also becomes less of a constraint as the observations can be spaced out over a period of time.

Tab.8: Nature of parameters measured within the framework of the SeagrassNet, Corsica P. Monitoring Network (RSP Corse) (Pergent *et al.*, 2007) and the MedPosidonia programme (Pergent *et al.*, 2009).

Parameters	SeagrassNet	P. Monit. Network (RSP)	MedPosidonia
Light	X	-	-
Temperature	X	-	X
Salinity	X	-	-
Lower limit	Depth	Depth, type and cartography	Depth, type, cartography
Upper limite	Profondeur	Depth, type and cartography	Cartography
Density	12 measurement along transect	Measurement at each of 11 markers	Measurement at each of 11 markers
% plagiotropic rhizomes	-	Measurement at each of 11 markers	Measurement at each of 11 markers
Receding	-	Measurement at each of 11 markers	Measurement at each of 11 markers
Cover	12 measures along transect	Along markers using (50m) video	Measurement along each of 11 markers
Phenological analysis	12 measures along transect	On 20 bundles	on 20 bundles
lépidochronological analysis	-	On 10 bundles	on 10 bundles
State of apex	-	On 20 bundles	on 20 bundles
Biomass (g. poids sec)	Leaves	-	-
Necromass	Rhizome & scales	-	-
Granulometry of sédiment	-	1 measurement	1 measurement
% organic material of sédiment	-	1 measurement	1 measurement
Trace-metal content	-	-	Ag & Hg

Other, intermediate techniques between these two methods (permanent transects with seasonal monitoring, acoustic data) can be used in particular situations like the monitoring of lagoon environments (Pasqualini *et al.*, 2006) or for the study of “relic” meadows (Descamp *et al.,* 2009).

It needs to be stressed that:

- In addition to the chosen technique, the measured parameters (Tab. 7 & 8) determine the nature of the monitoring (e.g. monitoring of chemical contamination of the environment, discharge into the sea from a treatment plant, general evaluation of a meadow’s state of health);

- No matter what parameters are chosen, particular attention must be paid to the validity of the measurements made (acquisition protocol, precision of the measurements, reproducibility, whether parameters correspond to expected monitoring data; Lopez Y Royo *et al.*, 2010a).

c) How to interpret monitoring data?

Monitoring data can be interpreted on the basis of what experts say or by comparing the measured data with the data available in the literature, either directly or through scales. The multiplication of studies on *Posidonia oceanica* (over 1000 publications indexed in the Web of Science) means that in the last few decades a growing number of interpretation scales have been set up of the most widely used parameters for monitoring this species (e.g. Giraud, 1977; Meinesz & Laurent, 1978; Pergent *et al.*, 1995b; Pergent-Martini *et al.,* 1999; Montefalcone *et al.,* 2006; Salivas-Decaux *et al.*, in press; Tab. 7).

The implementation of the Water Framework Directive in the European countries has led to:

- An adaptation of some of the scales (rating), (e.g. density *in* Pergent-Martini *et al.,* 1999) with the creation of five classes (bad, poor, moderate, good and high: Annex 3);

- The setting up of synthetic indices to provide, on the basis of a panel of different parameters, (Buia *et al.,* 2004; Pergent *et al.*2007; Romero *et al.,* 2007; Fernandez-Torquemada *et al.,* 2008; Gobert *et al.,* 2009; Lopez Y Royo *et al.,* 2009; Montefalcone, 2009) a global evaluation of the quality of the water masses based on the "marine magnoliophyta" biological quality factor. This panel or range must be based on an adequate number of parameters to avoid evaluation errors but not too many to avoid excessive costs in terms of acquisition time and the budget required. (Fernandez-Torquemada *et al.,* 2008).
  In the present state of knowledge it is difficult to opt for one or other of these synthetic indices as it has not been possible to compare them all on one single site.

Intercalibration trials between the POMI (Romero *et al.,* 2007) and POSID indices (Pergent *et al.,* 2008) have shown that there is a coherence in the classification order of the five sites studied (the Corsican sites had a higher classification than the Catalonia sites). Applying the BIPO index to 9 Mediterranean sites yields an identical classification of the Catalonia sites like the classification obtained with the POMI index (Lopez Y Royo *et al.,* 2010c). Finally, using both the POSID and BIPO indices within the framework of the "MedPosidonia" programme also yielded a similar classification of the meadows studied (Pergent *et al.,* 2009).

The POMI (Romero *et al.,* 2007) and POSID (Pergent *et al.,* 2007) indices are of interest as they are based on several parameters (respectively 14 and 8) which include different levels of organisation (of the population on a cellular level) and therefore response times which can be quite rapid and which yield information on the meadow and the mats, the plant structure and the impact of human activities through an increase in nutrients and the accumulation of trace-metals.

The BIPO index is based only on non-destructive parameters (Lopez Y Royo *et al.,* 2010b) and is particularly well suited for the monitoring of species or protected areas.

Conclusion

The approaches proposed for mapping and for monitoring marine magnoliophyta meadows are therefore similar (Fig. 14 &15) and can be divided into three stages:

- Planning
- Implementation and data acquisition
- Analysis, data interpretation and archiving

Steps to be taken for mapping marine magnoliophyta meadows

Initial Planning

Definition of mapping objectives (e.g. heritage inventory, impact study, knowledge, monitoring over a period of time)

Determination of surface area to be mapped and the necessary precision

Identification of tools to be used and the survey strategy

Evaluation of requirements (necessary means such as human, material and financial resources)

Survey data per se

Acquisition of the necessary data with complementary tools: optical methods and/or random observation for the superficial tranche (0 to -15 m), acoustic methods and/or random observations for the lower tranche (beyond -15 m).

Validation of acquired data with geo-located in situ observations which are numerous enough and distributed appropriately (e.g. with the necessary precision, heterogeneity of habitats).

Accurate archiving of data (what data, why, by whom, how and where?)

Data processing and interpretation

Data processing and classification (e.g. reference list of Mediterranean marine habitats)

Data interpretation (e.g. direct interpretation, according to what the experts say, or statistical modeling on the basis of available observations).

Preparation of map using standardized representations.

Evaluation of reliability of results (e.g. quality of the bibliographical data used, suitable surveying techniques, % of the surface area really inventoried in relationship to the mapped area, precision of positioning, heterogeneity of habitat….).

Fig. 14: Synthesis of the approach proposed for cartography

Steps to be taken for setting up a monitoring system for marine magnoliophyta meadows

Initial planning

Definition of monitoring objectives (e.g. control within the framework of developments in the environment, monitoring for regulatory purposes, monitoring over a period of time of trends for heritage and conservation reasons.

Locating sites to be monitored

Identifying parameters to be taken into account by targeting different levels of organization (e.g. population, individual, and cell) and setting up a sampling strategy.

Evaluation of requirements (necessary human, material and financial resources).

Setting up the monitoring system

Positioning of structures to ensure monitoring over time (e.g. fixed markers, buoys, transects…).

Acquisition of parameters chosen at the initial phase and establishing a reference report or initial report for each of the monitored sites.

Regular return visits to the sites in line with the monitoring strategy and enhance the chosen parameters.

Data processing and interpretation

Measurements made in situ to be analyzed and archived

Data interpretation (.e.g. according to the experts, direct interpretation through comparison with data from the literature or through the interpretation grids or existing indices).

Checking that the results obtained respond to the monitoring objectives (reliability and reproducibility of the results, valid interpretations and coherence with the observations made).

Fig. 15: Synthesis of approach proposed for monitoring.

There are no ideal methods for mapping or universal parameters for the monitoring of marine magnoliophyta meadows but rather a great diversity of efficient and complementary tools. They must be chosen depending on the objectives in mind and the species present and the local context.

As for cartography, an integration into a Geo-referenced Information System which can be freely consulted (like MedGIS implemented by RAC/SPA), is to be recommended and should be encouraged, so that the data acquired becomes available to the wider public and can be of benefit to the maximum number of users.

As for effective monitoring, this should be done over a period of time even if it means limiting the number of sites being monitored and the number of parameters. The parameters should be adequate enough to avoid errors of interpretation but sufficiently reduced in numbers to ensure permanent monitoring. The nature of the parameter is less important than reproducibility, reliability and the precision of the method used for its acquisition.

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Annex 1 – Keynote presentation at the Roundtable, organized by RAC/SPA in Hvar (September 2009)

Context

3rd Mediterranean Symposium on marine vegetation (Marseille 2007)

Creation of a tool-box for studying seagrasses

Proposition of guidelines for the mapping and the monitoring

Questionnary

Mapping

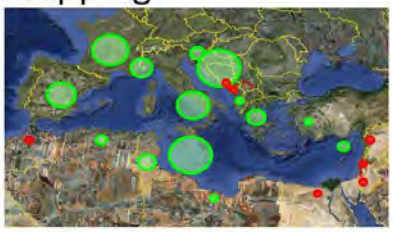
- How the situation is?
- Are there methods?
- For each, is it necessary to propose a standardization?
- Are they relevant for all the Mediterranean species?
- Are they applicable in each mediterranean countries?
- Avantages and limits?

Monitoring

- How the situation is?
- Are there methods?
- For each, is it necessary to propose a standardization?
- Are they relevant for all the Mediterranean species?
- Are they applicable in each mediterranean countries?
- Avantages and limits?

Mapping

Present situation ?



Main methods used

http://www.ifremer.fr/posidonia/

MESH MAPPING EUROPEAN SEABED HABITATS

http://www.searchmesh.net/

Is standardization useful or required ?

Monitoring

Present situation ?

Existing methods

Descriptors of Posidonia oceanica meadows: Use and application. C. Pergent-Martini a, V. Leoni a,*, V. Pasqualini a, G.D. Ardizzone b, E. Balestri c, R. Bedini d, A. Belluscio b, T. Belsher e, J. Borg f, C.F. Boudouresque g, S. Boumaza h, J.M. Bouquegneau i, M.C. Buia j, S. Calvo k, J. Cebrian l, E. Charbonnel g, F. Cinelli c, A. Cossu m, G. Di Maida k, B. Dural n, P. Francour o, S. Gobert i, G. Lepoint i, A. Meinesz o, H. Molenaar o, H.M. Mansour p, P. Panayotidis q, A. Peirano r, G. Pergent a, L. Piazzi c, M. Pirrotta k, G. Relini s, J. Romero t, J.L. Sanchez-Lizaso u, R. Semroud h, P. Shembri f, A. Shili v, A. Tomasello k, B. Velimirov w

➔ Is a Mediterranean Monitoring System possible ?

Annex 2 – Summary of the Roundtable, organized by RAC/SPA in Hvar (September 2009)

« Standardization of methods for mapping and monitoring seagrasses in the Mediterranean region»

Chairs: Christine Pergent-Martini & Aslam Djellouli
Rapporteur: Cecilia Lopez y Royo

The context

The RAC/SPA is responsible at regional level of the implementation of the conservation Action Plan of the Mediterranean marine vegetation. During the 3rd Mediterranean Symposium on marine vegetation, in Marseille, in March 2007, a general request was formulated: the development of a common tool-box for monitoring seagrass.
The RAC/SPA therefore proposes to develop, together, guidelines for the development of this common toolbox to map and monitor seagrasses at Mediterranean level.

For this purpose, and in the context of this roundtable, a basic questionnaire has been prepared:

Mapping	Monitoring
• How the situation is?	• How the situation is?
• Are there methods?	• Are there methods?
• For each, is it necessary to propose a standardization?	• For each, is it necessary to propose a standardization?
• Are they relevant for all the Mediterranean species?	• Are they relevant for all the Mediterranean species?
• Are they applicable in each mediterranean countries?	• Are they applicable in each mediterranean countries?
• Avantages and limits?	• Avantages and limits?

Discussion

Mapping

The present situation has been illustrated in Christine Pergent Martini's presentation (morning session). There is certain coverage in N Mediterranean, however is this sufficient?

A variety of methods have been adopted to map seagrass beds, which mainly include satellite images, aerial photography, Side Scan Sonars, ROVs, field measures, etc.

Concerning standardization of mapping methods, two research projects have approached the subject:

- An Interreg project, which compares the different mapping methods in terms of aim, cost and reliability.

- The MESH programme, which developed guidelines on the ability in Europe to map seagrass, however information on the Mediterranean is scarce.

The issue of cost of mapping entire coastlines was raised. In this context, the reduction of areas to be mapped is inevitable, however it is essential to keep in mind the importance of following a rationale in the selection of areas (i.e. reference sites vs impacted sites).

In addition, although financial limitations are an important issue, these do not prevent laboratories and research institutes to agree on a common tool-box of methods.

No additional comments were made concerning mapping methods.

Monitoring

The present situation has been illustrated in different presentations during the morning session. Operational *P. oceanica* monitoring networks result in a good coverage of the NW Mediterranean, and have been developed in certain areas of the southern and eastern Mediterranean. However there are important geographical gaps, in which it would be interesting to develop additional monitoring networks.

Methods to monitor seagrass, in particular *P. oceanica*, are numerous and varied. A published paper clearly summarises the different descriptors and methods adopted around the Mediterranean (Pergent-Martini *et al*., 2005).
Considering this variety of methods, is it possible to develop a common toolbox of methods and to develop a Mediterranean monitoring network?

In terms of standardisation of methods to measure desciptors, two aspects have to be considered:

- The definition of a descriptor and,
- The method to measure this descriptor.

Is it necessary to adopt a unique definition of common descriptors (e.g. cover)? A single common definition for each descriptor would be in line with the Mediterranean regional approach. However it is difficult to reach given different labs' expertise and habits.
Is it necessary to standardize methods to measure descriptors? A strong request was expressed by managers, for experts to reach standardization at least for the most commonly used descriptors.

The issue of number and type of descriptors to be used in a monitoring programme was also raised. The choice of descriptors has to clearly correspond to the objectives of the monitoring programme, in terms of type of information required, timeframe, etc.
Ideally the common toolbox of methods should contain protocols for a certain number of descriptors. Therefore, all or part of this toolbox will be included in the monitoring network (in relation to its objectives).

In addition, the experimental design with which you measure these parameters is essential too. The adoption of an inadequate experimental design could lead to data interpretation errors.

Proposals

- Fred Short: to create a hierarchy of parameters. A hierarchy of parameters that can be measured by all, according to the information they provide. This would allow to request financial support step by step, as well as to report results in a visible way to managers.
  However, the parameters included in the hierarchy should have a clearly defined protocol.
- As a clearly defined protocol has been defined for the MedPosidonia programme, can't this protocol be used as the basis to discuss the development of the common toolbox of methods to map and monitor seagrass in the Mediterranean?

Conclusions

The protocol of the MedPosidonia programme and the SeagrassNet manual that are available online (RAC/SPA and SeagrassNet websites) could be used to build this common tool-box.

Christine Pergent-Martini is available to discuss this protocol further with all the scientific community.

Annex 3 – Grids of interpretation into five classes of few descriptors of *Posidonia oceanica* meadow

Meadow structure

Type of lower limit (UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
Lower limit	Progressive	Sharp C+	Sharp C-	Sparse	Regressive

Type de limite	**Main characteristics**
Progressive	Plagiotropic rhizome beyond the limit
Sharp – High cover (C+)	Sharp limit with cover above than 25%
Sharp – Poor cover (C-)	Sharp limit with cover lower than 25%
Sparse	Shoot density lower than 100 shoots/m^{-2}, cover lower than 15%
Regressive	Dead matte beyond the limit

Depth of the lower limit (in m; UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
Lower limit	> 34.2	34.2 to 30.4	30.4 to 26.6	26.6 to 22.8	< 22.8

Leaf cover (in percentage; UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
Lower limit	> 35%	35% to 25%	25% to 15%	15% to 5%8	< 5%

Shoot density (number of shoots per m²)

Depth (in m)	High	Good	Moderate	Poor	Bad
1	> 1133	1133 to 930	930 to 727	727 to 524	< 524
2	> 1067	1067 to 863	863 to 659	659 to 456	< 456
3	> 1005	1005 to 808	808 to 612	612 to 415	< 415
4	> 947	947 to 757	757 to 567	567 to 377	< 377
5	> 892	892 to 709	709 to 526	526 to 343	< 343
6	> 841	841 to 665	665 to 489	489 to 312	< 312
7	> 792	792 to 623	623 to 454	454 to 284	< 284
8	> 746	746 to 584	584 to 421	421 to 259	< 259
9	> 703	703 to 547	547 to 391	391 to 235	< 235
10	> 662	662 to 513	513 to 364	364 to 214	< 214
11	> 624	624 to 481	481 to 338	338 to 195	< 195
12	> 588	588 to 451	451 to 314	314 to 177	< 177
13	> 554	554 to 423	423 to 292	292 to 161	< 161
14	> 522	522 to 397	397 to 272	272 to 147	< 147
15	> 492	492 to 372	372 to 253	253 to 134	< 134
16	> 463	463 to 349	349 to 236	236 to 122	< 122
17	> 436	436 to 328	328 to 219	219 to 111	< 111
18	> 411	411 to 308	308 to 204	204 to 101	< 101
19	> 387	387 to 289	289 to 190	190 to 92	< 92
20	> 365	365 to 271	271 to 177	177 to 83	< 83
21	> 344	344 to 255	255 to 165	165 to 76	< 76
22	> 324	324 to 239	239 to 154	154 to 69	< 69
23	> 305	305 to 224	224 to 144	144 to 63	< 63
24	> 288	288 to 211	211 to 134	134 to 57	< 57
25	> 271	271 to 198	198 to 125	125 to 52	< 52
26	> 255	255 to 186	186 to 117	117 to 47	< 47
27	> 240	240 to 175	175 to 109	109 to 43	< 43
28	> 227	227 to 164	164 to 102	102 to 39	< 39
29	> 213	213 to 154	154 to 95	95 to 36	< 36
30	> 201	201 to 145	145 to 89	89 to 32	< 32
31	> 189	189 to 136	136 to 83	83 to 30	< 30
32	> 179	179 to 128	128 to 77	77 to 27	< 27
33	> 168	168 to 120	120 to 72	72 to 24	< 24
34	> 158	158 to 113	113 to 68	68 to 22	< 22
35	> 149	149 to 106	106 to 63	< 63	
36	> 141	141 to 100	100 to 59	< 59	
37	> 133	133 to 94	94 to 55	< 55	
38	> 125	125 to 88	88 to 52	< 52	
39	> 118	118 to 83	83 to 48	< 48	
40	> 111	111 to 78	78 to 45	< 45	

Plagiotropic rhizome (in percentage ; UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
Lower limit	> 70%	70% to 30%	< 30%		

Plant Structure

Foliar surface (in cm² per shoot), between June and July (UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
-15 m	> 362	362 to 292	292 to 221	221 to 150	< 150

Number of leaves produced by year (UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
-15 m	> 8.0	8.0 to 7.5	7.5 to 7.0	7.0 to 6.5	< 6.5

Rhizome elongation (in mm per year; UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
-15 m	> 11	11 to 8	8 to 5	5 to 2	< 2

Environment eutrophication

Nitrogen concentration in adult leaves (in percentage, between June and July; UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
-15 m	< 1.9%	1.9% to 2.4%	2.4% to 3.0%	3.0% to 3.5%	> 3.5%

Organic matter in the sediment (in percentage, fraction 0.063 mm; (UNEP-MAP-RAC/SPA, 2009b)

	High	Good	Moderate	Poor	Bad
-15 m	< 2.5%	2.5% to 3.5%	3.5% to 4.6%	4.6% to 5.6%	> 5.6%

Environment contamination (Salivas-Decaux, 2009)

Silver concentration (mg per g DW), blade of adult leaves, between June and July

	High	Good	Moderate	Poor	Bad
-15 m	< 0.08	0.08 to 0.22	0.23 to 0.36	0.37 to 0.45	> 0.45

Cadmium concentration (mg per g DW), blade of adult leaves, between June and July

	High	Good	Moderate	Poor	Bad
-15 m	< 1.88	1.88 to 2.01	2.02 to 2.44	2.45 to 2.84	> 2.84

Mercury concentration (mg per g DW), blade of adult leaves, between June and July

	High	Good	Moderate	Poor	Bad
-15 m	< 0.051	0.051 to 0.064	0.065 to 0.075	0.075 to 0.088	> 0.088

Lead concentration (mg per g DW), blade of adult leaves, between June and July

	High	Good	Moderate	Poor	Bad
-15 m	< 1.17	1.17 to 1.43	1.44 to 1.80	1.81 to 3.23	> 3.23

Annex VI – DRAFT PROPOSAL FOR STANDARDIZED METHODS FOR INVENTORYING AND MONITORING CORALLIGENOUS AND RHODOLITHS COMMUNITIES AND THEIR MAIN SPECIES

Note : The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of UNEP concerning the legal status of any State, Territory, city or area, or of its authorities, or concerning the delimitation of their frontiers or boundaries.

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Executive summary:

In the framework of the Action Plan for the Conservation of Coralligenous and other Mediterranean bio-constructions adopted by Contracting Parties to Barcelona Convention Barcelona in 2008, several priority actions are identified which relate in particular to (i) The strengthening the knowledge on the distribution and composition of these population, (ii) The compiling a database of specialists and (iii) The establishment of a spatio-temporal monitoring of coralligenous and maërl populations. However, inventory and monitoring of coralligenous and maërl raise several problems, related to the accessibility of these populations, their heterogeneity and lack of standardized protocol used by different teams working in this field. The aim of this document is to make a census of the main methods used in the Mediterranean for inventory and monitoring of coralligenous and maërl populations, , and to better understand their benefits, limitations and conditions of use.

The synthesis, which is divided into two parts (the methods of inventory and monitoring) is based on twenty sheets corresponding to protocols implemented by different Mediterranean teams Mediterranean.

The inventory of coralligenous and maërl could be apprehended at two levels:

(I) the location of population, which uses classic mapping techniques. If scuba diving is often used for small areas, it becomes unsuitable when the study area and / or the depth increase. The use of acoustic investigative methods or underwater observation systems is then necessary. However, acoustic techniques must be complemented by a large number of "field" data because often the answers reveal much more on the substrate than on populations.

(Ii) characterization of the populations, which is heavily dependent on the working scale and precision sought. Although the use of underwater photographs or video may be relevant, the use of specialists in taxonomy, enjoying a good experience in scuba diving, is often essential given the complexity of this habitat. If it is possible to estimate the abundance or coverage by standardized indices, detailed characterizations often requires the use of quadrats, transects, or even the removal of all organisms on a given surface. The presences of broken individuals, of necrosis are all factors to be considered as the precise description of the site.

Monitoring of coralligenous and maërl population relies mainly on the scuba diving but given the constraints, using other tools of investigation (ROV, towed camera ...) should be considered because it allows monitoring with less precision but on larger surfaces. Depending on the population taken into account, the techniques differ:

(I) **monitoring coralligenous population on hard substrate** requires the realization of a zero state or specific reference state, with guaranteed reproducibility of the measure over time. It requires the realization of micro-mapping and the use of descriptors. However, these descriptors vary widely from one team to another as well as their measurement protocol.

(ii) **monitoring of maërl populations and rhodoliths seabeds** can also be done in scuba diving but the observation using the ROV, towed cameras and the collection using bins are privileged because of the greater homogeneity of these populations. However, there is no method for monitoring as accurate as in the case of coralligenous hard substrate because the action of hydrodynamics may cause a shift on the seabed.

Collected datasheets confirm the multiplicity of operational protocols for both inventory of coralligenous population, and monitoring of coralligenous populations on hard substrate. In contrast, monitoring maërl populations seems less documented.

Longtime ignored because of their location and limited means of investigation, coralligenous maërl and must be now adressed by priority programs. Their inventory and monitoring are therefore a unique challenge at the Mediterranean level because of their ecological and economic importance and threats to their survival. The results obtained in this work should be discussed in the context of a specific workshop involving key specialists usually working on the monitoring of coralligenous and maërl populations (i) to initiate collaborations between the teams involved (ii) propose a number of "minimal" descriptors to be taken into account, and (iii) to validate methods that can be compared or cross-calibrated. It would indeed be relevant to be able to propose a "toolbox" in which different stakeholders could find to even validated protocols to meet their objectives and available resources. Effort should also be made in terms of training and technology transfer between institutes benefiting from proven and new players.

A- Context and aims

the Action Plan for the Conservation of Coralligenous and other Mediterranean bio-constructions adopted by Contracting Parties to Barcelona Convention Barcelona in 2008 (UNEP-MAP, 2008).

Many priority actions were identified, mainly concerning (i) enhancing knowledge on the distribution (compiling existing information, carrying out field assignments in new sites or sites of particular interest) and the composition (list of species) of these populations, (ii) compiling a database that lists specialists and (iii) setting up a spatio-temporal monitoring of the coralligenous and maërl populations.

Even if we have an overall knowledge about the composition and distribution of coralligenous and marl populations in the Mediterranean (Ballesteros, 2006; Georgiadis *et al*., 2009; UNEP-MAP-RAC/SPA, 2009), the absence of cartographical data on the overall distribution of these populations is one of the greatest lacunae from the conservation point of view (Agnesi *et al*., 2008). The summary crafted by these authors confirms the scarcity of available data, with less than 50 cartographies listed for the Mediterranean basin. Most of these maps are recent (a dozen years old) but basically concern the north-western basin.

The implementation of a spatio-temporal monitoring must enable answers to be found to questions about (i) changes over time in the composition of these populations, (ii) viability of the floral and faunal populations which develop there, (iii) the impact of natural or anthropogenic disturbance, and (iv) selection of species that can be used as bio-indicators.

We have to admit that, unlike the marine magnoliophyte meadows, for which we now have a great many methods that can account for their distribution, state of health and evolution, inventorying and monitoring the coralligenous and marl populations presents several problems linked to the accessibility of these populations, their heterogeneity and the absence of a standardised protocol used for different teams working in this field (Ballesteros, 2006).

These lacunae are particularly worrying in that these populations are undergoing very great pressures linked to their direct exploitation as a source of calcium for soil improvement1, fishing activities, development of pleasure diving and climate change-linked acidification of the water (Grall *et al*., 2009; UNEP-MAP-RAC/SPA, 2009). Beyond the mechanical degradation of these populations the excessive exploitation of living resources associated is likely to significantly alter the ichthyofauna (Harmelin & Marinopoulos, 1994).

This document aims at listing the main methods used for inventorying and monitoring the coralligenous and marl populations in the Mediterranean and better understanding their advantages, restrictions and conditions of use. Starting from these bits of information, a meeting of specialists must be held to choose a set of standardised methods to be implemented as part of a regional strategy.

B- Summary of the main methods used

Bearing in mind the aims pursued and the investigative tools to be implemented, the summary will be subdivided into two parts, inventorying methods and monitoring methods.

1. Inventorying coralligenous and maërl populations

Inventorying coralligenous and maërl populations can be understood at two levels:

- Locating the populations (bathymetric distribution, substrata, mapping etc.)
- Characterisation of the populations (species present, vitality, abundance, etc.).

Locating the coralligenous and maërl populations calls on 'traditional' mapping techniques similar to those used for the deep magnoliophyte meadows. Although underwater diving is often used for small areas (e.g. transects, quadrates), this method of investigation quickly shows its limits when the area of study and the depth increase significantly, even if the technique can be optimised for a general description of the site (dragged diver, video transects; Cinelli, 2009). Having recourse to acoustic methods of investigation (side sweep sonar, multi-bundle sounder; Georgiadis *et al*., 2009) or submerged observation systems (Remote Operating Vehicle; dragged cameras) is found to be necessary. However, acoustic techniques must be supplemented by a great deal of 'field data', for the answers obtained usually concern the substratum rather than the population that develops there, and submerged observation systems require a very long acquisition time given their limited speed and range. Finally, given the 3-D distribution of the populations over hard substrata, 'quality' bathymetric data often constitutes an appreciation element that is indispensable. The strategy to be implemented will thus depend on the aim of the study and the area concerned, means and time available (Table I).

Table I: Main tools used for mapping the coralligenous and marl populations in the Mediterranean. Whenever possible, the bathymetric bracket, surface of use, precision, area mapped per hour, interest or limits of uses are stated.

Survey tool	Depth	Surface to be mapped	Geometrical precision	Mapped area (sq.km./hour)	Interest	Limit
Underwater diving	Bathymetric bracket (0 to -50 m)	Areas less than sq.km.	From 0.1 m (relative)	0.001 to 0.01	Very great precision for the identification (taxonomy) and distribution of species (micro-mapping). Non-destructive method. Low cost, easy to implement	Small area inventoried. Work takes a lot of time. Limited depth. Top-level divers (safety). Variable geo-referencing Légal problems
Transects by dragged divers	Bathymetric bracket (0 to -50 m)	Intermediary areas (a few sq.km.)	From 1-10 m	0.01 to 0.025	Easy to implement and possibility of taking pictures. Good identification of populations. Non-destructive method. Low cost. Area covered	Time to acquire and go through data. Limited depth. Top-level divers (safety). Variable positioning of diver (geo-referencing). Water transparency.
Side sweep sonar	From -8 m to over 100 m	Can be used for big areas (a few dozen to a few hundred sq.km.) From 1 m 1 to 4	From 1 m A	1 to 4	Realistic representation allowing good distinction of the nature of the bed and of certain populations (marl) with location of edges. Good geo-referencing. Non-destructive method. Speedy. Wide bathymetric bracket	Flat (2-D) picture to represent 3-D populations (hard substrata). Acquisition of field data necessary to validate sonograms. High cost, major means out at sea. Very big mass of data

Multi-bundle sounder	From -2 m to over 100 m	Can be used for big areas (a few dozen to a few hundred sq.km.)	From 1 m (linear) <1 m (depth)	0.5 to 6	Possibility of obtaining 3-D picture. Double information (bathymetric and imaging). Very precise bathymetry. Good geo-referencing. Non-destructive method. Speedy. Wide bathymetric bracket	Very great mass of data. Complex processing of information (MNT). Less precise imaging (nature of bed) than side sweep sonar. Acquisition of field data indispensable. High cost, major means out at sea
Remote Operating Vehicle (ROV)	From -2 m to over 100 m	Suits small areas (a few sq.km.)	From 1 m to 10 m	0.01 to 0.025	Non-destructive method. Possibility of taking pictures. Good identification of populations. Wide bathymetric bracket. Identification and distribution of species	Small area inventoried. High cost, major means out at sea. Slow processing and recording of information. Variable positioning. Difficult to handle in currents
Dragged camera	From -2 m to over 100 m	Intermediary areas (a few sq.km.)	From 1 m to 10 m	0.025 to 1	Easy to implement and possibility of taking pictures. Good identification of populations. Non-destructive method. Large area covered	Limited to homogeneous and horizontal beds. Slow acquiring and processing of data. Variable positioning (geo-referencing). Water transparency

Characterisation of the coralligenous and maërl populations depends greatly on the scale of work and the precision sought (Table II). Even if the use of photographs or underwater videos can be pertinent, for it enables the relationship between information obtained and diving time to be optimised, having recourse to specialists in taxonomy (validity of the information) with good experience in underwater diving (safety) is often indispensable, given the complexity of this habitat (3-D distribution of species). The acoustic methods that were described above are totally inoperative, especially for coralligenous.

For a rough characterisation of the populations, semi-quantitative evaluations often give sufficient information; thus it is possible to estimate the cover or abundance by standardised indices directly *in situ* or using photographs (UNEP-MAP-RAC/SPA, 2008). But a quality characterisation of the populations often requires the use of quadrates or transects (with or without photographs; Fraschetti *et al*., 2001; Coma *et al*., 2006) or even the sampling of all the organisms present over a given area for laboratory analysis (destructive method; Boudouresque, 1971).As well as the presence or abundance of a given species, assessing its vitality seems a particularly interesting parameter. The presence of broken individuals, and necrosis, are elements to be taken into consideration (Garrabou *et al*., 1998; 2001). Finally, the nature of the substratum (silted up, roughness, interstices, exposure, slope), the temperature of the water, the ichthyological population associated, the cover by epibionta and the presence of invasive species must also be considered to give a clear characterisation of the population (Harmelin, 1990).

Table II: Main methods used to characterise the coralligenous and marl populations in the Mediterranean. Whenever possible, the bathymetric bracket, surface of use, precision, area mapped per hour, interest or limits of uses are stated.

Method	Depth	Surface studied	Geometrical precision	Studied area (sq.m./hour)	Interest	Limit
Remote Operating Vehicle (ROV)	From -2 m to over 100 m	Suits areas of about 1 sq.km.)	From 1 m to 10 m	0.0025 to 0.01 2,500 to 40,000 sq.m	Non-destructive method. Possibility of taking pictures. Wide bathymetric bracket. Good identification of facies and associations. Possibility of semi-quantitative evaluation. Determining big species. On-off collections	Needs recourse to specialists in taxonomy. High cost, major means out at sea. Slow processing and recording of information. Positioning difficult in the presence of currents. Difficulty of observation and access according to the complexity of the populations
Simple underwater diving	Bathymetric bracket (0 to -50 m)	Areas less than 250,000 sq.m.	From 1 m	100 to 2,500 sq.m.	Great precision for the identification, characterisation and distribution of species. Non-destructive method. Low cost, easy to implement. Taking of samples possible	Need to have recourse to specialists in taxonomy. Small area inventoried. Work takes a lot of time. Limited depth. Top-level divers (safety). Pretty imprecise survey. Limited number of species observed
Underwater diving with shots	Bathymetric bracket (0 to -50 m)	Areas less than 250,000 sq.m.	From 1 m	100 to 10,000 sq.m.	Great precision for the identification, characterisation and distribution of species. Non-destructive method. *A posteriori* identification possible. Low cost, easy to implement. Taking of samples possible	Need to have recourse to specialists in taxonomy. Small area inventoried. Work takes a lot of time. Limited depth. Material for taking shots necessary. Top-level divers (safety). Limited number of species observed. 2-D observation possible
Underwater diving with sampling	Bathymetric bracket (0 to -50 m)	Areas less than 10 sq.m.	From 1 m	1 to 2 sq.m.	Very great precision for the identification (taxonomy) and distribution of species (micro-mapping). All species taken into account. *A posteriori* identification. Low cost, easy to implement.	Destructive method. Very small area inventoried. Sampling material needed. Work takes a lot of time. Limited depth. Top-level divers (safety)

2. Monitoring coralligenous and marl populations

Monitoring coralligenous and marl populations basically calls on underwater diving, although this technique gives rise to many constraints due to the conditions of the environment in which these formations develop (great depths, weak luminosity, low temperatures, presence of currents etc.); it can only be done by confirmed divers and over a limited time (Bianchi *et al*., 2004; Tetzaff & Thorsen, 2005). To break free of these constraints, it is possible to call on new investigation tools (ROV) that open up possibilities of a monitoring that is less precise but over greater areas of these populations. The complementarity of these techniques must be taken into account when crafting an operational strategy.

Also, although it cannot be denied that there are constraints linked to the observation of coralligenous and marl populations, their slow growth rate enables sampling to be done at long intervals of time to monitor them in the long term, outside those sectors where human pressure is great (Garrabou *et al*., 2002).

Monitoring the coralligenous populations on hard substratum requires achieving a zero state, or precise reference state, with an additional requirement: the data gathered must be able to be reproduced over time. Thus, the experimental protocol has capital importance. As well as very precise locating of the measurement, often requiring the making of a micro-map (quadrates, transects), the descriptors taken into account have to be the subject of a standardised protocol and not be restricted to the presence or abundance of a few target species (cf. Characterisation of the coralligenous and maërl populations).

Although destructive methods (sampling of all the organisms present over a given area) have long been used, because they offer excellent results for sedentary fauna and flora, they are not desirable for long-term regular monitoring (UNEP-MAP-RAC/SPA, 2008). It is more suitable to favour non-destructive methods like photographic sampling or direct observation in given areas (quadrates). Neither method requires sampling of organisms and both are therefore absolutely appropriate for long-term monitoring. These different methods can be used separately or together according to the aims of the study; area inventoried and means available (Table III). Non-destructive methods are increasingly used and – mainly for photographic sampling – enjoy significant technological advances.

Table III: Comparison between three traditional methods of sampling hard substratum populations (Bianchi *et al*., 2004)

In situ sampling	
Advantages	Taxonomical precision, objective evaluation, reference samples
Drawbacks	High cost, slow laborious work, intervention of specialists, limited area inventoried, destructive method
Use	Studies integrating a strong taxonomical element
Video or photo monitoring	
Advantages	Objective evaluation, can be reproduced, reference samples, can be automated, speedy diving work, big area inventoried, non-destructive method
Drawbacks	Low taxonomical precision, problem of *a posteriori* interpreting of pictures
Use	Studies on the biological cycle or over-time monitoring, great depth of study
Direct observation	
Advantages	Low cost, results immediately available, big area inventoried, can be reproduced, non-destructive method
Drawbacks	Risk of taxonomic subjectivity, slow diving work
Use	Exploratory studies, monitoring of populations, bionomic studies

Unlike the marine magnoliophyta meadows, the descriptors to be taken into account vary greatly from one team to another, as does their measuring protocol (Harmelin & Marinopoulos, 1994; Pérez *et al*., 2000; Bianchi *et al*., 2004; Cinelli, 2009). 'Standardised' sheets are being crafted by scientific teams, particularly in the context of the Natura 2000 sea programmes, and should enable these difficulties to be at least partially solved (Figure 1; Annex A).

Monitoring the marl populations and those on rhodolith beds may also be done by underwater diving, but observation using the ROV, dragged cameras, or more usually sampling using buckets are favoured because of the greater homogeneity of these populations (Table IV). Similarly, having recourse to acoustic techniques (side sweep sonar) associated with good geo-location means that the expansion of these populations can be monitored over time (Bonacorsi *et al*., 2010). However, there is no method that is as precise as those developed for the coralligenous populations of the hard substratum (micro-mapping, photographic sampling). Indeed, the movement of these populations over the bed, particularly in response to hydrodynamics, does not suit this kind of technique.

Natura 2000 - Fiche Coralligène – ANTONIOLI 2010 – GIS Posidonie

- Date : …… - Observateur :…… - N° de plongée & site :……..……..

- **Type de faciès :** *Cystoseira zosteroides* ☐ *Eunicella singularis* ☐
  Eunicella cavolinii ☐ *Lophogorgia sarmentosa* ☐
  Paramuricea clavata ☐ Autre : …… ☐

- **Gorgone :**

	Non → Oui			
	- -	-	+	+ +
Toutes les classes de taille				
Nécrose				
Gorgone arrachée				
Epibiontes				
Recrutement (<3cm)				

Gorgonaire	**Espèce :**……
……cm	……cm
……cm	……cm
……cm	……cm
……cm	……cm
……cm	……cm
……cm	……cm

- **Aspect général :**

	Non → Oui			
	- -	-	+	+ +
Sédimentation / vase				
Voiles algaux				
Impression de diversité (très coloré)				
Faune cryptique riche				

Filet ☐
Ancrage ☐
Fil ☐
Déchet ☐

Profondeur d'observation des gorgonaires :
- Max :
- Min :

- **Inventaire :**

Macrophytes	
Lithophyllum & Mesophyllum en 3D	
Couverture de *Lithophyllum incrusans* sans relief	
Taches blanches sur Lithophyllum ou Mesophyllum	
Présence d'espèces dressées *Halimeda*, *Udotea* ; *Cystoseira*…	

Ichtyofaune	
Présence d'espèces-cibles avec grands individus	
Poissons benthiques ou nectobenthiques	

Spongiaire & Bryozoaire	
Eponges perforantes (Clione)	
Espèces dressées (*Axinella sp.*, *Spongia agaricina*,…)	
Grands bryozoaires branchus	

- **Observation :**

Photos quadrats et paysagères à réaliser

Figure 1: Example of synthetic sheet used in the context of the Natura 2000 studies by GIS Posidonie (Antonioli, 2010)

Table IV: Methods used to monitor marl populations and those of rhodolith beds

Diving observation	
Advantages	Low cost, results immediately available, pretty non-destructive method, reference samples, taxonomical precision, distribution of species
Drawbacks	Work limited as regards depth, small area inventoried
Use	Exploratory studies, monitoring of populations, bionomic studies
Blind sampling (bucket, dragging)	
Advantages	Low cost, easy to implement, taxonomical precision, reference samples, analysis of substratum (granulometry, calcimetry, % of organic matter), great depth of study
Drawbacks	Imprecision of observation, several repeats needed, limited area inventoried, destructive method
Use	Localised studies integrating a taxonomical element, validation of acoustic methods
Monitoring with ROV and dragged cameras	
Advantages	Objective evaluation, reference samples (pictures), big area inventoried, non-destructive method, distribution of species, great depth of study
Drawbacks	High cost, low taxonomical precision, problem of *a posteriori* interpretation of pictures, superficial observation, little information on the substratum
Use	Studies on distribution and temporal monitoring, validation of acoustic methods
Side sweep sonar	
Advantages	Very big areas inventoried, information on hydrodynamics (sedimentary figures), can be reproduced, non-destructive method, great depth of study
Drawbacks	High cost, interpreting of sonograms, additional validation (inter-calibration), superficial observation, no taxonomical information
Use	Studies over big areas, monitoring of populations, bionomic studies

C- Recommendations

Following on the first Mediterranean symposium on the conservation of the coralligenous and other calcareous assemblages (Tabarka, January 2009; UNEP-MAP-RAC/SPA, 2009), that brought together over 120 participants from 11 Mediterranean countries, it was recommended that:

- knowledge on coralligenous populations should be enhanced by deciding on reference states, acquiring long chronological sets and setting up a network of Mediterranean experts
- monitoring networks, locally managed and coordinated on a regional scale, should be started, and standardised protocols suggested that could be applied to the entire Mediterranean
- species that are indicators of the state of health of these formations should be identified, as well as quality criteria giving information on specific human impacts.

We have to say that two years after this symposium was held, although an enhancing of knowledge was started via (i) the Natura 2000 sea programmes and the Maritime Strategy Directive for the European countries, or (ii) the transfer of skills for researchers on the southern shores (CapCoral Programme; Bonacorsi, 2010), there is still no overall strategy or efficacious coordination at regional level. It thus seems urgent that a work group be set up to meet the expectations expressed at this symposium.

Inventorying and monitoring the coralligenous and marl populations in the Mediterranean constitutes a unique challenge given the ecological and economic importance of these populations and the threats that hang over their continued existence. Long ignored due to their location and the limited means of investigation, today these populations must be the subject of priority programmes.

This approach must be encouraged and coordinated at regional level via the holding of a specific workshop that brings together the main specialists usually working on monitoring coralligenous and marl populations. Even if it is hard to suggest one single standard method for monitoring, this kind of workshop is always useful to (i) initiate collaboration, (ii) propose a minimal number of descriptors, and (iii) validate methods that can be compared or inter-calibrated (UNEP-MAP-RAC/SPA, 2008).

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Annex
Draft list of the principal species to be considered in the inventorying and monitoring coralligenous and maërl populations

LIST OF THE PRINCIPAL SPECIES TO BE CONSIDERED IN THE INVENTORYING

Coralligenous Population

Builders

Algal builders

Lithophyllum cabiochae (Boudouresque & Verlaque) Athanasiadis
Lithophyllum stictaeforme (Areschoug) Hauck 1877
Lithothamnion sonderi Hauck 1883
Lithothamnion philippii Foslie 1897
Mesophyllum alternans (Foslie) Cabioch & Mendoza 1998
Mesophyllum expansum (Philippi) Cabioch & Mendoza 2003
Mesophyllum macedonis Athanasiadis 1999
Mesophyllum macroblastum (Foslie) Adey 1970
Neogoniolithon mamillosum (Hauck) Setchell & L.R.Mason 1943
Peyssonnelia rosa-marina Boudouresque & Denizot 1973
Peyssonnelia polymorpha (Zanardini) F.Schmitz in Falkenberg 1879
Sporolithon ptychoides Heydrich 1897

Animal builders

Foraminifera
Miniacina miniacea Pallas 1766

Bryozoans
Myriapora truncata Pallas 1766
Schizomavella spp.
Turbicellepora spp.
Adeonella calveti Canu & Bassler 1930
Smittina cervicornis Pallas 1766
Pentapora fascialis Pallas 1766
Schizotheca serratimargo Hincks 1886
Myriapora truncata Pallas 1766
Rhynchozoon neapolitanum Gautier 1962

Polychaeta
Serpula spp.
Spirorbis sp.
Spirobranchus polytrema Philippi 1844

Protozoa
Miniacina miniacea Pallas 1766

Cnidaria
Caryophyllia inornata Duncan 1878
Caryophyllia smithii Stokes and Broderip 1828
Leptopsammia pruvoti Lacaze-Duthiers 1897
Hoplangia durotrix Gosse 1860
Polycyathus muellerae Abel 1959
Cladocora caespitosa Linnaeus 1767
Phyllangia americana mouchezii Lacaze-Duthiers 1897
Dendrophyllia ramea Linnaeus 1758
Dendrophyllia cornigera Lamarck 1816

BIOERODERS

Sponges
Clionidae (Cliona, Pione…)

Echinoids
Echinus melo Lamarck 1816
Sphaerechinus granularis (Lamarck, 1816)

Molluscs
Gastrochaena dubia Pennant 1777
Hiatella arctica Linnaeus 1767
Lithophaga lithophaga Linnaeus 1758
Petricola lithophaga Philippson 1788

Polychaetes
Polydora spp.
Dipolydora spp.
Dodecaceria concharum Örsted 1843

Sipunculids
Aspidosiphon (Aspidosiphon) muelleri muelleri Diesing, 1851
Phascolosoma (Phascolosoma) stephensoni Stephen 1942

(OTHER) RELEVANT SPECIES (*invasive; **disturbed or stressed environments-usually, when abundant)

Algae

Green algae
Flabellia petiolata (Turra) Nizamuddin 1987
Halimeda tuna (J.Ellis & Solander) J.V.Lamouroux 1816
Palmophyllum crassum (Naccari) Rabenhorst 1868
Caulerpa racemosa (Forsskål) J.Agardh 1873*
Caulerpa taxifolia (M.Vahl) C.Agardh 1817*
Codium bursa (Olivi) C.Agardh 1817**
Codium fragile (Suringar) Hariot 1889*
Codium vermilara (Olivi) Chiaje 1829**

Brown algae
Cystoseira zosteroides C.Agardh 1820
Cystoseira spinosa var. *compressa* (Ercegovic) Cormaci, G.Furnari, Giaccone, Scammacca & D.Serio 1992
Laminaria rodriguezii Bornet 1888
Halopteris filicina (Grateloup) Kützing 1843
Phyllariopsis brevipes (C.Agardh) E.C.Henry & G.R.South 1987
Dictyopteris lucida M.A.Ribera Siguán, A.Gómez Garreta, Pérez Ruzafa, Barceló Martí & Rull Lluch 2005**
Dictyota spp.**
Stypopodium schimperi (Buchinger ex Kützing) Verlaque & Boudouresque 1991*
Acinetospora crinita (Carmichael) Kornmann 1953**
Stilophora tenella (Esper) P.C.Silva in P.C. Silva, Basson & Moe 1996**
Stictyosiphon adriaticus Kützing 1843**

"Yellow" algae (Pelagophyceae)
Nematochrysopsis marina (J.Feldmann) C.Billard 2000**

Red algae
Osmundaria volubilis (Linnaeus) R.E.Norris 1991
Rodriguezella spp.
Ptilophora mediterranea (H.Huvé) R.E.Norris 1987
Kallymenia spp.
Halymenia spp.
Sebdenia spp.
Peyssonnelia spp. (non calcareous)
Phyllophora crispa (Hudson) P.S.Dixon 1964
Gloiocladia spp.
Leptofauchea coralligena Rodríguez-Prieto & De Clerck 2009
Acrothamnion preissii (Sonder) E.M.Wollaston 1968*
Lophocladia lallemandii (Montagne) F.Schmitz 1893*
Asparagopsis taxiformis (Delile) Trevisan de Saint-Léon 1845*
Womersleyella setacea (Hollenberg) R.E.Norris 1992*

Animals
Sponges
Acanthella acuta Schmidt 1862
Agelas oroides Schmidt 1864
Aplysina aerophoba Nardo 1843
Aplysina cavernicola Vacelet 1959
Axinella spp.
Chondrosia reniformis Nardo 1847
Clathrina clathrus Schmidt 1864Cliona viridis
Dysidea spp.
Haliclona (Reniera) mediterranea Griessinger 1971
Haliclona (Soestella) mucosa Griessinger 1971
Hemimycale columella Bowerbank 1874
Ircinia fasciculata Esper 1794
Ircinia oros Schmidt 1864
Ircinia variabilis Schmidt 1862
Oscarella sp.
Petrosia ficiformis Poiret 1789
Phorbas tenacior Topsent 1925
Spirastrella cunctatrix Schmidt 1868
Spongia officinalis Linnaeus 1759
Spongia (Spongia) lamella Schulze 1879

Cnidaria
Alcyonium acaule Marion 1878
Alcyonium palmatum Pallas 1766
Corallium rubrum Linnaeus 1758
Paramuricea clavata Risso 1826
Eunicella spp.
Leptogorgia sarmentosa Esper 1789
Ellisella paraplexauroides Stiasny 1936
Antipathes spp.
Parazoanthus axinellae Schmidt 1862
Savalia savaglia Bertoloni 1819
Callogorgia verticillata Pallas 1766
Polychaeta

Sabella spallanzanii Gmelin 1791
Filograna implexa Berkeley 1835
Salmacina dysteri Huxley 1855
Protula spp.

Bryozoans
Chartella tenella Hincks 1887
Margaretta cereoides Ellis & Solander 1786
Hornera frondiculata Lamouroux 1821

Tunicates
Pseudodistoma cyrnusense Pérès 1952
Aplidium spp.
Microcosmus sabatieri Roule 1885
Halocynthia papillosa Linnaeus 1767

Molluscs
Charonia lampas Linnaeus 1758
Charonia variegata Lamarck 1816
Pinna rudis Linnaeus 1758
Erosaria spurca Linnaeus 1758
Luria lurida Linnaeus 1758

Decapoda
Palinurus elephas Fabricius 1787
Scyllarides latus Latreille 1803
Maja squinado Herbst 1788

Echinodermata
Antedon mediterranea Lamarck, 1816
Hacelia attenuata Gray 1840
Centrostephanus longispinus Philippi 1845
Holothuria (Panningothuria) forskali Delle Chiaje 1823
Holothuria (Platyperona) sanctori Delle Chiaje 1823

Pisces
Epinephelus spp.
Mycteroperca rubra Bloch 1793
Sciaena umbra Linnaeus 1758
Scorpaena scrofa Linnaeus 1758
Raja spp.
Torpedo spp.
Mustelus spp.
Phycis phycis Linnaeus 1766
Serranus cabrilla Linnaeus 1758
Scyliorhinus canicula Linnaeus 1758

Rhodolith Communities

(*invasive; **disturbed or stressed environments-usually, when abundant).

Species that can be dominant or abundant are preceded by #

Algae

Red algae (calcareous)
Lithophyllum racemus (Lamarck) Foslie 1901
Lithothamnion corallioides (P.L.Crouan & H.M.Crouan) P.L.Crouan & H.M.Crouan 1867
Lithothamnion valens Foslie 1909
Peyssonnelia crispata Boudouresque & Denizot 1975
Peyssonnelia rosa-marina Boudouresque & Denizot 1973
Phymatolithon calcareum (Pallas) W.H.Adey & D.L.McKibbin 1970
Spongites fruticulosa Kützing 1841
Tricleocarpa cylindrica (J.Ellis & Solander) Huisman & Borowitzka 1990
Lithophyllum cabiochae (Boudouresque et Verlaque) Athanasiadis
Lithophyllum stictaeforme (Areschoug) Hauck 1877
Lithothamnion minervae Basso 1995
Lithothamnion philippii Foslie 1897
Mesophyllum alternans (Foslie) Cabioch & Mendoza 1998
Mesophyllum expansum (Philippi) Cabioch & Mendoza 2003
Neogoniolithon brassica-florida (Harvey) Setchell & L.R.Mason 1943
Neogoniolithon mamillosum (Hauck) Setchell & L.R.Mason 1943
Peyssonnelia polymorpha (Zanardini) F.Schmitz in Falkenberg 1879
Sporolithon ptychoides Heydrich 1897

Red algae (non builders)
Osmundaria volubilis (Linnaeus) R.E.Norris 1991
Phyllophora crispa (Hudson) P.S.Dixon 1964
#*Peyssonnelia* spp. (non calcareous)
Acrothamnion preissii (Sonder) E.M.Wollaston 1968*
Aeodes marginata (Roussel) F.Schmitz 1894
Alsidium corallinum C.Agardh 1827
Brongniartella byssoides (Goodenough & Woodward) F.Schmitz 1893
Cryptonemia spp.
Gloiocladia microspora (Bornet ex Bornet ex

Rodríguez y Femenías) N.Sánchez & C.Rodríguez-Prieto ex Berecibar, M.J.Wynne, Barbara & R. Santos 2009

Gloiocladia repens (C.Agardh) Sánchez & Rodríguez-Prieto in Rodriguez-Prieto *et al.* 2007

Gracilaria spp.

Halymenia spp.

Kallymenia spp.

Leptofauchea coralligena Rodríguez-Prieto & De Clerck 2009

Myriogramme tristromatica (J.J.Rodríguez y Femenías ex Mazza) Boudouresque in Boudouresque & Perret-Boudouresque 1987

Osmundea pelagosae (Schiffner) K.W.Nam in K.W. Nam, Maggs & Garbary 1994

Phyllophora heredia (Clemente) J.Agardh 1842

Polysiphonia subulifera (C.Agardh) Harvey 1834

Rhodophyllis divaricata (Stackhouse) Papenfuss 1950

Rytiphlaea tinctoria (Clemente) C.Agardh 1824

Sebdenia spp.

Womersleyella setacea (Hollenberg) R.E.Norris 1992*

Green algae

Flabellia petiolata (Turra) Nizamuddin 1987

Caulerpa racemosa (Forsskål) J.Agardh 1873*

Caulerpa taxifolia (M.Vahl) C.Agardh 1817*

Codium bursa (Olivi) C.Agardh 1817

Microdictyon tenuius J.E.Gray 1866

Palmophyllum crassum (Naccari) Rabenhorst 1868

Umbraulva olivascens (P.J.L.Dangeard) G.Furnari in Catra, Alongi, Serio, Cormaci & G. Furnari 2006

Brown algae

Arthrocladia villosa (Hudson) Duby 1830

Laminaria rodriguezii Bornet 1888

Sporochnus pedunculatus (Hudson) C.Agardh 1820

Acinetospora crinita (Carmichael) Kornmann 1953**

Carpomitra costata (Stackhouse) Batters 1902

Cystoseira abies-marina (S.G.Gmelin) C.Agardh 1820

Cystoseira foeniculacea (Linnaeus) Greville 1830

Cystoseira foeniculacea f. *latiramosa* (Ercegovi?) A.Gómez Garreta, M.C.Barceló, M.A..Ribera & J.R.Lluch 2001

Cystoseira spinosa var. *compressa* (Ercegovic) Cormaci, G.Furnari, Giaccone, Scammacca & D.Serio 1992

Cystoseira zosteroides C.Agardh 1820

Dictyopteris lucida M.A.Ribera Siguán, A.Gómez Garreta, Pérez Ruzafa, Barceló Martí & Rull Lluch 2005

Dictyota spp.

Halopteris filicina (Grateloup) Kützing 1843

Nereia filiformis (J.Agardh) Zanardini 1846

Phyllariopsis brevipes (C.Agardh) E.C.Henry & G.R.South 1987

Spermatochnus paradoxus (Roth) Kützing 1843

Stictyosiphon adriaticus Kützing 1843

Stilophora tenella (Esper) P.C.Silva in P.C. Silva, Basson & Moe 1996

Zanardinia typus (Nardo) P.C.Silva in W.Greuter 2000

Animals

Sponges

Aplysina spp.

Axinella spp.

Cliona viridis Schmidt 1862

Dysidea spp.

Haliclona spp.

Hemimycale columella Bowerbank 1874

Oscarella spp.

Phorbas tenacior Topsent 1925

Spongia officinalis Linnaeus 1759

Spongia (Spongia) lamella Schulze 1879

Cnidaria

Alcyonium palmatum Pallas 1766

Eunicella verrucosa Pallas 1766

Paramuricea macrospina Koch 1882

#*Aglaophenia* spp.

Adamsia palliata Fabricius 1779

Calliactis parasitica Couch 1838

Cereus pedunculatus Pennant 1777

Cerianthus membranaceus Spallanzani 1784

Funiculina quadrangularis Pallas 1766

Leptogorgia sarmentosa Esper 1789

Nemertesia antennina Linnaeus 1758

Pennatula spp.

Veretillum cynomorium Pallas 1766

Virgularia mirabilis Müller 1776

Polychaetes

Aphrodita aculeata Linnaeus 1758

Sabella pavonina Savigny 1822
Sabella spallanzanii Gmelin 1791

Bryozoans
Cellaria fistulosa Linnaeus 1758
Hornera frondiculata Lamouroux 1821
Pentapora fascialis Pallas 1766
Turbicellepora spp.

Tunicates
#*Aplidium* spp.
Ascidia mentula Müller 1776
Diazona violacea Savigny 1816
Halocynthia papillosa Linnaeus 1767
Microcosmus spp.
Phallusia mammillata Cuvier 1815
Polycarpa spp.
Pseudodistoma crucigaster Gaill 1972
Pyura dura Heller 1877
Rhopalaea neapolitana Philippi 1843
Synoicum blochmanni Heiden 1894

Echinodermata
Astropecten irregularis Pennant 1777
Chaetaster longipes Retzius 1805
Echinaster (Echinaster) sepositus Retzius 1783
Hacelia attenuata Gray 1840
Holothuria (Panningothuria) forskali Delle Chiaje 1823
Leptometra phalangium Müller 1841
Luidia ciliaris Philippi 1837
Ophiocomina nigra Abildgaard in O.F. Müller 1789
Parastichopus regalis Cuvier 1817
Spatangus purpureus O.F. Müller 1776
Sphaerechinus granularis Lamarck 1816
Stylocidaris affinis Philippi 1845

Pisces
Mustelus spp.
Pagellus acarne (Risso, 1827)
Pagellus erythrinus (Linnaeus, 1758)
Raja undulata Lacepède, 1802
Scyliorhinus canicula (Linnaeus, 1758)
Squatina spp.
Trachinus radiatus Cuvier, 1829

LIST OF THE PRINCIPAL SPECIES TOP BE CONSIDERED ON THE MONITORING

Coralligenous Populations

CORALLIGENOUS BUILDERS

Algal builders

Lithophyllum cabiochae (Boudouresque et Verlaque) Athanasiadis
Lithophyllum stictaeforme (Areschoug) Hauck 1877
Mesophyllum alternans (Foslie) Cabioch & Mendoza 1998
Mesophyllum expansum (Philippi) Cabioch & Mendoza 2003
Mesophyllum macedonis Athanasiadis 1999
Mesophyllum macroblastum (Foslie) Adey 1970
Peyssonnelia polymorpha (Zanardini) F.Schmitz in Falkenberg 1879
Peyssonnelia rosa-marina Boudouresque & Denizot 1973

Animal builders

Bryozoans
Adeonella calveti Canu & Bassler 1930
Pentapora fascialis Pallas 1766
Schizotheca serratimargo Hincks 1886
Smittina cervicornis Pallas 1766

Bioeroders

Echinoids
Echinus melo Lamarck 1816

(Other) Relevant species (*invasive; ^disturbed

or stressed environments-usually, when abundant)

Algae
Green algae
Caulerpa racemosa (Forsskål) J.Agardh 1873*
Caulerpa taxifolia (M.Vahl) C.Agardh 1817*

Brown algae
Acinetospora crinita (Carmichael) Kornmann 1953^
Dictyopteris lucida M.A.Ribera Siguán, A.Gómez Garreta, Pérez Ruzafa, Barceló Martí & Rull Lluch 2005^
Dictyota spp.^
Laminaria rodriguezii Bornet 1888
Stictyosiphon adriaticus Kützing 1843^
Stilophora tenella (Esper) P.C.Silva in P.C. Silva, Basson & Moe 1996^

"Yellow" algae (Pelagophyceae)
Nematochrysopsis marina (J.Feldmann) C.Billard 2000^

Red algae
Acrothamnion preissii (Sonder) E.M.Wollaston 1968*
Lophocladia lallemandii (Montagne) F.Schmitz 1893*
Womersleyella setacea (Hollenberg) R.E.Norris 1992*

Animals
Sponges
Axinella spp.
Spongia officinalis Linnaeus 1759
Spongia (Spongia) lamella Schulze 1879

Cnidaria
Corallium rubrum Linnaeus 1758
Eunicella spp.
Leptogorgia spp.
Paramuricea clavata Risso 1826
Savalia savaglia Bertoloni 1819

Polychaeta
Filograna implexa Berkeley 1835
Salmacina dysteri Huxley 1855

Bryozoans
Hornera frondiculata Lamouroux 1821

Tunicates
Halocynthia papillosa Linnaeus 1767

Molluscs
Charonia lampas Linnaeus 1758
Charonia variegata Lamarck 1816

Decapoda
Homarus gammarus Linnaeus 1758
Maja squinado Herbst 1788
Palinurus spp.
Scyllarides latus Latreille 1803

Pisces
Epinephelus spp.
Mustelus spp.
Mycteroperca rubra Bloch 1793
Phycis phycis Linnaeus 1766
Raja spp.
Sciaena umbra Linnaeus 1758
Scorpaena scrofa Linnaeus 1758
Scyliorhinus canicula Linnaeus 1758
Serranus cabrilla Linnaeus 1758
Torpedo spp.

Rhodolith populations

(*invasive; **disturbed or stressed environments-usually, when abundant).

Species that can be dominant or abundant are preceded by #

Algae

Red algae (calcareous)

Brunch

Lithophyllum racemus (Lamarck) Foslie 1901
Lithothamnion corallioides (P.L.Crouan & H.M.Crouan) P.L.Crouan & H.M.Crouan 1867
Lithothamnion valens Foslie 1909
Phymatolithon calcareum (Pallas) W.H.Adey & D.L.McKibbin 1970

Crust

Lithophyllum cabiochae (Boudouresque et Verlaque) Athanasiadis
Lithophyllum stictaeforme (Areschoug) Hauck 1877
Neogoniolithon brassica-florida (Harvey) Setchell & L.R.Mason 1943
Neogoniolithon mamillosum (Hauck) Setchell & L.R.Mason 1943
Sporolithon ptychoides Heydrich 1897

Peyssonneliaceae

Peyssonnelia crispata Boudouresque & Denizot 1975
Peyssonnelia rosa-marina Boudouresque & Denizot 1973
Peyssonnelia polymorpha (Zanardini) F.Schmitz in Falkenberg 1879

Thin encrusting coralline

Spongites fruticulosa Kützing 1841
Lithothamnion minervae Basso 1995
Lithothamnion philippii Foslie 1897
Mesophyllum alternans (Foslie) Cabioch & Mendoza 1998
Mesophyllum expansum (Philippi) Cabioch & Mendoza 2003

Tricleocarpa cylindrica (J.Ellis & Solander) Huisman & Borowitzka 1990

Brown algae

Laminaria rodriguezii Bornet 1888

Animals

Sponges

Axinella spp.

Annex VII – DRAFT PROTOCOL FOR DATA COLLECTION AND ASSESSING THE INTERACTION OF FISHING WITH MARINE TURTLES

Note: The terms used in this document and the presentation of the data appearing therein in no way imply RAC/SPA's or the UNEP's having any stance as to the legal status of the states, territories, towns or areas, or their authorities or the tracing of their borders or limits.

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Executive summary

Today there are only seven species left in the group of marine turtles. Three of these feed in the waters of the Mediterranean and two certainly use the beaches of this basin (particularly the eastern basin) to reproduce. These three species – the *Caretta caretta* loggerhead turtle, the *Chelonia mydas* green turtle and the *Dermochelys coriacea* leatherback turtle, appear on the Red List of the International Union for the Conservation of Nature (IUCN) as endangered species (the first two) and a critically endangered species (the third). The three also appear in Annex II (the list of endangered or threatened species) to the Protocol on Specially Protected Areas and Biological Diversity in the Mediterranean (Barcelona, 1995).

Marine turtles encounter many threats, mainly linked to fishing activity and the loss of vital habitats at sea (feeding and wintering areas) and on land (egg-laying beaches). The impact of incidental catch on the various populations is today one of the most urgent problems that must be solved if all the species around the world are to survive. In the Mediterranean, too, all the species of marine turtle are concerned by fishing activity, in particular *Caretta caretta* and *Chelonia mydas*, which are the most common and the only ones that reproduce in this sea. Different data bears witness to this: a recent study on this threat shows that this factor causes more than 150,000 incidental catches and a high mortality – over 50,000.

Faced by this situation and as part of implementing the Action Plan for the Conservation of Mediterranean Marine Turtles, the present work has the main aim of defining a standard protocol for collecting pertinent information on by-catch of marine turtles in Mediterranean fisheries. This aim is achieved by defining, for the gear most involved, the main parameters that observers on board fishing boats should note. These parameters concern every aspect of fishing activity, i.e. the trip itself, the fishing gear, the various stages of the fishing operation and the catch recorded.

Although the prepared forms mainly concern marine turtles, some other protected or vulnerable species (cetaceans, sea birds, elasmobranchs) have not been forgotten. A form concerning all these species has been crafted, enabling even a preliminary assessment of their interaction with the various gear studied.

The collection of data on fishing is costly from both the financial and the time point of view. It is thus recommended that the observation forms on fishing operations prepared as part of this work should be correctly filled in so that the data gained is of excellent quality and can be used for the anticipated purposes. This would be an enormous help for implementing the Action Plan for the Conservation of Mediterranean Marine Turtles, particularly Item III-2 on priorities for assessing interactions with fisheries and the deaths that ensue.

Introduction

Today there are only seven species left in the group of marine turtles. Three of these feed in the waters of the Mediterranean and two use the beaches of this basin (particularly the eastern basin) to reproduce. These three turtles belong to two families, the Cheloniidae and the Dermochelyidae.

There is only one turtle left among the Dermochelyidae, the leatherback turtle *Dermochelys coriacea*, which enters the Mediterranean basin through the Gibraltar Strait to feed. Among the Cheloniidae we find the loggerhead turtle *Caretta caretta*, the commonest turtle, which nests mainly on the beaches of Greece, Turkey, Libya and Cyprus, and the green turtle *Chelonia mydas*, which, for reasons of climate, prefers the eastern shores of the Mediterranean (mainly Turkey and Cyprus).

The Mediterranean populations of the two latter species are found mixed up with those of the Atlantic who enter the basin via the Strait of Gibraltar. However, the threats in the Mediterranean affect the populations of the two regions differently.

Today, human activity-linked threats that can be termed indirect and that are increasingly numerous harm the marine turtles at every stage of their life cycle. Among these threats, the most alarming is by-catch. Although there is no fishing that specifically targets marine turtles in the Mediterranean, they are often caught incidentally. *Longlines*, trawls and mesh nets are traps that are often deadly. Caught in nets or by a hook at the end of a bottom *longline* line, or at the bottom of a trawl bag, the turtles are unable to surface to breathe. They drown the more quickly in that the stress they undergo considerably reduces their ability to survive underwater. Reports by stranding networks show clearly that corpses of marine turtles killed by fishing gear are found regularly; this however is but the tip of the iceberg – many beaches are not monitored and the dead bodies washed ashore are not recorded.

A recent study on incidental catch of marine turtles in the Mediterranean (Casale, 2008) asserts that over 150,000 turtles are caught every year (all species, sizes and origins) in the basin (including over 50,000 by surface *longline*, 40,000 by trawls and 30,000 by fixed nets) and that over 50,000 die.

Assessing interactions with fisheries and the deaths that ensue, reducing incidental catch to a minimum and eliminating deliberate massacres are among the priority actions of the Action Plan for the Conservation of Mediterranean Marine Turtles (UNEP MAP RAC/SPA, 2007) and many other conventions and conservation tools.

As a result of the recommendations made by the Transversal Workshop on Selectivity Improvement and Bycatch Reduction (SCMEE/SCSA/SCESS) held in Tunis, Tunisia, on 23-25 September 2009 for data collection on species that are ‘at risk’ or are of conservation interest (marine turtles, marine mammals, elasmobranchs and sea birds) and the need to craft a common protocol in the Mediterranean based on existing data, the Regional Activity Centre for Specially Protected Areas (RAC/SPA) – aware of this problem in the Mediterranean and its impact on the marine ecosystem and thus on fishing activities – offers this document, one that defines a standard protocol whose aim is to collect pertinent information on by-catch of marine turtles in Mediterranean fisheries. The protocol defines, for each gear, the main parameters to be noted by qualified, well-trained on-board observers to enable the interaction and the ensuing mortality to be assessed.

The fishing gear considered is *longlines*, trawls and mesh nets; these are the most concerned by interaction with turtles and engender most by-catch and thus mortality on a Mediterranean scale and elsewhere. This document provides forms that have to be filled in during work on fishing boats, some of which concern the biological data to be gathered at each turtle capture, enabling the

impact of each gear on the marine turtle population in the study region to be assessed.

Although this document mainly considers marine turtles, the forms contain sections that concern other species that are protected or at risk (marine mammals, sea birds, sharks, fishes) and this enables their interactions with the gear studied to be assessed.

The forms that concern fishing trips are the same for all the gear considered. Thus, the 'Fishing trip' form and its description will only be dealt with in the first chapter as far as it concerns *longlines*; it is the same for the other gear.

I. Need for a standardised protocol for data collection and assessment of by-catch

World fishing production of sea catch reached an average of 84 million tonnes between 1993 and 2003, 8% of which was incidental catch, or by-catch (FAO, 2004). Although the amounts of sea fish fished and then thrown back dropped by several million tonnes, due to the improvements made in several fields (selectivity of fishing gear and improved fishing practices, fisheries management that restricted access to certain stocks, anti-throw back policies implemented in some countries, etc.), and although the incidental catch of marine turtles, marine mammals and sea birds only represents a tiny part of the biomass fished, it has been shown that this catch has a negative impact on the populations of these threatened animals (Rojas-Bracho, 1999; Spotila *et al*., 2000). Although fishing is not the only danger confronting these animals, studying it with a view to regulating it to reduce incidental catch and mortality could have a positive effect.

Several workshops held in many places focusing mainly on the reduction of incidental catch of marine turtles, marine mammals and sea birds have argued the need to collect data via standardised protocols used by observers on fishing boats, especially *palangriers* (FAO 1998/1999a/1999b; FAO and Birdlife International, 2004). However, the reports from these workshops lack sufficient detail on what the norms and best practices should be. It should also be noted that other protocols are sufficiently exhaustive and set a very good example to follow (e.g. NOAA Fisheries Pacific Islands Region Longline Observer Data System).

In this report we are trying to present the necessary parameters to be collected to be able to assess by-catch as exhaustively as possible without the data collection losing its simplicity.

This collection will be done by well trained observers who work on board fishing boats.

II. What is an on-board observer?

An observer on board a fishing boat is a technician (preferably a biologist with qualification for tagging and sampling skin) who works independently at gathering biological information on board fishing boats. This information is used for scientific or regulating and management ends. The observers are recruited by private or public bodies for a limited period.

Observers of fishing operations gather precious information that can be obtained in no other way. They provide a good part of the information needed to better understand and better manage fishing, and make sure the regulations are respected. This data collection is costly, in terms of both money and time required. It is thus important that the fishing operation observation forms should be correctly filled in so that the data gathered is of excellent quality and can be used for the anticipated purposes (Brogan *et al*., 2009).

Working conditions are hazardous, sometimes dangerous, and sea conditions can be harsh. And

yet this work can also be adventurous. Once the observer is on the fishing boat, s/he enters a work environment that is also a home. It is a place where the members of the crew have already established a system of communication and responsibility. Sleep and feeding habits will thus be disturbed. The ability of the observer to face up to the situation in which he finds himself demonstrates his flexibility and resilience. The environment can thus be solitary, irritating, intrusive and hostile but it can also be agreeable; a good working relationship with the crew on board the ship ensures a good trip.

Aims

To shoulder their responsibilities, the following aims are established for observers on board fishing ships:

- Obtain reliable information on the interaction of marine turtles with fishing gear
- Obtain information on the fishing effort
- Record the interaction with other 'at risk' species (mammals and sea birds)
- Gather information on target species and throw-back species
- Gather biological information on the species studied (size, sex, etc.)
- Take biological samples, in accordance to national procedure.

Once on board, observers must also gather information of a general kind, needed for correct interpretation of the results. This information concerns:

- Features of the ship and fishing gear
- Specific composition of the catch
- Gather data on the boat's activity and the fishing operations
- Identify protected species, target species and species deemed to be by-catch
- Record the number and position of the various species (protected, target or by-catch) caught during the fishing operations or observed during the trip
- Gather biological data (size, sex, sex ratio etc.) on the protected species and captured species.

III. Data collection

The information requested will be recorded on forms that have been prepared beforehand. If the information requested on the data collection form is not available or is irrelevant, the box should be left empty and the situation should be described in the 'Comments' box. Make sure that any additional information that might be interesting is recorded. The writing must be legible and the information and events must be immediately recorded, not committed to memory.

Marine turtles and protected species generally have priority in data collection. Never let secondary information interfere with the priority information. During the data collection or the sampling of protected species, if the observer is unable to take down data on fishes or other species of secondary priority, just make a simple note. However, the observer must always watch what is happening during the rest of the fishing operation so that he does not miss protected species.

The data collection mainly concerns:

- All incidental catch and interactions with protected species. Marine turtles have highest priority. Marine mammals, sea birds and elasmobranchs come second
- Composition of catch
- Fishing grounds and features of the fishing gear
- Measurements of fishes and other species of zoological groups

- All the tags applied[1], observed or skin samples taken on the captured animals.

Concerning the taking of samples and in accordance to national procedure, the observer may take small portions of the skin according to need for laboratory studies or keep the whole animal if it is dead . For other species, it would be better to consult specific protocols.

IV. Necessary parameters for assessing interaction with fishery activity

Average rate of catch of marine turtles

The average rate of catch of marine turtles is *R*.

R is estimated as follows: $R = \frac{T}{FE}$

- *T* is the number of turtles caught during the operations studied
- *FE* is the fishing effort during the operations studied

It should be noted that the fishing effort and thus the rate of catch may vary from one region to the next and one season to another. No extrapolation is therefore allowed.

Particular attention must be paid to any difference between gear classified under the same heading. Bottom *longlines* and pelagic *longlines*, and benthic trawls and pelagic trawls, are gear that use different techniques and must therefore be handled separately.

Total number of turtles caught

The total number of catches *C* is obtained by multiplying the rate of catch *R* by the total fishing effort *H* in a studied region.

$C = H \times R$

Getting a reliable estimate of the fishing effort in a region is extremely difficult. It can only happen if the fishermen accept: (i) to voluntarily record on their log books any catch of a marine turtle and to mention the fishing effort made, or (ii) to agree to observers on board their ships for each sea trip. Now these two conditions are very difficult to achieve for problems of liabilities, insurance…etc.

The best solution for this calculation in the total absence of reliable data would be to use data available in fisheries administrations, such as number of trips for the entire fleet using a given gear and operating in a given area. It should also be noted that the **total catch** parameter does not automatically correspond to the number of individuals caught. A turtle may be caught on several occasions if it is released alive each time.

Mortality

Halieutic mortality caused by *longlines* is mainly due to the forced apnoea to which the captured specimens are subjected. There are naturally fewer deaths with surface *longlines*, for example,

[1] Recommandations and guidelines on tagging in the Mediterranean (Annexe II of the Action Plan fro the conservation of Mediterranean marine turtles) should be used

since the animal is still able to swim and reach the surface to breathe, although it is hampered by the hook, unlike the bottom *longline* where the weights attached to the main line often prevent this and the animal ends up drowned (Jribi *et al*., 2008).

The rate of direct mortality *p* is the proportion of turtles found dead during fishing operations when the catch is brought on deck. This proportion is estimated from the number of the total catch.

Total mortality is estimated as follows: $TM = C \times p = H \times R \times p$

Specimens can be found alive, dead (direct mortality) or comatose. In the last case, if by ignorance the marine turtles are not recognised as being comatose and are considered as dead, and thrown back into the sea, they will die. Without handling procedures to bring the turtles out of it, the state of coma is deemed to be potential death (Laurent *et al*., 2001).

Furthermore, it really is impossible to follow a freed turtle or anticipate what will happen to it. As fishermen usually: (i) cut the line in various ways, leaving pieces of differing lengths, and/or (ii) let specimens go without a true knowledge of their state of health, it is very difficult to check the idea that a specimen freed with a hook and part of a line within its body, or in a bad physical state, is able to survive. Anyway, the mortality caused by the various fishing gear is still far from being assessed with certainty. The study done by Casale *et al*. (2007) in the care centre shows that mortality caused by *longlines*, for example, is high (much more than 30%) and may happen in the short or long term.

V. Longlines

Use of *longlines* is deemed to be one of the oldest fishing techniques (it seems to have been known since 177 BC in Sicily (Camiñas and de la Serna, 1995)). It is based on the very old way of fishing using hooks and bait.

A *longline* usually consists of a main line (mother line) on which a series of baited hooks is fixed with secondary lines (*avançons*) distributed at regular intervals along it, sufficiently far apart to prevent them getting tangled up when the lines are drawn in.
This technique, which can be adapted to different boats, including sailing boats or row boats for coastal fishing, does not require particularly expensive equipment. Upkeep merely involves replacing the damaged or lost hooks and renewing material lost when fishing.

According to the species sought, the *longline* may be fixed at various depths: bottom *longline* (Fig. 1) or near bottom (demersal) *longline*, and open sea (pelagic) *longline* (Fig. 2). Its total length can vary from a few dozen metres to several kilometres and the number of hooks may be several thousand. Basically the differences concern the size of the hook, the length of the main line and, thus, the number of hooks, and the time the line is set and drawn up. Usually the floating *longline* is longer and its hooks are bigger.

The bait set on the hook is chosen according to the target species and also according to its availability, resistance and cost.

During a fishing trip, there can be one or several fishing operations. A fishing operation starts with the dropping of the line and ends when it is drawn in.

The bottom *longlines* used in the Mediterranean are usually small, bearing about 1,500-2,000 hooks almost always baited with sardines (Sacchi, 2007). The target species are bottom fishes like grouper, dentex and gilthead sea bream. For surface *longlines*, 3 main kinds are used: the swordfish *longline* (*Xiphias gladius*), the longfin tuna *longline* (*Thunnus alalunga*), and the tuna

longline. A feature is sequences of small numbers of very long *avançons* with buoys between them to keep them on the surface. The three types of *longline* are very long (50 to 100 km.) but differ as to the size and depth of immersion of their hooks. The bait used is usually either sardine (longfin tuna), mackerel or squid (swordfish, red tuna) (Sacchi, 2007). Over-fishing of the swordfish stock, markedly reducing the probability of catch and the average size of specimens caught, has led fishermen to other species of fish. This is so in the south of Tunisia where the shark *Carcharhinus plumbeus* is a target species for this fishing gear (Echwikhi *et al*., 2010).

In most cases *longline* catch arrives on deck alive and is treated suitably (evisceration and conservation in ice); it appears on the market as a high quality product, superior to that from other fishing techniques.

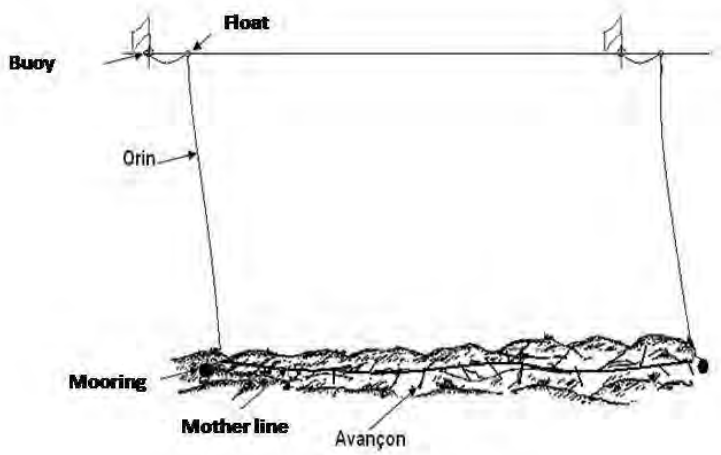

Figure 1 : Bottom *palangre*

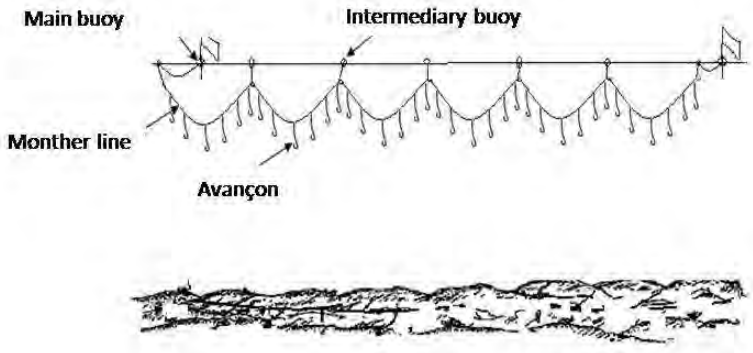

Figure 2 : Surface *Palangre*

V.1 Impact on the environment and threatened species

Except for the risks of dredging by the mooring weights or of the hooks catching on the bottom, use of *longlines* presents no risk of degrading the substratum or even fixed flora or fauna. But there are great risks to elasmobranchs, sea birds, marine mammals and marine turtles. The blue shark (*Prionace glauca*) is the species most often caught by Mediterranean *longline* fisheries (De Metro *et al*., 2000; Orsi Relini *et al*., 1998; Raymakers and Lynham, 1999). In the south of Tunisia, the grey shark (*Carcharhinus plumbeus*) is the main species targeted by surface *longlines* now that the swordfish *(Xiphias gladius*) has become scarce. The weaver shark (*Carcharhinus brevipinna*) is also fished in large quantities (Echwikhi *et al*., 2010).

Longline fishing seems to be the main cause of deaths of sea birds, especially when the gear is fixed near areas where sea birds concentrate, like nesting areas. Most incidental catch happens when the *longlines* pay out their lines, for the birds try to seize the bait on the hooks. Once the hook is swallowed, or sometimes when the bird gets entangled in the lines, it is pulled under the water and drowned (Valeiras and Camiñas, 2003).

Marine mammals are also caught incidentally by *longlines*, either when entangled in the lines or when trying to swallow the bait or the fishes that have already been caught: depredation.

Among the three species of marine turtles in the Mediterranean, it appears that only *Caretta caretta* is regularly caught by *longlines* (Gerosa and Casale, 1999). The green turtle is a herbivorous species that frequents different areas than the *longline*'s target areas. The leatherback turtle is rarely caught and only represented 0.1% of the turtles caught in many fishing drives in Spain, Italy and Greece (Laurent *et al*., 2001).

Recent studies done in the Mediterranean show catch rates of the order of 0.69 to 1.41 turtles/1,000 hooks in Spain (Camiñas *et al*., 2006), 0.27 turtles/1,000 hooks in the Ionian Sea (Italy) (De Florio *et al*., 2005), 0.97 turtles/1,000 hooks around the Island of Lampedusa in Italy (Casale *et al*., 2007), and about 0.82 in the Gulf of Gabès region in Tunisia (Jribi *et al*., 2008). Total catch of *Caretta caretta* by surface *longlines* is, according to Casale (2008), about 50,000, with deaths of over 20,000 specimens, essentially in Spain, Morocco, Italy, Greece, Malta, Libya and other possible countries.

Benthic *longlines* are much less studied than surface *longlines*; a study done in Italy shows a catch rate of the order of 0.87 turtles/1,000 hooks (Casale *et al*., 2007), whereas in the Gulf of Gabès in Tunisia the rate is about 0.28 turtles/1,000 hooks (Jribi *et al*., 2008). This gear also gives rise to a fairly sizeable catch of over 35,000, with about 14,000 deaths, essentially in Tunisia, Libya, Greece, Turkey, Italy, Egypt, Morocco and other possible countries (Casale, 2008). Bottom *longlines* are harmful in that turtles remain attached to the hooks near the bed for longer, in general, than their apnoea capacities. The danger also depends to a great extent on the depth at which the gear is placed. Its use at great depths should not pose any problem. However, in the Mediterranean, this method is usually carried on in shallow depths and is thus harmful to the Mediterranean population of loggerhead *Caretta caretta* turtles in particular.

V.2 Forms

V.2.1 Fishing trip

This form is filled in once only for each fishing trip. It is used to record the features of each trip

(name and characteristics of the ship, licence number, name of operator, etc.). When it is separated from the observer's other sheets it becomes very difficult to associate it with the appropriate ship, so care must be taken not to separate the sheets.

The main information to record is:

- Observer identifier: This is given to each observer during training or when s/he is first recruited. It is written in the top left-hand corner of the form

- Type of trip: Two types of gear will be used during a trip to practice benthic or pelagic fishing (Surface). Use the letter **S** for surface or fairly shallow fishing and the letter **B** for benthic fishing. If several kinds of gear are used, this must be noted in the additional information box. The type of trip is written in the upper left-hand corner of the sheet

- Trip number: In the upper right-hand corner of the sheet, write the gear used (SP=surface *longline*; BP=bottom *longline*; BT=benthic trawl; PT=pelagic trawl; and MN=mesh net) followed by the number of the trip in 4 figures

- Ship identifier: This means the number of the ship written on both sides of the prow and the sides of the wheel-house, the name of the boat as it appears on the stem, the length that can be obtained via the ship's papers or directly from the captain, and lastly the name of the ship's real owner

- Start of trip:

    - Date/time of departure: The date and the exact time of departure are recorded the moment the ship casts off from the quay using the Day Month Year form (DD MM YYYY) (e.g. the 9th July 2010 is recorded as 09 07 2010). Local time is used and the clock is a 24-hour one with two figures for the hour and two figures for the minutes (e.g. 5 minutes past 6 is 0605; 4.27 p.m. is 1627).
    - Port of registry: Indicate the name of the town from which the ship sets out.
    - Port of call: From time to time the ship visits ports for reasons other than landing catch. In this case the appropriate boxes must be filled in. Sometimes the ship leaves the quay to moor in another part of the port to take on ice, bait or other supplies. These stops must not be seen as ports of call or intermediary ports. The number of call stops is written on the sheet starting with the number 1.

- End of trip:

    - Date/time of arrival: The date and exact time of arrival are recorded the moment the ropes are attached to the quay at the end of the fishing trip. The data is written down in the same way as for the departure
    - Port of arrival: The port of arrival is where the ship lands its catch. This port is not automatically the port of departure.

- Comments: This section is used for any explanation concerning details of the halts in ports of call or any other information that does not appear in the data boxes. This section should also be used to record all the specimens that are not recorded on the catch form. This could mean, for example, a sea bird that dies on deck after smashing into the ship but was not brought in by fishing gear.

Use the other side of the sheet if the appropriate box is not big enough.

RAC/SPA
by-catch Protocol
Fishing Trip Form

Observer identifier

Trip number

Type of trip

Features of trip

Number of ship | Name of ship | Length of ship | Name of owner

Time of trip and ports of call

Departure of the trip — Departure : Date/time (Day, Month, Year, Hour, Minute) — Port of departure

N°	Stop: Day	Month	Year	Hour	Minute	Departure: Day	Month	Year	Hour	Minute	Port of call

End of trip — End : Date/Time (Day, Month, Year, Hour, Minute) — Port of registry

Comments and additional information .....

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V.2.2 *Longline*/Dropping and drawing up the gear

All the information on the form is used to describe and record the basic elements of the *longline*'s dropping of gear. This information is gained by direct observation and mainly concerns:

- General information about the observer, the trip (number of trip) and anchorage (numbered for each trip starting from 01)

- Information about dropping the gear: This is information taken at the beginning and end of the dropping of the gear:

    - Date (DD MM YYYY) and exact time (24-hur clock) of the setting of the first mooring and at the end of the setting of the last mooring
    - Location: The ship's position (latitude and longitude) is taken using the on-board GPS. Note the latitude (dd° mm.mmm') and longitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Meteorological conditions: mainly concerning the state of the sea (follow the key on the sheet) and the direction and force of the wind (follow the key on the sheet)
    - Surface temperature of the water taken using a ship's thermometer (if it has one) and using a portable thermometer

- Information about **drawing in the lines**: This is information taken at the beginning and end of the drawing in of the lines:

    - Date (DD MM YYYY) and exact time (24-hour clock) of the beginning and the end of drawing in the *longline*'s gear
    - Location: The ship's position (latitude and longitude) is taken using the on-board GPS. Note the latitude (dd° mm.mmm') and longitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Meteorological conditions: mainly concerning the state of the sea (follow the key on the sheet) and the direction and force of the wind (follow the key on the sheet)
    - Surface temperature of the water taken using a ship's thermometer (if it has one) and using a portable thermometer

- Other events: During the fishing operation, certain accidental events can happen and can affect catch of target species and interaction with protected species.

    - The starting tip for raising the lines: The drawing in usually starts by the tip last set, but this is not always so. Drawing in can sometimes start from the other end of the line, or even from some other point
    - Loss of part of the line: State whether the main line was accidentally cut during the drawing in or whether the crew cut the main line at the level of a bad section or a tangle
    - Interaction with protected species: State on the form whether there was interaction with a protected species, even if this was an attempted approach to the gear during the setting of the gear. Details will be written on the forms about the interaction with the protected species

- Comments: This section is used to report unusual or important events that have an effect on the fishing strategy, or caused problems. It is used to describe any event or particularity that

has no place or is not recorded on the form. It can also be used to explain why information was not gathered.

RAC/SPA
By-catch Protocol
Mesh net/Fishing operation Form

Observer identifier

Trip number

Drop number

Information Dropping/Drawing in gear

Beginning of drop

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

End of drop

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

Beginning of drawing in

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction ind/force

Surface temperature ℃

End of drawing in

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

State of sea
01 Calm
02 Rippled
03 Choppy
04 Rough
05 Very rough

Wind direction
01 North 02 North/east
03 South/east 04 East
05 South 06 South/west
07 West 08 North/West

Wind force
01 Calm
02 Light breeze
03 Breezy
04 Fresh breeze
05 Moderate

Drawing in from
Start end ☐
End end ☐
Other ☐

Net damaged No ☐ Yes ☐

Interaction with protected species
No ☐ During gear drop ☐
Yes ☐ **During drawing in of gear** ☐
At rest ☐

Comments

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V.2.3 *Longline*/Features of the gear

The data in this form describes the features of the different parts of the fishing gear. It can be used *inter alia* to study the effect on catch of protected species and target species. The form must be filled in before the start of the fishing operation via direct observations or measurements taken by the observer himself. He must from time to time consult the captain or crew for further details. A form must be filled in for each fishing day, even if nothing has changed.

- General information about the observer, the trip (trip number) and fishing operation

- Hooks/floats/weights: This information mainly concerns:

    - The number of floats: This is the number of main (attached to the tips of the line) or intermediary floats or buoys that enable the boat to localise the line and alert other fishing units to the presence of the *longline*. State whether luminous devices are used for this purpose (state number and colour)
    - Number of weights: This is the number of weights used to fix the mother line on the sea bed for the benthic *longline*. The nature of the weights may also be recorded
    - Hooks: This means the number of hooks used (J hooks, circular hooks, tuna hooks etc.), their size, the number between two consecutive floats, number between two weights and number for each dropping of the gear. It is better to count the number of hooks before the start of each fishing operation

- Mother line, *avançons* and *orins*: In this part, state the material used, and the lengths and diameters of the various lines used in the *longline*'s makeup

- Fishing technique: In this part of the form, state the depth at which the captain intends to carry out the fishing operation, the target species and the bait used. Say whether many kinds of bait are used

- Comments: This section is used to record every detail or specificity of the gear that has not been noted on the form.

Identifier observer

RAC/SPA
By-catch Protocol
***Longline*/Fishing gear Form**

Trip number

Drop number

Gear/Features and techniques

Type of longline

✓ ☐ Bottom *longline*

✓ ☐ Surface *longline*

Floats/Moorings

Number of floats

Number of weights

Hooks

Type

01 Tuna 03 Circular
02 Luminous 04 Other

Taille

No. Hooks between 2 floats

No. Hooks between 2 weights

Number of hooks

Signal buoy

Type

01 Circular
02 Luminous
03 Other

Number

Colour

01 White 02 Black
03 Green 01 Red
05 Bleu 06 Yellow
07 Other

Fishing technique

Depth (m)

Target species .....
.....

Bait

01 Sardine 03 Mackerel
02 Squid 04 Other.....

Mother line

Kind of Material

01 Monofilament 03 Other
02 Poly

Diameter (mm)
Length (km)
Colour

01 White 02 Black
03 Green 01 Red
05 Bleu 06 Yellow
07 Other

Avançons

Kind of Material

01 Monofilament 03
Other

Diameter (mm)
Length (km)
Colour

01 White 02 Black
03 Green 01 Red
05 Bleu 06 Yellow
07 Other

Comments

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V.2.4 Longline/Catch

The form concerns all the target and protected species caught during the fishing operation. It also concerns their condition, location and certain metrical features. The data recorded basically helps when calculating the catch rate for target species and protected species. The data will be of very great use for determining the efficacity of certain methods (e.g. circular hooks) on catch of target species and protected species.

The observer must record all the specimens of fishes and protected species caught. Each specimen is recorded on a separate line. At the end of the line it must be shown whether there is a marking applied and if a photo has been taken. Any catch of a strange or uncommon species must be written under 'Comments'.

The observer must not take measurements in dangerous conditions (very active dangerous animal, bad weather, etc.).

The main data to be recorded is:

- General information about the observer, the trip (trip number), the fishing operation, page number and date

- Name of species: State the common and scientific name of the species. It would be better to have a guide of fishes on hand for this task. It is always better to take photos and attribute their number to each specimen

- Float or mooring number: The floats (especially surface *longline*) and weights (bottom *longline*) are counted consecutively starting from the number 01

- Hook number: The hooks are counted consecutively between the floats or weights. If, for example, a specimen has been caught three hooks after the drawing in of float 05, write float 05 and hook 03

- Animal's physical condition: State the physical condition of the animal when caught.
    - Fish: **A**=Taken **A**live; **D**=Taken **D**ead; **ID**=**I**ndeterminate state
    - Protected species: **A**=Taken **A**live; **D**=Taken **D**ead; **C**=**C**omatose; **W**=**W**ounded; **ID**=**I**ndeterminate state

- Animal kept/rejected: State whether the caught animal was kept or thrown back into the water and the condition when it was thrown back.
    - Kept: **K**
    - Rejected: **RA**= **R**ejected **A**live: **RD**=**R**ejected **D**ead; **RW**=**R**ejected **W**ounded; **RC**=**R**ejected **C**omatose; **RR**=**R**ejected after **R**ehabilitation; **RID**=**R**ejected in **I**ndeterminate state

- Sex: Where possible, state the animal's sex. If its sex is not determined with precision, leave the box empty (**M**=**M**ale; **F**=**F**emale; **ID**=**I**ndeterminate)

- Measurement: Where possible, take measurements of fishes (**TL**=**T**otal **L**ength and **LF**=**L**ength at **F**ork). Do not take measurements of dangerous fishes that are still alive (e.g. sharks). For turtles, simply state whether measurements have been taken. A special form for marine turtles will be filled in. It is possible for certain specimens, which have not been landed on deck, to state approximate measurements

- Tagging: State (X) for protected species, if the captured animal is tagged or if a tag has been applied (this mainly concerns marine turtles)

- Sample: State (X) if a biological sample has been taken (a piece of tissue or the whole animal)

- Photo: State (X) if a photo has been taken of the animal

- Comments: State (X) if there are comments describing the animal. This section will be used for any explanation or any detail concerning the animal in question.

RAC/SPA
By-catch protocol
***Longline*/Catch Form**

Observer identifier

Trip number

Page number

Day Month Year

Number of fishing operation

Catch

Line number	Name of specie	Number of float	Number of mooring	Number of hook	Physical condition	Animal Kept/Rejected	Sex	Measurement		Tag	Sample	Photo	Comments
								LT	LF				
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Physical condition
A Alive
D Dead
C Comatose
W Wounded
ID Indeterminate

Sex
M Male
F Female
ID Indeterminate

Animal Kept/Rejected
K Kept
RA Rejected Alive
RD Rejected Dead
RW Rejected Wounded
RC Rejected Comatose
RR Rejected after Rehabilitation
RID Rejected/Indeterminate condition Rehabilitation

Comments

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V.2.5 *Longline*/Interaction with threatened species

This form allows data concerning the nature and number of protected species (marine turtles, marine mammals and sea birds) linked to *longline* fishing operations to be recorded. However, in this form, there can be a description of these animals when they were observed without their having been direct contact with the fishing gear.

During a fishing operation, several contacts (observation or capture) with threatened species may take place. Each contact is recorded on a separate line and a form contains as many lines as there were contacts.

- General information's about the observer, the trip (trip number), and the fishing operation

- Page number: During a fishing operation, if many contacts with threatened species took place, several pages will be filled in. Each page will be numbered

- Number and nature of the contact: Each contact (observation or capture of the animal) is recorded on a separate line. If there are not enough lines on the page for a fishing operation, continue on another form without starting again from 01. For example, if the first form has contacts from 01 to 10, page 02 starts with contact 11

- Date/time: The date and the exact time are recorded at the moment of each contact

- Activity of the ship: Record the activity of the ship at the moment of contact. This contact may take place when sailing towards or leaving the fishing grounds, when the lines are being dropped or drawn in…(follow the key on the form)

- Location: The location (latitude and longitude) is taken using on-board GPS at the moment of contact. Note the latitude (dd° mm.mmm') and lon gitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)

- State of the sea: Fill in from the key on the form

- Species: The key of species is recorded from the list on the form. The list concerns the most common species in the Mediterranean

- Animal's behaviour: The animal's behaviour is recorded from the key on the form. The animal may enter into direct contact with the gear and may or may not be caught, moving around or pursuing prey (fishes or other), pursuing the ship, resting on the surface of the water, feeding on gear catch, etc.

- Animal's physical condition: This criteria indicates the condition in which the animal was observed or caught. The animal can be dead or alive, wounded, decomposing…(follow the key on the form)

- Number of animals: This criterion basically concerns observed animals. An approximate estimate of the number will be important if the exact number is difficult to determine

- Photo: State whether a photo has been taken of the animal

- Comments: This section is used to describe any event or particularity that has no place or is not recorded on the form. It can also be used to give further information or to explain why certain information was not gathered.

RAC/SPA
By-catch Protocol
Interaction *Longline*/Protected species Form

Observer identifier

Trip number

Page number

Fishing operation number

Interaction *Longline*/Protected

Contac number	Nature of contact	Date/time					Activity of ship	Location		Stade of sea	Species	Behaviour	Physical condition	Number	Photo ✓
		Day	month	year	Hour	minute		Latitude	Longitude						
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Contact
01 Catch
02 Observation
03 Other

State of sea
01 Calm
02 Rippled
03 Choppy
04 Rough
05 Very rough

Activity of ship
01 Sailing (tripout)
02 Sailing (returning)
03 Dropping gear
04 Drawing in gear
05 Resting
06 Other

Common protected species
01 Loggerhead turtle *Caretta caretta*
02 Green turtle *Chelonia mydas*
03 Leatherback turtle *Dermochelys coriacea*

04 Bottlenose dolphin *Tursiops truncatus*
05 Common dolphin Delphinus *delphis*
06 Striped dolphin *Stenella coeruleoalba*
07 Risso's dolphin *Grumpus griseus*
08 Killer whale *Orcinus orca*
09 Long-finned pilot whale *Globicephala melas*
10 Common rorqual *Balaenoptera physalus*
11 Sperm whale *Physeter catodon*

12 Cory's shearwater *Calonectris diomedia*
13 Balearic shearwater *Puffinus yelkouan*
14 Terns *Sterna sp*
15 Others

Behaviour
01 Contact (catch)
02 Attempt, without contact
03 Near the gear
04 Swimming on the surface
05 Resting on the surface
06 Feeding on throw back
07 Feeding from the gear
08 Pursuing gear
09 Other

Physical condition
01 Alive, good condition
02 Comatose
02 Wounded
03 Freshly dead
04 Decomposing
05 Condition unknown

Comment
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V.2.6 *Longline*/Catch of marine turtles

This form must be filled in every time a marine turtle is caught. Even if the turtle was not brought on deck, as much data as possible must be given. Data collection also concerns turtles that were strangled or tangled in the lines. For turtles not brought on deck, the general information (heading of the form) and data concerning the catch and the release must be recorded.

The main data to be recorded is:

- General information about the observer, the trip (trip number), and the fishing operation

- Name of species: State the scientific name of the species of marine turtle. If this is another species that is not common in the Mediterranean, put 'Other' and take a photo

- Other information: State (X) if a photo has been taken, a sketch made, a sample taken or a tag applied to or removed from the animal

- Corresponding page and line on the catch form: State the page number and line number on the catch form corresponding to the turtle in question

- Catch: State the data concerning the capture of the turtle.

    - Date/time: The date and time of the capture are recorded using the Day Month Year (DD MM YYYY) format and the 24-hour clock
    - Location: The latitude and longitude of the point of capture are taken using the on-board GPS. Note the latitude (dd° mm.mmm') and long itude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Tagging: State whether the turtle bears a tag at the moment of capture

- Release: State the data concerning the release of the turtle

    - Date/time: The date and time of the capture are recorded using the Day Month Year (DD MM YYYY) format and the 24-hour clock
    - Location: The latitude and longitude of the point of release are taken using the on-board GPS. Note the latitude (dd° mm.mmm') and long itude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Tagging: State whether a tag was applied to or removed from the turtle at the moment of release
    - Physical condition: State (from the key on the form) the animal's physical condition when it was released

- Method of catch:

    - Caught by hook or strangulation: state how the animal was caught
    - Place of the hook or the strangling: state the position of the hook or line on the turtle causing its capture
    - Removal from the gear: State in the best way possible how the animal was removed from the gear and whether part of the gear (hook or line) remained attached to the animal

- Morphology:
    - Cover of the carapace: State whether the carapace was covered by skin or plates
    - Plates of the carapace: If it is covered by plates, state the number of vertebral, right and left costal, right and left marginal and right and left infra-marginal plates (consult the sketch for the names of the various plates)

- Measurement: The curve measurements are the simplest and most often used by herpetologists. They will be taken using a tape measure. Remove all the epibionta that have adhered to the carapace and that can affect the measurements. The main measurements to take are:

    - The standard curved carapace length (SCCL): This is the distance between the nuchal and the most distal of the two last marginal.

    SCCL

    - The curved carapace width (CCW): This is the curved measurement of the widest part of the carapace

    CCW

    - Tail length (TL): This is the distance between the posterior tip of the plastron and the point of the tail

- Signal buoy: State in this section of the form the nature of the signal buoys used (the same as on the fishing gear form), their colour and distance (in number of *avançons*) between the captured turtle and the closest buoy

- Comments: This section is used to state certain details that do not appear on the form. This mainly concerns how the turtle was brought on deck (if it was), removal of the fishing gear, rehabilitation of the animal if it was comatose, etc.

RAC/SPA
By-catch Protocol
***Longline* /Marine Turtle Form**

Observer identifier

Trip number

Drop number

Catch / marine turtle

Species

01 Loggerhead turtle *Caretta caretta*
02 Green trutle *Chelonia mydas*
03 Leatherback turtle *Dermochelys coriacea*
04 Other

Photos
Sample
Sketch
Tag

Page number/Catch form
Line number/Catch form

Capture

Day Month Year Hour Minute

Date/time

Latitude N

Longitude E

Presence of tag
01 yes
02 no

Release

Day Month Year Hour Minute

Date/time

Latitude N

Longitude E

Tag
Applied
Removed

Physical Condition
01 Already dead
02 Good condition
03 Wounded
04 Died on deck
05 Comatose
06 Indeterminate

Method of catch

By hook
By strangling

Hook visible

01 yes

Position of hook
Position of strangling

01 Swallowed
02 Head/neck
03 Beak
04 Forefoot
05 Hindfoot
06 Carapace
07 Tail
08 Other

Gear removed

01 yes
02 no

Gear still attached to the animal

01 Gear removed
02 Hook
03 Line
04 Hook and line

Commentaire :
……
……
……

Morphology

Carapace cover

01 Skin
02 Plates

Number of plates
Vertebral plates
Right costal plates
Left costal plates
Right marginal plates
Left marginal plates
Right infra-marginal plates
Left infra-marginal plates

Measurements

(State carapace measurements to within about 0.5 cm)

SCCL(Standard Curve Carapace Length)

CCW (Curved Carapace Width)

TL (Tail length)

Catch/Signal buoys

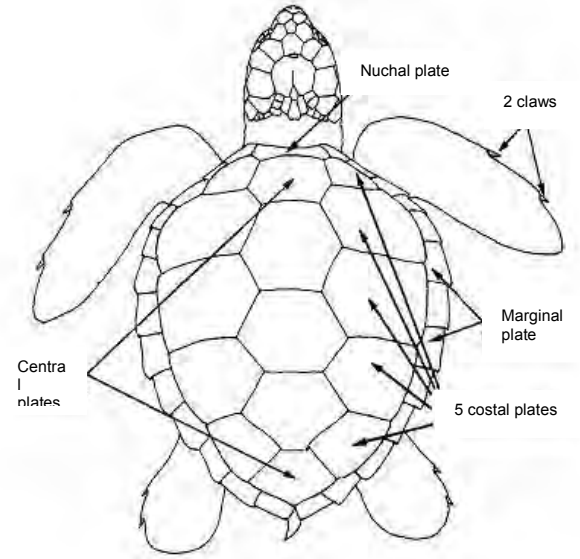
Type

01 Flag
02 Luminous

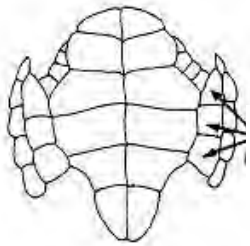
Colour

01 White
02 Black
03 Green
04 Red
05 Blue
06 Yellow
07 Other

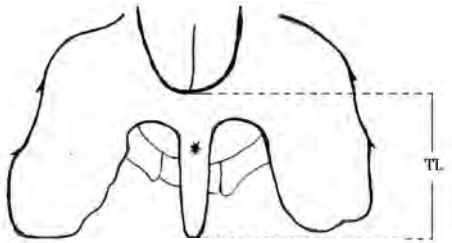
Distance buoy/turtle caught
(State number of avançons)



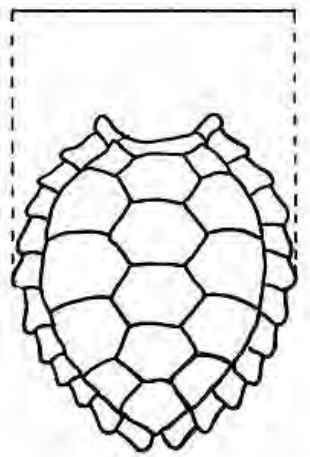
Back



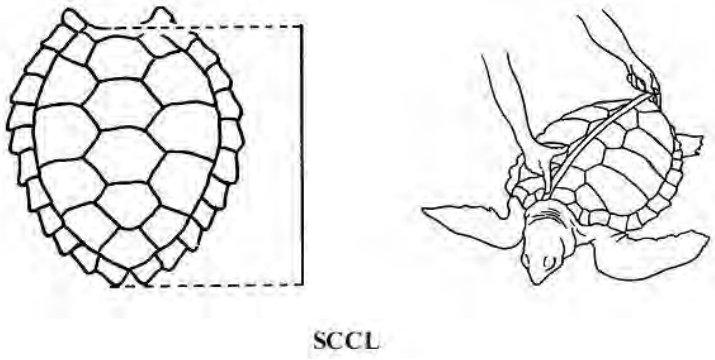
Plastron



Tail lengh



Curved Carapace Width



Longueur Standard Courbe de la Carapace

Comments

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VI. Trawls

A trawl is a dragged net of approximately conical shape, whose small base is closed by a 'dead end' pocket while the biggest hole is kept open by a pole or panels set at the lateral tips. The net is trawled by one or many ships. This is an 'active' way of fishing in that it catches every animal on its path, conveying them into a terminal bag.

According to the trawled area and the target species, the kinds of trawl (and there are many) can be put into two big categories according to whether or not they come into contact with the sea bed: benthic trawls (Fig. 3) and pelagic trawls (Fig. 4).

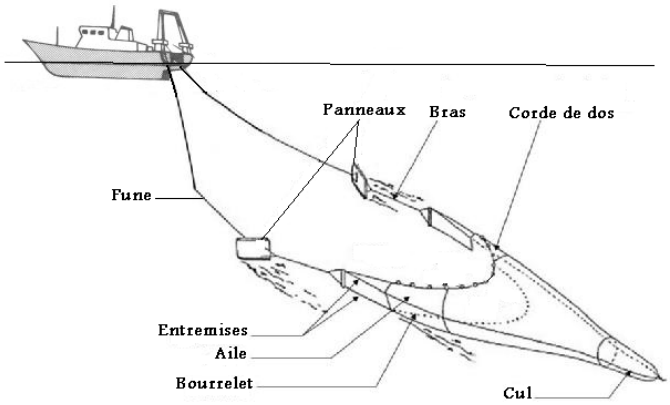

Figure 3: Chalut benthique

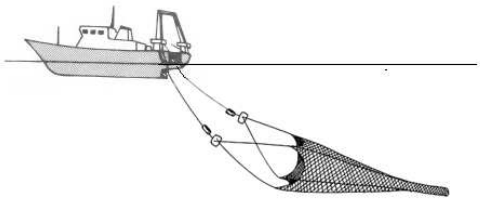

Figure 4: Chalut pélagique

According to the mode of operation, in the Mediterranean there are three major families of trawl (Sacchi, 2007): (1) trawls with a small vertical opening (most of the Mediterranean bottom trawls belong to this type), less than 2 metres, adapted to catching animals that live very close to, or slightly detached from, the sea bed, such as shrimps and flatfish; (2) trawls with big vertical openings of 20-25 metres especially used for catching small pelagics or demersal species. These trawls can be used either with pelagic panels or dragged by two boats in tandem; (3) fixed frame trawls whose vertical and horizontal openings are fixed by a fixed or 'pole' frame in wood or metal.

When fishing with a panel trawl, the trawl is linked to the panels by a pair of flanges (in rope or steel cable), and the **gates** of the trawl are linked to the ship by a pair of *funes* (usually in steel cable). The opening is kept wide open by divergent panels (trawl gates) in front of the trawl that keep the trawl open at the sides, while the vertical opening is maintained by weights on the lower part (*bourrelet*) and floats on the upper part (back rope).

VI.1. Impact on the environment and threatened species

Trawls (especially benthic ones) that scrape or eat into the sea bed have the greatest impact on the environment as regards destruction of the habitat and changes in sediment structure and selectivity of catch. The limited selectivity of trawls is a major problem. In most fisheries this gear simultaneously catches many species of different shapes and sizes and thus gives rise to pretty

sizeable throw back.

Habitats located in the trawled area, and composition of fixed flora and fauna, are all but irreversibly spoiled according to the frequency of the fishing. The impact is, however, variable according to the sectors fished: it is, for example, great in hard beds dominated by big sessile fauna, with a significant reduction in abundance of sponges, anthozoa and corals, but is fairly low in silty beds.

Although the populations of marine mammals and sea birds seem to be little affected in the Mediterranean by trawling, catches of chondrichthyans and marine turtles are recorded to be fairly sizeable.

In the Mediterranean, there is strictly speaking no chondrichthyan-targeted fishery. But the sustained growth of this type of fishing effort has helped bring about a gradual decline of certain species in the continental shelf and slope, particularly because of the deterioration of their habitats (Sacchi, 2007). Some endangered or vulnerable species are often among those thrown back into the sea.

As for sea birds, trawling does not cause direct mortality but can make certain species become dependent on throw back.

As for marine mammals, incidental catch by trawling is rarely mentioned. And yet cetaceans can approach the trawls, attracted by the fishes that escape from them or the catch that is thrown back. The sounds emitted by the engines, especially when the trawl pulls in the lines, are often characteristic and likely to attract dolphins.

As for marine turtles, the main impact is due to benthic trawling when done in relatively shallow waters frequented by these animals. Of the three species of marine turtle in the Mediterranean, it seems that the loggerhead turtle *Caretta caretta* is most affected by trawl catch, given the size of its population compared to the two other turtle species present in the basin.

Estimates available in the Mediterranean indicate fairly sizeable catch in Italy, Tunisia, Croatia, Turkey and Egypt. Overall, Italy and Tunisia seem to be the countries by far most concerned by by-catch, with over 20,000 catches per year for the two countries (Casale, 2008). The marine areas most affected by by-catch of marine turtles in the Mediterranean are the North African continental shelves (Tunisia, Libya and Egypt), the Adriatic, the Levantine Sea and the Aegean Sea.

In all, the available data enables us to estimate a yearly number of catches by the Mediterranean trawling fleet of over 40,000. Note that this figure represents the number of captures not that of individuals, for the same turtle can be caught several times over if it is released each time.

Mortality caused by trawling depends on several factors (e.g. duration of drag), making it extremely variable from one country to the next. Mortality recorded in the Gulf of Gabès in Tunisia, for example, is no more than 182 individuals per year despite a big total annual catch of the order of 5,458 catches (Jribi *et al*., 2007). According to Casale (2008), there are 7,400 (20%), and probably even more than 10,000, annual deaths from benthic trawling in the Mediterranean.

VI.2 Forms

VI.2.1 Trawl/Dropping and drawing in the gear

This form is used to describe and record basic elements of the trawl gear drops. To collect the data the observer must consult the captain and members of the crew and go by direct observations. The data must be filled in for each trawl drag and mainly concerns:

- General information about the observer, the trip (trip number), and the trawling (drags are numbered for each trip starting from 01)
- Information about dropping the gear: This is information taken the moment the trawl drops the gear:
    - Date (DD MM YYYY) and exact time (24-hour clock) when the trawl is put into the water (beginning and end)
    - Location: The position of the ship (latitude and longitude) is taken using the on-board GPS. Note the latitude (dd° mm.mmm') and long itude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Meteorological conditions: Mainly concerns the state of the sea (follow the key on the sheet), and the direction and force of the wind (follow the key on the sheet)
    - Surface temperature taken using the ship's thermometer, if it has one, or a portable thermometer
- Information about drawing in the gear: This is information taken the moment the trawl draws in the gear:
    - Date (DD MM YYYY) and exact time (24-hour clock) when the trawl is drawn out of the water (beginning and end)
    - Location: (Latitude and longitude taken from the on-board GPS)

- Meteorological conditions: Mainly concerns the state of the sea (follow the key on the sheet), and the direction and force of the wind (follow the key on the sheet)
- Surface temperature taken using the ship's thermometer, if it has one, or a portable thermometer

- Other events: During the fishing operation, certain accidental events may happen and affect the catch of target species and interaction with protected species.
  - Interruption of the fishing operation: State whether the trawl drag was interrupted and why (mechanical, operational, etc.)
  - Interaction with protected species: State on the form whether there was interaction with a protected species even if this was an attempted approach to the gear during the dropping or drawing in of the gear. Details will be written on the form about the interaction with protected species and the form about capture of marine turtles

- Comments: This section is used to describe any event or particularity that has no place or is not recorded on the form. Interruption of the fishing operation is especially described in this section. It can also be used to explain why information was not gathered.

RAC/SPA
By-catch Protocol
Trawl/Fishing operation Form

Observer identifier

Trip number

Trawl drag number

Information Dropping/Drawing in gear

Start of dropping

Date/hour (Day Month Year Hour Minute)

Latitude (Deg Min) N

Longitude (Deg Min) E

State of sea | Wind/direction | Wind/force

Surface temperature ℃

End of dropping

Date/hour (Day Month Year Hour Minute)

Latitude (Deg Min) N

Longitude (Deg Min) E

State of sea | Wind/direction | Wind/force

Surface temperature ℃

Start of drawing in gear

Date/hour (Day Month Year Hour Minute)

Latitude (Deg Min) N

Longitude (Deg Min) E

State of sea | Wind/direction | Wind/force

Surface temperature ℃

End of drawing in gear

Date/hour (Day Month Year Hour Minute)

Latitude (Deg Min) N

Longitude (Deg Min) E

State of sea | Wind/direction | Wind/force

Surface temperature ℃

State of sea

01 Calm
02 Rippled
03 Choppy
04 Rough

Wind direction

01 North
02 North/east
03 South/east
04 East
05 South
06 South/west
07 West
08 North/west

Wind force

01 Calm
02 Light breeze
03 Breezy
04 Fresh breeze
05 Moderate gale

Trawl drag interrupted Non ☐ Oui ☐

Interactions with protected species

No ☐ During drag ☐
Yes ☐ During gear drop ☐
During drawing in gear ☐
Other ☐

Comment

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VI.2.2 Trawl/Features of the gear/Fishing operation

The data in this form describe the features of the trawl. It can be used *inter alia* to study the effect on catch of protected species and target species. The form must be filled in for each trawl drag via direct observations or measurements taken by the observer himself. He must from time to time consult the captain or crew for further details.

- General information about the observer, the trip (number of trip) and trawl drag

- Type of trawl: State whether it is a benthic or pelagic trawl

- Position of the gear: State the position of the gear (port side, starboard, stern and prow) (follow the key on the form)

- Trawl: In this section, state the features of the trawl used during the fishing operation

    - Length of back rope: State the length in metres of the back rope at each trawl drag
    - Length of *bourrelet*: State the length in metres of the *bourrelet* for each trawl drag
    - Other measurements: In this section, state the mesh size of the body of the trawl and the bottom of the trawl, the presence (or not) of a scraper chain and its features, and the features of the panels (material and measurements)

- Fishing technique: In this part of the form, state the depth at which the captain intends to carry out the fishing operation and the target species

- Fishing operation: In this section, state the length of the *funes*, the length of the arms and the speed of the ship (in sea-miles/hour) when the gear is being dragged

- Comments: This section is used to describe any event during the fishing operation or particularity of the gear that has no place or is not recorded on the form. It can also be used to explain why information was not gathered.

RAC/SPA
By-catch Protocol
Trawl/Fishing gear Form

Observer identifier

Trip number

Trawl drag number

Features of the gear / fishing operation

Type of trawl

✓ ☐ Benthic trawl (m)

✓ ☐ Pelagic trawl (m)

Fishing technique

Depth (m)

Target species .....

Trawl

Length of back cord (m)

Lengh of *bourrelet* (m)

Bodv of trawl

Mesh size (mm)

Bottom of

Panel

Material

Length (cm)

Height (cm)

01 Wood
02 Aliminium
03 Other

Presence of scraper chain

01 Yes
02 No

Position of gear on the ship

01 Port 03 Prow
02 Starboard 04 Stern

Fishing operation

Length of funes (m)

Length of arms (m)

Speed of ship (knots/h)

Comments

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VI.2.3 Trawl/Catch

A form is filled in for each trawl drag. It concerns all the target and protected species caught. It also concerns their quantity, condition, location and certain metrical features. The data recorded basically helps when calculating the catch rate for target species and protected species.

Each target species or each specimen of protected species or strange and uncommon species is recorded on a separate line. At the end of the line it must be shown whether there is a tag applied and if a photo has been taken.

The observer must not take measurements in dangerous conditions (very active dangerous animal, bad weather, etc.).

The main data to be recorded is:

- General information about the observer, the trip (trip number), the trawl drag, page number and date

- Name of specie: State the common and scientific name of the species. It is always better to take photos and attribute their number to each specimen

- Quantity: State the number of crates and approximate weight for the target species. For protected species, or big species, state the number and approximate weight

- Animal's physical condition: State the physical condition of the animal when caught.
    - Fish: **A**=Taken **A**live; **D**=Taken **D**ead; **ID=I**ndeterminate state
    - Protected species: **A**=Taken **A**live; **D**=Taken **D**ead; **C=C**omatose; **W=W**ounded; **ID=I**ndeterminate state

- Animal kept/thrown back: State whether the caught animal was kept or thrown back into the water and the conditions when it was thrown back.
    - Kept: **K**
    - Rejected: **RA= R**ejected **A**live: **RD=R**ejected **D**ead; **RW=R**ejected **W**ounded; **RC=R**ejected **C**omatose; **RR=R**ejected after **R**ehabilitation; **RID=R**ejected in **I**ndeterminate state

- Sex: Where possible, state the animal's sex (**M=M**ale; **F=F**emale; **ID=I**ndeterminate). This does not concern species caught in great quantities

- Measurement: Where possible, take measurements of big fishes caught in small quantities (**TL=T**otal **L**ength and **LF=L**ength at **F**ork). Do not take measurements of dangerous fishes that are still alive (e.g. sharks). For turtles, simply state whether measurements have been taken. A special form for marine turtles will be filled in. It is possible for certain specimens, which have not been landed on deck, to state approximate measurements

- Tagging: State whether the captured animal is tagged or if a tag has been applied (this mainly concerns marine turtles)

- Sample: State (X) if a biological sample has been taken (a piece of tissue or the whole animal)

- Photo: State (X) if a photo has been taken of the animal

- Comments: State (X) if there are comments describing the animal. This section will be used for any explanation or any detail concerning the animal in question.

RAC/SPA
By-catch Protocol
Mesh net/Catch Form

Identifier Observer

Trip number

Page number

Date Day Month Year

Drop number

Catch

Line number	Name of species	Number of crates or parts	Approx. Weight	Physical condition	Animal Kept/Rejected	Sex	Measurement		Tag	Sample	Photo	Comment
							LT	LF				
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Physical condition
A Alive
D Dead
C Comatose
W Wounded

Measurements
LT Total length
LF Length at fork

Sex
M Male
F Female
ID

Animal Kept/Rejected
K Kept
RA Rejected Alive
RD Rejected Dead
RW Rejected Wounded
RC Rejected Comatose
RR Rejected after Rehabilitation
RID **Rejected/Indeterminate**

Comment
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VI.2.4 Trawl/Interaction with threatened species

This form allows data concerning the nature and number of protected species (marine turtles, marine mammals and sea birds) linked to trawling operations to be recorded. However, in this form, there can be a description of these animals when they were observed without their having been direct contact with the fishing gear.

During a fishing operation, several contacts (observation or capture) with threatened species may take place. Each contact is recorded on a separate line and a form contains as many lines as there were contacts.

- General information about the observer, the trip (trip number), and the trawl drag

- Page number: During a fishing operation (trawl drag), if many contacts with threatened species took place, several pages will be filled in. Each page will be numbered

- Number and nature of the contact: Each contact (observation or capture of the animal) is recorded on a separate line. If there are not enough lines on the page for a fishing operation, continue on another form without starting again from 01. For example, if the first form has contacts from 01 to 08, page 02 starts with contact 09

- Date/time: The date and the exact time are recorded at the moment of each contact

- Activity of the ship: Record the activity of the ship at the moment of contact. This contact may take place when sailing towards or leaving the fishing grounds, when the lines are being paid out or drawn in, during the dragging of the trawl (follow the key on the form)

- Location: The latitude and longitude are taken using the on-board GPS at the moment of contact. Note the latitude (dd° mm.mmm') and longit ude (ddd° mm.mmm') in decimal minutes (three decimals after the point)

- State of the sea: Fill in from the key on the form

- Species: The key of species is recorded from the list on the form. The list concerns the most common species in the Mediterranean

- Animal's behaviour: The animal's behaviour is recorded from the key on the form. The animal may enter into direct contact with the gear and may be caught or not, moving around or pursuing prey (fishes or other), pursuing the ship, resting on the surface of the water, feeding on throw back, etc.

- Animal's physical condition: This criteria indicates the condition in which the animal was observed or caught. The animal can be dead or alive, comatose, wounded, decomposing…(follow the key on the form)

- Number of animals: This criterion basically concerns observed animals. An approximate estimate of the number will be important if the exact number is difficult to determine

- Photo: State whether a photo has been taken of the animal

- Comments: This section is used to describe any event or particularity that has no place or is not recorded on the form. It can also be used to give further information or to explain why certain information was not gathered.

RAC/SPA
By-catch Protocol
Interaction Mesh net/Protected species Form

Observer identifier

Trip number

Page number

Fishing operation number

Interaction Mesh net/Protected species

Contact Number	Nature of contact	Date/time					Activity of ship	Location		State of sea	Species	Behaviour	Physical condition	Number	Photo ✓
		Day	Month	year	Hour	minute		Latitude	Longitude						
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Contact
01 Catch
02 Observation
03 Other

State of sea
01 Calm
02 Rippled
03 Choppy
04 Rough
05 Very rough

Activité du navire
01 Navigation (aller)
02 Navigation (retour)
03 Filage
04 Virage
05 Repos
06 Autre

Common protected species
01 Lofferhead turtle *Caretta caretta*
02 Green turtle *Chelonia mydas*
03 Leatherback turtle *Dermochelys coriacea*

04 Bottlenose dolphin *Tursiops truncatus*
05 Common dolphin Delphinus *delphis*
06 Striped dolphon *Stenella coeruleoalba*
07 Risso's dolphin *Grumpus griseus*
08 Killer whale *Orcinus orca*
09 Long-finned pilot whale *Globicephala melas*
10 Common rorqual *Balaenoptera physalus*
11 Sperm Whale *Physeter catodon*

12 Cory's shearwater Calonectris diomedia
13 Balearic shearwater Puffinus yelkouan
14 Terns *Sterna sp*
15 Other

Behaviour
01 Contact (catch)
02 Attempt, without contact
03 Near the gear
04 Swimming on the surface
05 Resting on the surface
06 Feeding on throw back
07 Pursuing the ship
08 Other

Physical condition
01 Alive, good condition
02 Comatose
03 Wounded
04 Freshly dead
05 Decomposing
06 Condition unknown

Comments
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VI.2.5 Trawl/Catch of marine turtles

This form must be filled in every time a marine turtle is caught. As much data as possible must be used.

The main data to be recorded is:

- General information about the observer, the trip (trip number), and the trawl drag

- Name of species: State the scientific name of the species of marine turtle. It this is another species that is not common in the Mediterranean, put 'Other' and take a photo

- Other information: State (X) if a photo has been taken, a sketch made, a sample taken or a tag applied to or removed from the animal

- Catch: State the data concerning the capture of the turtle.

    - Trawl drag: State the page number and line number in the catch form corresponding to the trawl drag where the turtle was caught
    - Method of catch: State where the captured turtle was in the gear (bottom of the bag, caught on the net of the body of the trawl, etc.)
    - Tagging: State whether the turtle bears a tag at the moment of capture

- Release: State the data concerning the release of the turtle

    - Date/time: The date and time of the capture are recorded using the Day Month Year (DD MM YYYY) format and the 24-hour clock
    - Location: The latitude and longitude of the point of release are taken using the on-board GPS. Note the latitude (dd° mm.mmm') and long itude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
    - Tagging: State whether a tag was applied to or removed from the turtle at the moment of release
    - Physical condition: State (from the key on the form) the animal's physical condition when it was released

- Morphology:
    - Cover of the carapace: State whether the carapace was covered by skin or plates
    - Plates of the carapace: If it is covered by plates, state the number of vertebral, right and left costal, right and left marginal and right and left infra-marginal plates (consult the sketch for the names of the various plates)

- Measurements: The curve measurements are the simplest and most often used by herpetologists. They will be taken using a tape measure. Remove all the epibionta that have adhered to the carapace and that can affect the measurements. The main measurements to take are:

    - The standard curved carapace length (SCCL): This is the distance between the nuchal and the most distal of the two last marginals

    - The curved carapace width (CCW): This is the curved measurement of the widest part of the carapace

- Tail length (TL): This is the distance between the posterior tip of the plastron and the point of the tail

- Comments: This section is used to state certain details that do not appear on the form. This mainly concerns the rehabilitation of the animal if it was comatose, etc.

RAC/SPA
By-catch Protocol
Trawl/Marine Turtle Form

Observer identifier

Trip number

Trawl drag number

Catch/Marine turtle

Species

01 Loggerhead turtle *Caretta caretta*
02 Green turtle *Chelonia mydas*
03 Leatherback *Dermochelys*

Photos
Sample
Sketch
Tag

Capture

Page number/Catch form

Line number/Catch form

Presence of tag
01 yes
02 no

Method of capture

01 In the trawl Bottom
02 Caught on the net
03 Other place

Release

	Day	Month	Year	Hour	Minute
Time/hour					
Latitude			N		
Longitude			E		

Tag
Applied
Removed

Physical conditio

01 Already dead
02 Good condition
03 Wounded
04 Died on deck
05 Comatose
06 Indeterminate

Measurements

(State carapace measurements to within about 0.5 cm)

SCCL (Standard Curve Carapace Length

CCW (Curved carapace Width)

TL (Tail length)

Morphology

Carapace cover

01 Skin
02 Plates

Number of plates

Vertebral plates
Right costal plates
Left costal plates
Right marginal plates
Left marginal plates
Right infra-marginal plates
Left infra-marginal plates

Croquis

Comment

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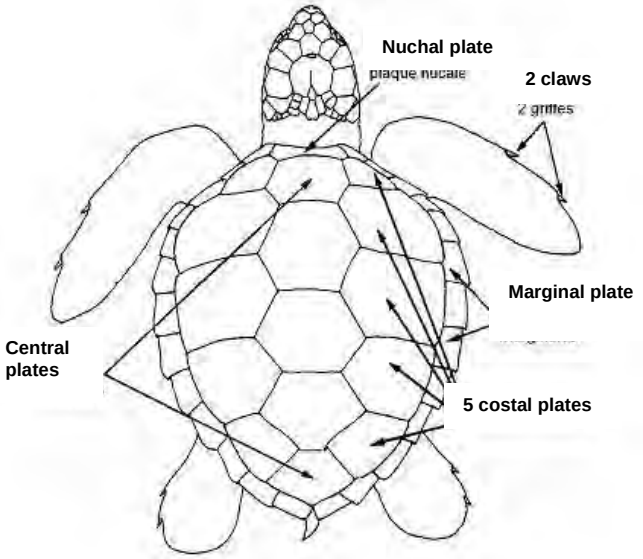
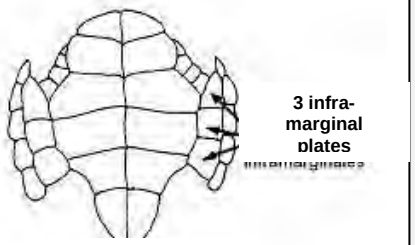
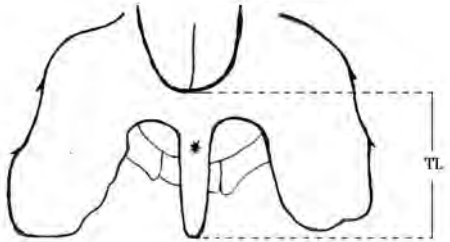


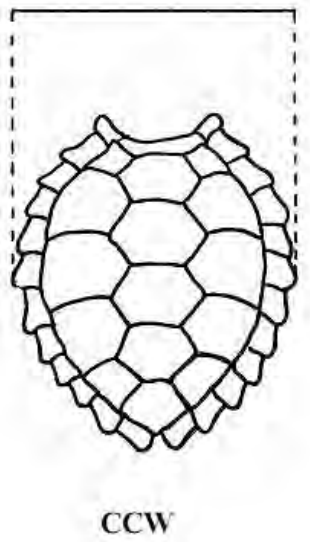
Sketch



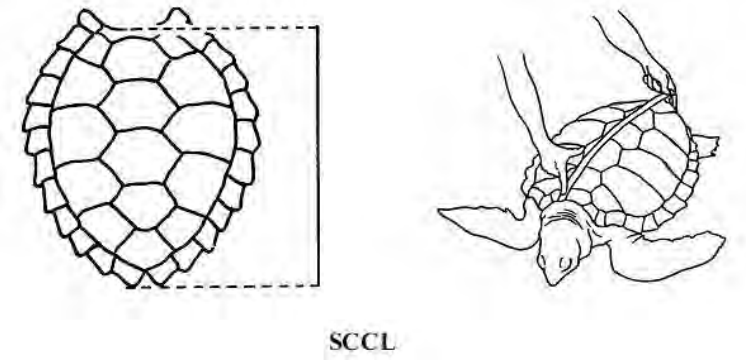
Plastron



Tail length



Curved Carapace Width



Standard Curved Carapace Length

Comments

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VII Mesh nets

Mesh nets are walls of thousands of meshes, each one a deadly trap for fishes which enter and are then unable to pass through. They are made up of one or many rectangular sheets of net, hanging vertically in the water. Floats are fixed to the top part; the bottom part is weighed down to keep the nets vertical. Fishes of precise size are caught in the mesh that has the right dimensions to hold them by the head or the forepart of the body.

The drift mesh net (Fig. 5) is a mesh net held on the surface of the sea or at shallow depth by floats; it drifts with the current, without being attached to anything, or, more usually, being attached to the ship it belongs to. Put end to end, the nets can be several dozen kilometres long.

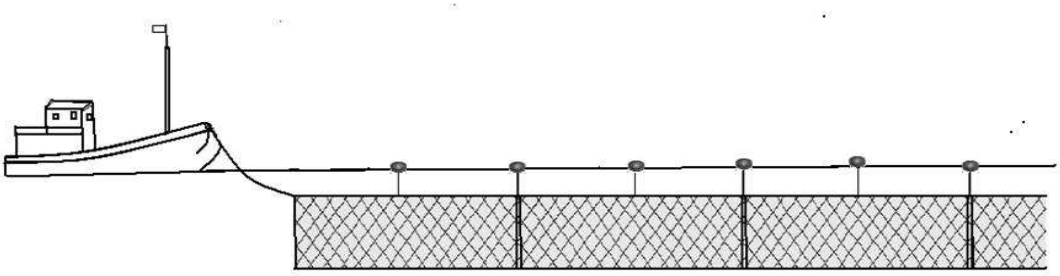

Figure 5 : Drift mesh net

When the weighting is greater than the ability to float the mesh net stays on the bed. Then it is called a set net. When there is just one sheet it is called a straight net (Fig. 6). When it is made of several sheets it is called a tangling net, one of the most often used being the trammel net (Fig. 7) made up of three adjacent nets. The two outside nets (the *aumées*) are coarse mesh and the inside net (the *flue*) is finer but bigger, able to hold big and little fishes alike.

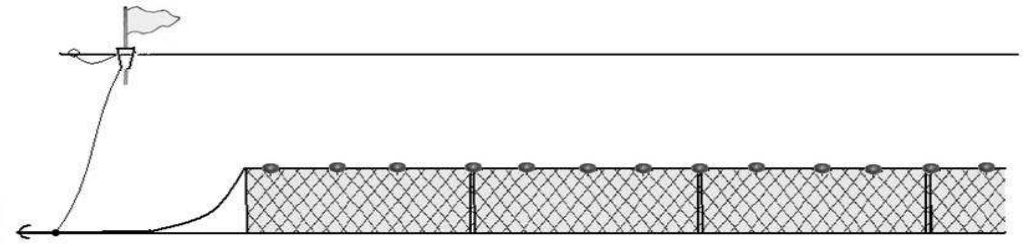

Figure 6 : Straight bottom net

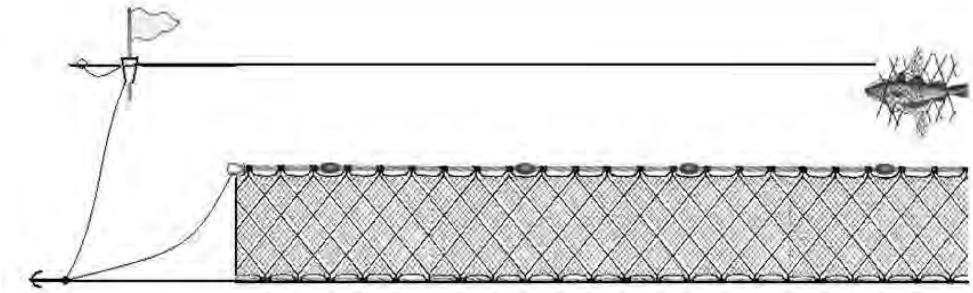

Figure 7 : Trammel net

Straight mesh nets, including trammels, are the fishing gear most commonly used by small Mediterranean fisheries.

The mesh nets are usually dropped in the evening; several hours or even days later they are drawn up.

The gear is drawn up by hand or by a net-spin winch, usually located at the back of the boat (Ferretti, 1990).

Mesh nets present certain advantages, particularly their small impact on beds and marine habitats and their selectivity, since they only retain one size range of the target fish. But for various reasons these nets are abandoned on the bed; then they are called ghost nets and have harmful effects on the stocks of fish and other marine organisms and can even represent a danger to boats.

VII.1 Impact on the environment and threatened species

The impact of mesh nets on sea beds is fairly small, and only concerns straight bottom nets. These are in contact with the bed via the lower bolt rope; the risks of biotope degradation happen when the net is drawn up and if it catches on rocky and coral beds.

Few mesh net fisheries target sharks, like those of the northern Adriatic (Sacchi, 2007) and the south of Tunisia (Echwikhi *et al*., 2010); however, incidental catch of sharks and rays has been mentioned in various drift net fisheries and in bottom net fisheries.

Incidental catch of sea birds by drift nets is rare and seems basically to happen in coastal waters.

Marine mammals are frequently taken in mesh nets, with which they maintain an interaction. Cetaceans can find themselves caught up in the sheets of net while trying to eat the fish caught therein. This basically concerned the less experienced juveniles. When a marine mammal is caught up in a net, fairly severe lesions can appear on the skin in contact with the sheet and ropes, and if it remains tangled up it can drown. The fishing gear can be seriously harmed or even destroyed.

Incidental catch in mesh nets concerns various species of marine mammal, but mainly dolphins.

Marine turtles are caught by accident in mesh nets when they move around. But these animals actively try to feed on fish caught up in the net, damaging the gear (Panou *et al*., 1993) and run the risk of being tangled up and drowned. Once caught up in the net, the animals cannot reach the surface to breathe and die if they are not quickly released. However, even if a marine turtle survives and is released, there may be later mortality if the fisherman does not cut the turtle free from all the ropes of the net. What is certain is that this material can cause serious wounds and necrosis.

Reports give a high mortality and a large number of captures for nets set near regions where marine turtles are present (Delaugerre, 1987; Argano *et al.*, 1992; Laurent, 1991; Lazar *et al*., 2006; Echwikhi *et al*., 2010). As regards the Mediterranean, in a recent study Echwikhi *et al*. (2010) noted a mortality rate of 69.4% for specimens of *Caretta caretta* caught up in shark nets in the Gulf of Gabès region, known to be a marine turtle feeding and wintering area. In other regions, the mortality rate varied between 53.7% in France (Laurent, 1991), 54.9% in the northern Adriatic (Lazar *et al*., 2006) and 94.4% in Corsica (Delaugerre, 1987). Mesh nets thus seem to be very dangerous fishing gear. If used on a wide scale this could have an impact on the Mediterranean population and even the Atlantic population, some specimens of which enter the Mediterranean basin via the Strait of Gibraltar.

When the net is pulled up, several turtles are brought up in a comatose state. If through ignorance the fisherman does not recognise these turtles as being comatose and deems them to be dead, throwing them back, they will die, and this will further increase the mortality rate.

VII.2 Forms

VII.2.1 Mesh net/Dropping and drawing in the gear

All the information on this form is used to describe and record the basic elements of the mesh net drop. This information is obtained via direct observation and mainly concerns:

- General information on the observer, the trip (trip number) and gear drops (gear drops are numbered for each trip starting from 01)

- Information on dropping the gear: This is information taken at the beginning and end of the drop

- The date (DD MM YYYY) and exact time (24-hour clock) when the net is dropped (beginning and end)
- Location: The location is taken from the on-board GPS. Note the latitude (dd° mm.mmm') and longitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
- Meteorological conditions: Mainly concerns the state of the sea (follow the key on the sheet) and the direction and force of the wind (follow the key on the sheet)
- Surface temperature taken with the ship's thermometer, if it has one, or using a portable thermometer

- Information on drawing in the gear: This is information taken at the beginning and end of the drawing in:

- The date (DD MM YYYY) and exact time (24-hour clock) when the net is drawn in (beginning and end)
- Location: The location is taken from the on-board GPS. Note the latitude (dd° mm.mmm') and longitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)
- Meteorological conditions: Mainly concerns the state of the sea (follow the key on the sheet) and the direction and force of the wind (follow the key on the sheet)
- Surface temperature taken with the ship's thermometer, if it has one, or using a portable thermometer

- Other events: During the fishing operation, certain accidental events can happen and affect the catch of target species and the interaction with protected species:

- The end where the raising starts: State the end of the net from which the drawing in of the net starts. The drawing in can start with the first end or the last end, or sometimes another point
- Damage to the fishing net: State whether the fishing net was damaged during the fishing operation. A detailed description will be written in the 'Comments' section
- Interaction with protected species. State on the form whether there was any interaction with a protected species, even if this was an attempted approach to the gear. The details will be written on the form concerning interaction with protected species and the catch form if this involves a marine turtle

- Comments: This section is used to describe any event or particularity that has no place or is not recorded on the form. It can also be used to explain why information was not gathered.

RAC/SPA
By-catch Protocol
Mesh net/Fishing operation Form

Observer identifier

Trip number

Drop number

Information Dropping/Drawing in gear

Beginning of drop

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

End of drop

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

Beginning of drawing in

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

End of drawing in

Date/time Day Month Year Hour Minute

Latitude Deg Min N

Longitude Deg Min E

State of sea Wind/direction Wind/force

Surface temperature ℃

State of sea
11 Calm
12 Rippled
13 Choppy
14 Rough
15 Very rough

Wind direction
01 North 02 North/east
03 South/east 04 East
05 South 06 South/west
07 West 08 North/West

Wind force
01 Calm
02 Light breeze
03 Breezy
04 Fresh breeze
05Moderate gale

Drawing in from
Start end ☐
End end ☐
Other ☐

Net damaged N☐ Y☐

Interaction with protected species
No ☐ During gear drop ☐
Yes ☐ **During drawing in of gea** ☐
At rest ☐

Comments

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VII.2.2 Mesh net/Features of the gear

The data on this form describes the features of the net. It can be used *inter alia* to study the effect on catch of protected species and target species. The form must be filled in for each gear drop via direct observation and measurements taken by the observer himself. He must from time to time consult the captain or the crew for further details.

- General elements about the observer, the trip (trip number) and gear drop

- Type of net: State whether this is a drift net or a straight bottom net or a trammel net

- Net: In this section, state the features of the net used during the fishing operation:

- Length: State the length in metres of the net
- Depth: Corresponds to the height of the net pulled taut with the leaded rope during the fishing operation
- Mesh size: State the mesh size measured in mm along one side
- Mesh type: State whether the mesh is formed by monofilament cord or Multi monofil cord or other
- Upper bolt rope: State the length with the two ends, the diameter of the cord, the number and diameter of floats and the distance between two successive floats
- Lower bolt rope: State the length with the two ends, the cord diameter, the number of sinkers and the distance between two successive sinkers

- Fishing technique: In this part of the form state the depth at which the captain intends to carry out the fishing operation and the target species

- Comments: This section is used to describe any event during the fishing operation or particularity of the gear that has no place or is not recorded on the form. It can also be used to explain why information was not gathered.

Identifiant de l'observateur

RAC/SPA
By-catch Protocol
Mesh net/Fishing gear Form

Trip number

Drop number

Gear/Features and

Type of net

- ✓ ☐ Drift net
- ✓ ☐ Straight bottom net
- ✓ ☐ Trammel net
- ✓ ☐ Other

Fishing technique

Depth (m)
Target species
……
……
……

Net/Features

Length (m)
Diameter (m)
Mesh size (mm)
Mesh type

01 Monofilament
02 Multi monofil
03 Other

Upper bolt rope

Length (m)
Diameter (mm)
Number of floats
Diameter of floats (mm)
Distance between 2 floats (m)

Lower bolt rope

Length (m)
Diameter (mm)
Number of sinkers
Approx.weight of sinker bead
Distance between 2 sinkers (m)

Comments

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VII.2.3 Mesh net/Catch

A form is filled in for each gear drop. It concerns all the target species and protected species caught during the fishing operation. It also concerns their condition, location, and certain metric features. The data recorded is basically used to calculate the rate of catch of target species and protected species.

Each target species or each specimen of a protected species or a strange or uncommon species is recorded on a separate line. Mark at the end of the line if there is a tag applied and if a photo has been taken.

The observer must not take measurements in dangerous conditions (very active dangerous animal, bad weather, etc.).

The main data to be recorded is:

- General information on the observer, the trip (trip number), the gear drop, the page number and date

- Name of the species: State the common and scientific name of the species. It is always better to take photos and attribute their number to each specimen

- Quantity: State the number of crates and approximate weight for the target species. For protected or big species, state the number and approximate weight

- Animal's physical condition: State the animal's physical condition when caught

- Fishes: **A**=Taken **A**live; **D**=Taken **D**ead; **ID**=**I**ndeterminate
- Protected species: **A**=Taken **A**live; **D**=Taken **D**ead; **C**=**C**omatose; **W**=**W**ounded; **ID**=**I**ndeterminate

- Animal Kept/Rejected: State whether the caught animal was kept or thrown back into the water and the conditions at the moment when it was rejected

- Kept: **K**
- Rejected: **RA**=**R**ejected **A**live; **RD**=**R**ejected **D**ead; **RW**=**R**ejected **W**ounded; **RC**=**R**ejected **C**omatose; **RR**=**R**ejected after **R**ehabilitation; **RID**=**R**ejected in an **I**ndeterminate state

- Sex: Where possible, state the animal's sex (**M**=**M**ale; **F**=**F**emale; **ID**=**I**ndeterminate). This does not concern target species caught in large quantities

- Measurement: Where possible, take measurements of big fishes caught in small quantities (**TL**=**T**otal **L**ength and **LF**=**L**ength at **F**ork). Do not take measurements of dangerous fish that are still alive (e.g. sharks). For turtles, simply state whether the measurements have been taken. A special form for marine turtles will be filled in. For certain specimens that have not been landed on deck it is possible to state approximate measurements.

- Tagging: State (X) whether the animal has been tagged or if a tag has been applied (this mainly concerns marine turtles)

- Sample: State (X) whether a biological sample has been taken (a piece of tissue or the whole animal)

- Photo: State (X) whether a photo has been taken of the animal

- Comments: State (X) whether there are comments describing the animal. This section will be used for any explanation or all details concerning the animal in question.

RAC/SPA
By-catch Protocol
Mesh net/Catch Form

Identifier Observer

Trip number

Page number

Date Day Month Year

Drop number

Catch

Line number	Name of species	Number of crates or parts	Approx. Weight	Physical condition	Animal Kept/Rejected	Sex	Measurement		Tag	Sample	Photo	Comment
							LT	LF				
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Physical condition
A Alive
D Dead
C Comatose
W Wounded
ID Indéterminé

Measurements
LT Total length
LF Length at fork

Sex
M Male
F Female
ID indeterminate

Animal Kept/Rejected
K Kept
RA Rejected Alive
RD Rejected Dead
RW Rejected Wounded
RC Rejected Comatose
RR Rejected after Rehabilitation
RID **Rejected/Indeterminate**

Comment
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VII.2.4 Mesh net/Interaction with threatened species

This form enables data concerning the nature and number of protected species (marine turtles, marine mammals and sea birds) linked to mesh net fishing operations to be recorded. However, in this form there may be a description of these animals when they are observed without there being any direct contact with the fishing gear.

During the fishing operation, several contacts (observation or capture) with threatened species may take place. Each contact is recorded on a separate line and a form contains as many lines as there are contacts.

- General information on the observer, the trip (trip number), and the fishing operation

- Page number: During a fishing operation, if many contacts with threatened species occur, several pages will be filled in. Each page will be numbered

- Number and nature of the contact: Each contact (observation of the animal or capture) is recorded on a separate line. If the number of lines on the page is not enough for a fishing operation, continue on another form without starting again with 01. For example, if the first form contains contacts from 01 to 08, page 02 starts with contact 09

- Date/time: The date (DD MM YYYY) and exact time (24-hour clock) are recorded at the moment of each contact

- Activity of the ship: Record the ship's activity at the moment of contact. This contact may take place when sailing towards or leaving the fishing grounds, when the nets are being dropped or drawn in, during rest periods…(follow the key on the form)

- Location: The latitude and longitude are taken at the moment of contact on the on-board GPS. Note the latitude (dd° mm.mmm') and longitude (ddd° mm.mmm') in decimal minutes (three decimals after the point)

- State of the sea: Fill in from the key on the form

- Species: The species key is recorded from the list on the form. The list concerns the commonest species in the Mediterranean

- Animal's behaviour: The animal's behaviour is recorded using the key on the form. The animal may enter into direct contact with the gear and may or may not be caught, moving around or pursuing prey (fishes or other), pursuing the ship, resting on the surface of the water, feeding on throw back, etc.

- Animal's physical condition: This criterion indicates the condition in which the animal was observed or caught. The animal may be dead or alive, comatose, wounded or decomposing…(follow the key on the form)

- Number of animals: This basically concerns the animals observed. An approximate estimate of the number will be important if the exact number is difficult to determine

- Photo: State whether a photo has been taken of the animal

- Comments: This section is used to describe any event or particularity that has no place or is not recorded on the form. It can also be used to give further information or to explain why certain information was not gathered.

RAC/SPA
By-catch Protocol
Interaction Mesh net/Protected species Form

Observer identifier

Trip number

Page number

Fishing operation number

Interaction Mesh net/Protected species

Contact Number	Nature of contact	Date/time					Activity of ship	Location		State of sea	Species	Behaviour	Physical condition	Number	Photo ✓
		Day	Month	year	Hour	minute		Latitude	Longitude						
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Contact
01 Catch
02 Observation

State of sea
01 Calm
02 Rippled
03 Choppy
04 Rough
05 Very rough

Activité du navire
01 Navigation (aller)
02 Navigation (retour)
03 Filage
04 Virage
05 Repos
06 Autre

Common protected species
01 Lofferhead turtle *Caretta caretta*
02 Green turtle *Chelonia mydas*
03 Leatherback turtle *Dermochelys coriacea*

04 Bottlenose dolphin *Tursiops truncatus*
05 Common dolphin *Delphinus delphis*
06 Striped dolphon *Stenella coeruleoalba*
07 Risso's dolphin *Grumpus griseus*
08 Killer whale *Orcinus orca*
09 Long-finned pilot whale *Globicephala melas*
10 Common rorqual *Balaenoptera physalus*
11 Sperm Whale *Physeter catodon*

12 Cory's shearwater Calonectris diomedia
13 Balearic shearwater Puffinus yelkouan
14 Terns *Sterna sp*
15 Other

Behaviour
01 Contact (catch)
02 Attempt, without contact
03 Near the gear
04 Swimming on the surface
05 Resting on the surface
06 Feeding on throw back
07 Pursuing the ship
08 Other

Physical condition
01 Alive, good condition
02 Comatose
03 Wounded
04 Freshly dead
05 Decomposing
06 Condition unknown

Comments
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……..
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VII.2.5 Mesh net/Catch of marine turtles

This form must be filled in each time a marine turtle is caught. As much data as possible must be taken.

The main data to be recorded is:

- General information on the observer, the trip (trip number), and the fishing operation

- Name of the species: State the scientific name of the species of marine turtle. If this is a species that is not common in the Mediterranean, write 'Other' and take a photo

- Other information: State (X) if a photo has been taken, a sketch made, a sample taken or a tag applied to or removed from the animal

- Corresponding page and line on the catch forms: State the page number and line number on the catch form corresponding to the turtle in question

- Catch: State the data concerning the capture of the turtle

- Date/time: The date and time of capture are recorded using the Day Month Year format (DD MM YYYY) and the 24-hour clock
- Location: The latitude and longitude of the point of capture are recorded using the on-board GPS
- Tagging: State whether the turtle bears a tag when it is caught

- Release: State the data concerning the release of the turtle

- Date/time: The date and time of release are recorded using the Day Month Year format (DD MM YYYY) and the 24-hour clock
- Location: The latitude and longitude of the point of release are recorded using the on-board GPS
- Tagging: State whether a tag was applied or removed from the turtle when it was released
- Physical condition: State (using the key on the form) the animal's physical condition at the time it was released

- Morphology:

- Cover of the carapace: State whether the carapace is covered by skin or plates
- Plates of the carapace: If the carapace is covered with plates, state the number of vertebral, right and left costal, right and left marginal and right and left infra-marginal plates (consult the sketch for the names of the various plates)

- Measurement: Curve measurements are the simplest and most often recorded by herpetologists. They are taken using a tape measure. Remove all the epibionta that have adhered to the carapace and that can affect the measurements. The main measurements to be taken are:

- Standard curved carapace length (SCCL). This is the distance between the nuchal and the most distal of the two last marginals
- Curved carapace width (CCW). This is the curve measurement of the widest part of the carapace

- Tail length (TL). This is the distance between the posterior tip of the plastron and the point of the tail

- Comments: This section is used to state certain details that do not appear on the form. This mainly concerns rehabilitation of the animal if was comatose, etc.

RAC/SPA
By-catch protocol
Mesh net/Marine turtle Form

Observer identifier

Trip number

Drop number

Catch/Marine turtle

Species

01 Loggerhead turtle *Caretta caretta*
02 Green turtle *Chelonia mydas*
03 Leatherback turtle *Dermochelys coriacea*
04 Other

Photo
Sample
Sketch
Tag

Page number/Catch form
Line number/Catch form

Capture

	Day	Month	year	Hour	Minute
Date/time					
Latitude			N		
Longitude			E		

Presence of tag
01 yes
02 no

Release

	Day	Month	Year	Hour	Minute
Date/time					
Latitude			N		
Longitude			E		

Tag
Applied
Removed

Physical condition
01 Already dead
02 Good condition
03 Wounded
04 Died on deck
05 Comatose
06 Indeterminate

Morphology

Carapace cover
01 Skin
02 Plates

Number of plates

Vertebral plates
Right costal plates
Left costal plates
Right marginal plates
Left marginal plates
Right infra-marginal plates
Left infra -marginal plates

Sketch

Measurements

(State carapace measurements to within about 0.5 cm)

SCCL (Standard curve carapace Len
CCW (Curved carapace Width)
TL (Tail length)

Comments

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Annex VIII – DRAFT WORK PROGRAMME AND IMPLEMENTATION TIMETABLE OF THE ACTION PLAN FOR THE CONSERVATION OF MARINE VEGETATION IN THE MEDITERRANEAN SEA FOR THE PERIOD 2012-2017

Draft Work Programme and Implementation Timetable of the Action Plan for the conservation of marine vegetation in the Mediterranean Sea for the period 2012-2017

TYPE OF ACTION PLANNED	ACTIVITIES FOR IMPLEMENTING THE ACTION PLAN	DEADLINE
1. Regulatory activities	▪ Parties which have not yet done so ratify the SPA/BD Protocol	As soon as possible
	▪ Help the Parties take new vegetation species in Annex II into account	As soon as possible
	▪ Help the countries which have legal protections make them operational and efficacious	From 2013
	▪ Urge the Parties to create MPAs to conserve marine vegetation	As soon as possible
2. Scientific knowledge and communication	▪ Update the text of the Action Plan to integrate the amendments to Annex II to the SPA/BD Protocol	As soon as possible
	▪ Organise a symposium every 3 years	From 2013
	▪ Extend the bibliographical database to all the vegetal species in Annex II to the SPA/BD Protocol and regularly update it	From 2013
	▪ Make the information layer on distribution of meadows accessible (MedSIG)	As soon as possible
	▪ Update the information layer on mapping priority habitats	Every two years
	▪ Complete and regularly revise the directory of specialists and laboratories, institutions and organisations concerned	When there are symposiums
3. Inventorying and mapping the main vegetal assemblages	▪ Set up a programme for making national inventories on macrophyta species, with staggered planning according to the regions' priorities	From 2012
	▪ Make theoretical probable distribution maps for the main plant assemblages	As soon as possible
	▪ Implement targeted mapping and inventorying actions (Annex II species, priority sites)	From 2012
4. Monitoring and following up over time the main vegetal assemblages	▪ Establish a programme for setting up monitoring networks for the main marine plant assemblages at national and regional level	As soon as possible
	▪ Help the countries set up and/or extend their networks for follow-up of plants in the Mediterranean	From 2013
5.Taking on the Action Plan and enhancing national capacities	▪ Urge the countries that have so far not done so to develop short-, medium- and long-term action plans according to national and regional priorities	From 2012
	▪ Help countries implement action plans	As soon as possible
	▪ Set up training of 'liaison executives' responsible for providing national training courses	From 2013
	▪ Help the countries set up regular national training	From 2014

Annex IX - FILES CONCERNING CARTILAGINOUS FISH SPECIES (CHONDRICHTHYANS) PROPOSED FOR THE AMENDMENT OF ANNEXES II AND III TO THE SPA/BD PROTOCOL

Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Isurus oxyrinchus* Rafinesque, 1810

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Lamniformes

Family: Lamnidae

Genus and Species : *Isurus oxyrinchus*

Known Synonym(s) :

Common name (English and French): EN - Shortfin mako; FR - Taupe bleue

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

CMS Appendix II

Bern Convention Appendix III

ICCAT Recommendations 04-10; 05-05; 07-06 and 10-06

IUCN Red List status:

Global: Vulnerable A2abd+3bd+4abd

Mediterranean: Critically Endangered A2acd+3cd+4acd

Justification for the proposal :

Records show that shortfin mako has declined dramatically in the Mediterranean Sea, virtually disappearing from records in some areas. Declines of up to 99% since the mid 20th Century have been estimated in Lamnid sharks (*L. nasus* and *Isurus oxyrinchus*) in the northwestern Mediterranean Sea through meta-analysis of fisheries and survey records and sightings. As a result, the species is assessed as Critically Endangered regionally in the Mediterranean Sea. Unsustainable catch in fisheries is the main threat to this highly migratory, large pelagic shark. Its epipelagic nature exposes it to a variety of fisheries, particularly pelagic longlines, drifting or set gill nets and hook-and-line fisheries wherever it occurs. Shortfin mako may be too rare now in the region to constitute a direct fisheries target. This species is listed on Annex III of the Barcelona Convention and UNEP MAP RAC/SPA (2003) noted that management programmes for sustainable fisheries should be developed and implemented for it. However, because *I. Oxyrinchus* is now so rare in the whole Mediterranean Sea, any catches are likely to be unsustainable and therefore an Annex II listing is proposed to protect the remaining small regional population.

Biological data The shortfin mako reaches a maximum size of about 4 m (Compagno 2001). Initial age and growth studies in the western North Atlantic suggested that two pairs of growth bands are laid down each year in their vertebral centra, at least in young shortfin makos (Pratt and Casey 1983). However, recent evidence using marginal increment analysis in Mexico (Ribot-Carballal *et al.* 2005) and bomb radiocarbon (Campana *et al*. 2002, Ardizzone *et al.* 2006) indicates that the alternative hypothesis (one pair of growth bands per year; Cailliet *et al*. 1983) is valid. Age at maturity has been determined recently in several populations, including New Zealand (7-9 years for males, and 19-21 years for females Bishop *et al.* (2006)), the western North Atlantic (8 years for males, and 18 years for females (Natanson *et al.* 2006)) and the North Pacific (6 years for males, and 16 years for females (Semba *et al.* 2009)). Longevity has been estimated as 29-32 years (Bishop *et al.* 2006, Natanson *et al.* 2006). There is a large difference in size at sexual maturity between the sexes and spatial segregation of the sexes has also been observed (Mucientes *et al.* 2009), suggesting that regionally-focused fishing may have disproportionate effects on the sexes. The shortfin mako is ovoviviparous and oophagous, but what little is known of its reproductive cycle indicates the gestation period is 15-18 months, with a three year reproductive cycle (Mollet *et al*. 2000). Litter size is 4-25 pups (possibly up to 30, mostly 10-18), which are about 60-70 cm long at birth (Garrick 1967, Compagno 2001), although the species has recently been shown to be less productive than previously believed (Cortes *et al.* 2010). There are comparatively few records of pregnant females. Among 26 shark species, the shortfin mako has an intrinsic rebound potential (a measure of its ability to recover from exploitation) in the mid-range (Smith *et al*. 1998); among 12 pelagic shark species, shortfin makos have the second-lowest level of productivity (Cortés *et al.* 2010).The annual rate of population increase is estimated at 0.018 yr^{-1}(Cortés*et al* 2010) calculated a finite rate of increase (lambda) of 1.141 (1.098 to 1.181 95% CI, r = 0.13) and the average reproductive age as 10.1 (9.2 to 11.1 95% CI) years. Removal of shortfin mako, a top marine predator, may have significant and complex effects on the marine ecosystem (Stevens *et al.* 2000; Baum and Worm 2009).

Brief description of the species A large, fast shark with a dark blue back, white underside and a long pointed snout.

Distribution (current and historical) Widespread in temperate and tropical waters of all oceans from about 50°N (up to 60°N in the Northeast Atlantic) to 50°S. Highly migratory species, which makes occasional inshore movements (Compagno 2001). In the Mediterranean Sea, highest abundance is reported in the western basin and mako are rarely reported in eastern waters (Aegean Sea and Sea of Marmara). Recent investigations suggest that the western basin is a nursery area for this species (Buencuerpo *et al.* 1998). Juvenile makos (several months old) have also been reported in the Western Ligurian Sea as bycatch of the swordfish longline fishery (Orsi Relini and Garibaldi 2002). In the Eastern Adriatic Sea, shortfin makos were reported as common a century ago (Katuri 1893 and Kosic 1903), whereas recent publications consider it to be rare (Milišić 1994, Jardas 1996). Soldo and Jardas (2002) report that there have been no records of shortfin mako in the Eastern Adriatic since 1972. Shortfin makoshave not been reported from the Black Sea.

Population estimate and trends Shortfin mako were once considered common throughout the Mediterranean Sea, but evidence from different areas of the region suggests that dramatic declines have occurred. “Tonnarella” (tuna-trap) catches in the Ligurian Sea from 1950 to the 1970s show a rapid decline and eventual disappearance of the shortfin mako (Boero and Carli 1979). Landings data from Maltese waters for 1979-2001 (data from the Maltese fishery department) show a decline although fishing pressure had not changed. While historically described as common in the Eastern Adriatic (end of 19th/beginning of 20th century), shortfin mako have not been recorded there since 1972 (Soldo and Jardas 2002). Since 1998, there have been few records of mako sharks from the central and eastern Mediterranean (A. Soldo pers. comm.). Of 1405 shortfin makos caught by Spanish longline vessels targeting swordfish in the Western Mediterranean, from 1997-1999, all individuals were juveniles, suggesting that overfishing may have caused a decline in the average size/age of this species in the

Mediterranean (de la Serna *et al.* 2002). Ferretti *et al.* (2008) used records dating back to the early 19th and mid-20th century to reconstruct long term population trends of large predatory sharks in the northwestern Mediterranean Sea. They estimated that biomass and abundance of lamnid sharks (*I. oxyrinchus* and *L. nasus)* had declined by up to 99%, using nine time series of abundance indices from commercial and recreational fishery landings, scientific surveys, and sighting records. This species' Critically Endangered status with the IUCN reflects a combination of the above factors: large declines in some areas, absence of records from others, and captures of juveniles in the likely nursery area (Cailliet *et al.* 2004).

Habitat(s) Shortfin mako is oceanic, occurring from the surface to at least 500m depth and is widespread in temperate and tropical waters. It is occasionally found close inshore where the continental shelf is narrow. It is not normally found in waters below 16°C (Compagno 2001)

Threats

Existing and potential threats Unsustainable catch in fisheries is the major threat to this species in the Mediterranean Sea. Shortfin mako is caught by pelagic longlines, drifting or set gill nets and in hook-and-line fisheries wherever it occurs. This species has a long generation period, making it highly vulnerable to over-exploitation and population depletion.It is possible that the western Mediterranean basin is a nursery area from the eastern Central Atlantic population, which is affected by the swordfish longline fishery off the western coast of Africa and the Iberian peninsula. Simpfendorfer *et al.* (2008) assessed shortfin mako as being among the species at highest risk of over-exploitation in their study of the pelagic sharks taken in Atlantic longline fisheries, based on three metrics. Mortality for this species in longline fisheries has been estimated to be very high; of 11 pelagic shark species assessed, post-capture mortality was highest for shortfin makos, with a 92% probability of death after capture (Cortes *et al.* 2010).

ExploitationShortfin mako sharks are highly valued for their meat and fins and therefore catch is often retained and fully utilised. In general, it has been suggested that shortfin makos may be one of the most overfished pelagic sharks in the Mediterranean (Megalofonou *et al.* 2005). Reports of bycatch in "tonnarella" in the Ligurian Sea from 1950 until the 1970s show a rapid decline and eventual disappearance of the shortfin mako (INP 2000). Recent investigations of shortfin mako bycatch from the swordfish longline fishery in the western basin show that catches from this fishery consist almost exclusively of juveniles. Even though driftnetting is banned in Mediterranean waters, this practise has continued illegally (WWF 2005). The Moroccan swordfish driftnet fleet in the Alboran Sea operates year round, resulting in high annual effort levels (Tudela *et al.* 2005). Even though sharks are a secondary target or bycatch of this fishery, some boats deploy driftnets 1–2 miles from the coast where the chance of capturing pelagic sharks is higher. The catch rate for shortfin mako is nearly three times higher in boats actively fishing for sharks (from 0.6 to 1.9 N/fishing operation and 0.06 to 0.14 catch per km net). Both annual catches and mean weights of shortfin mako have fallen as a result of fishing mortality in the Moroccan driftnet fishery, illustrating the likely impact of this illegal fishery on stocks in the Alboran Sea and adjacent Atlantic (Tudela *et al.* 2005). Megalofonou *et al.* (2005) reported 321 specimens caught as bycatch in tuna and swordfish fisheries in the Mediterranean Sea. Of those, 268 specimens were caught in the Alboran Sea, 42 in the Balearic Islands area, 3 in the Catalonian Sea, while only 8 specimens were caught in the central and eastern Mediterranean area, eg. Levantine basin. Furthermore, most of the specimens caught were juveniles, with only a few large specimens from Levantine basin. Of 595 specimens caught in southern Spanish waters, all were immature juveniles (Buencuerpo *et al.* 1998). Official data from ICCAT show shortfin mako catches in the Mediterranean by longliners from three nations: Cyprus (2006-2009; average 0.9 T/yr), Spain (1997-2009; average 2.6 T/yr), and Portugal (1998, 2000, 2001, 2003, 2005, 2006; average 4.6 T/yr). The longest of these time series, for Spain, shows declining catches over a 13-year period. Recreational fishing of shortfin makos has also been reported in the Mediterranean, although there are no official data (A. Soldo pers. comm.).

Proposed protection or regulation measures

Uplist from Annex III to Annex II. Mandatory reporting and live release of bycatch.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Lamna nasus* (Bonnaterre, 1788)

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Lamniformes

Family: Lamnidae

Genus and Species :*Lamna nasus*

Known Synonym(s) :

Common name (English and French): EN – Porbeagle;

FR - Requin-taupe commun

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

CMS Appendix III

Bern Convention Appendix III

IUCN Red List status:

Global: Vulnerable A2bd +3d+4bd

Mediterranean: Critically Endangered A2bd

Justification for the proposal :

Lamna nasus has virtually disappeared from Mediterranean records. Declines of up to 99% since the mid 20th Century have been estimated in Lamnid sharks (*L. nasus* and *Isurus oxyrinchus*) in the northwestern Mediterranean Sea through meta-analysis of fisheries and survey records and sightings. As a result, the Mediterranean population is listed as Critically Endangered on the IUCN Red List of Threatened Species. Unsustainable catch in fisheries is the main threat to this large pelagic shark. Its epipelagic nature exposes it to a variety of fisheries, particularly longlines, and also seines, gill nets, drift nets, pelagic and bottom trawls and handlines. *Lamna nasus* may be too rare now in the region to constitute a direct fisheries target. This species is listed on Annex III of the Barcelona Convention and UNEP MAP RAC/SPA (2003) noted that management programmes for sustainable fisheries should be developed and implemented for it. A TAC = 0 has been established by the EC since 2009. However, because *L. nasus* is now so rare in the Mediterranean, any catches, including incidental catches, are likely to be unsustainable and therefore an Annex II listing is proposed to protect the remaining small regional population.

Biological data The porbeagle is a relatively slow growing species, which reaches a maximum reported size of 355cm TL (Francis *et al*. 2008). Porbeagles are relatively late maturing: males mature at about 8 years of age (and 195cm TL) and females mature at 12-16 years (and about 245cm TL (in the North Atlantic (Jensen *et al.* 2002; Francis *et al*. 2008). Reproduction involves embryonic oophagywith litters of 1-5 pups (average four) produced, which are 68-78cm TL at birth (Compagno 1984, Gauld 1989, DFO 2001, Francis and Stevens 2000, Francis *et al*. 2008). Aasen (1963) estimated that the gestation period was about eight months in the North Atlantic and that individual females breed each year. However, Shann (1923) found two distinct size groups of embryos present in the December-February period and suggested that gestation may last 18-24 months. Gauld (1989) noted that there may be a resting period between parturition and fertilisation. Francis and Stevens (2000), Jensen *et al.* (2002) and Francis *et al.* (2008) estimate an 8-9 month gestation period. Birth occurs in spring off Europe. Natanson *et al.* (2002) and Campana *et al.* (2002) examined age and growth in the North West Atlantic population and reported a maximum age of 26 years, much shorter than estimated longevity in an unfinished population, which may be as high as 46 years (Natanson *et al.* 2002). Ages at 50% maturity for North Atlantic males and females are 8 and 13 years, respectively (Jensen *et al.* 2002). Populations appear to be segregated by size and by sex (Compagno 2002), and have little exchange of individuals with adjacent populations (Stevens *et al.* 2006). The annual rate of population increase is estimated at 0.048 (Cortés *et al.* 2010). Removal of porbeagles, a top marine predator, may have significant and complex effects on the marine ecosystem (Stevens *et al.* 2000; Baum and Worm 2009).

Brief description of the species Large, stout, dark grey shark with a white underside.

Distribution (current and historical) The porbeagle shark is wide-ranging, found in temperate and cold-temperate waters worldwide. Records indicate that it is rare or very rare throughout the Mediterranean (see Storai *et al.* 2005). Little information is available on any changes in the geographic range of *Lamna nasus*, but this species now appears to be scarce, if not absent, in areas where it was formerly commonly reported (e.g. in the Western Mediterranean, Alen Soldo *in litt*. 2003). Comparison of recent data with historical records suggests a strong reduction in the geographical distribution of porbeagles in the Mediterranean, with the current population restricted mainly to the central Mediterranean sea around the Italian peninsula (Ferretti *et al.* 2008).

Population estimate and trends *Lamna nasus* has virtually disappeared from Mediterraneanrecords. In the North Tyrrhenian and Ligurian Seas, Serena and Vacchi (1997) reported only 15 specimens of porbeagle during a few decades of observation. Soldo and Jardas (2002) reported only nine records of this species in the Eastern Adriatic from the end of the 19th century until 2000. Recently two new records were reported there (A. Soldo, unpublished data). Several records indicate a possible nursery area in the Central Mediterranean. Two newborn porbeagles were caught as bycatch of the swordfish longline fishery in the Western Ligurian Sea (Orsi Relini and Garibaldi 2002). A young porbeagle, considered to be very recently born, was reported in the central Adriatic Sea (Orsi Relini and Garibaldi 2002). A young specimen was also caught in the central Adriatic during big-game fishing, and was suggested to be between 1-17 months of age, on the basis of its length (Marconi and De Maddalena 2001). During research of bycatch in the western Mediterranean swordfish longline fishery, no porbeagles were caught (De La Serna *et al*. 2002). Only 15 specimens were caught during research conducted in 1998-2000 on bycatch of sharks in large pelagic fisheries: catches were reported only in the southern Adriatic and Ionian Seas, mainly by driftnets (Megalofonou *et al*. 2000). Anecdotal reports from fishers and traders in Italy suggest that porbeagles have greatly declined in Italian waters (Storai *et al.* 2005). Official FAO statistics show that the only landings ofporbeagles in the Mediterrranean were reported -

in 1996 by Malta – 1t (FAO 2002). Ferretti *et al.* (2008) used records dating back to the early 19th and mid 20th century to reconstruct long term population trends of large predatory sharks in the northwestern Mediterranean Sea. They estimated that abundance and biomass of lamnid sharks (*I. oxyrinchus* and *L. nasus)* had declined by up to 99%, using nine time series of abundance indices from commercial and recreational fishery landings, scientific surveys, and sighting records. The dramatic rate of decline from what were already low densities at the beginning of time series used in this study suggests that the persistence of porbeagles in the Mediterranean is precarious (Ferretti *et al.* 2008).

Habitat(s) The porbeagle shark is a wide-ranging coastal and oceanic species found in temperate and cold temperate waters worldwide (1o–18oC, 0–370m). It is more common on continental shelves, but is also found far from land and occasionally close inshore (Compagno 2002).

Threats

Existing and potential threats The main threat to porbeagle sharks is unsustainable catch in fisheries, which has driven significant and ongoing population declines. Porbeagles are caught in many gear types – particularly longlines, but also gill nets, seines, drift nets, pelagic and bottom trawls and handlines. Post-capture mortality in longlines is estimated at 53% (Cortés *et al.* 2010). The low reproductive capacity and high commercial value of both mature and immature age classes makes this species highly vulnerable to over-exploitation and population depletion. Simpfendorfer *et al.* (2008) assessed porbeagles as having a moderately high level of risk of over-exploitation in their study of the pelagic sharks taken in Atlantic longline fisheries, based on three metrics. Further, limited exchange with adjacent populations (Stevens *et al.* 2006) means that the reduced Mediterranean porbeagle population is unlikely to rebuild through input from the Northeast Atlantic (a population which is also depleted and considered Critically Endangered by the IUCN) (Stevens *et al.* 2006).

Exploitation Porbeagles have long been intensely fished commercially and exploited for human consumption in the Mediterranean (Compagno 2002; Dulvy *et al.* 2008), and ongoing exploitation of the depleted Mediterranean population presents a serious threat. They are a valuable bycatch or secondary target of many fisheries, particularly longline fisheries, also gill nets, driftnets, pelagic and bottom trawls, and handlines (Stevens *et al.*2006). Bonfil (1994) estimated that in 1989, the Spanish longline swordfish fishery caught 50 T of porbeagle in the Mediterranean and Atlantic. More recently, ICCAT data of reported catches show porbeagles caught by Mediterranean longliners from two nations: Malta (1994-2005, 2007-2009; average 0.46 T/year) and Italy (2004, 2005, and 2008; average 1.37 T/yr) (ICCAT 2010). A study of by-catch in the Maltese tuna longline fishery in 2008 found that porbeagles represented 1.2% of the total catch by weight (Burgess *et al.* 2010). Spanish fisheries statistics show decreasing reported catches of porbeagles in the Mediterranean, from 0.7 T in 2001 to 0.14 T in 2008 (MARM 2011). The high value of porbeagle shark meat means that most 'bycatch' is exploited and the species' fins also enter the shark fin trade. Porbeagles are also popular as recreational species (big game fishing) in some areas of Mediterranean.

Proposed protection or regulation measures

Uplist from Annex III to Annex II to protect the remaining Critically Endangered population.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by : *(Indicate here the Party(s) introducing the amendment proposal)*	Species concerned: *Leucoraja circularis* (Couch, 1838)
	Amendment proposed : ■ Inclusion in Annex II ☐ Inclusion in Annex III ☐ Removal from Annex II ■ Removal from Annex III

Taxonomy Class : Chondrichthyes Order : Rajiformes Family: Rajidae Genus and Species : *Leucoraja circularis* Known Synonym(s) : *Raja circularis* (Couch 1838) Common name (English and French): EN – Sandy skate or ray; FR – Raie circulaire	Inclusion in other Conventions : *(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention.)* IUCN Red List status: Global: Vulnerable A2bcd+A3bcd+A4bcd Mediterranean: Critically Endangered (A2bcd+3bcd+4bcd)

Justification for the proposal :

This relatively large skate is thought to have undergone significant declines in the Mediterranean Sea, to the point where it is now only rarely observed in the northern Mediterranean. It appears to be locally common off Mallorca, Spain, however. Its area of occurrence and depth range appear to have contracted significantly, with evidence of local extirpation in the Gulf of Lions and the Adriatic Sea. Like other large skates, its life history characteristics render it vulnerable to depletion. All size classes, even eggs, are catchable in demersal trawls. This species is taken as bycatch in demersal multi-species trawl fisheries and measures are needed to protect the remaining population. UNEP MAP RAC/SPA (2003)noted that management programmes for sustainable fisheries catch should be developed and implemented for *Leucoraja* spp. This species' already heightened threatened status in this region, combined with its vulnerable life history characteristic (i.e., large body size and large size at maturity) indicate that strict protection is needed under Annex II.

Biological data Reproduction is oviparous. Eggcases measure 90 x 50mm (Stehmann and Bürkel 1984). The spawning period is undefined (Bauchot 1987, Notarbartolo di Sciara and Bianchi 1998). Males mature at 70-80cm in the Mediterranean (N. Ungaro pers. comm.) and the maximum recorded size is 120cm (Serena 2005). Age at maturity, longevity, size at birth, reproductive age, gestation time, reproductive periodicity, fecundity, rate of population increase and natural mortality are unknown.

Brief description of the species Large, dark brown or red brown to sandy coloured skate with a slender tail and a short, pointed snout.

Distribution (current and historical) This species occurs in the Northeast Atlantic, Eastern Central Atlantic and Mediterranean Sea. In the Mediterranean Sea, it occurs in the western basin, to Libya and Greece (Mytilineou *et al.* 2005), and is absent from the Black Sea. Countries of occurrence include: Albania, Algeria,Croatia, France, Italy, Greece, Montenegro, Morocco, Slovenia, Spain and Turkey (Stehmann and Bürkel 1984, Bauchot 1987, Notarbartolo di Sciara and Bianchi 1998, Serena 2005).This species may now only be found in the western area of the Mediterranean (particularly in the Italian Ionian Sea (Consalvo *et al.* 2009)), pointing to a substantial reduction in area of occurrence (Baino *et al.* 2001).

Population estimate and trends The occurrence of*Leucoraja circularis* in the Mediterranean Sea appears to have decreased significantly in the last 50 years. This species was recorded in only 12 of 6336 hauls conducted between 1994-1999 at depths of 10-800m as part of the MEDITS scientific trawl survey programme of the northern Mediterranean (Baino *et al.* 2001). *L. circularis* was present in both shelf and slope trawl surveys of the Gulf of Lions in 1957-1960 but is now absent from more recent comparable surveys. Between 1957-1960, the sandy ray was captured in >10% of hauls in shelf surveys and in approximately 17% of hauls in slope surveys; between 1966-1995 it was not recorded at all from 1,295 hauls in eight trawl surveys (Aldebert 1997). It is now considered to be locally extinct in the area (Dulvy *et al.* 2003). Local extinction also appears to have occurred in the Adriatic Sea, where sandy rays were caught in trawl surveys in 1948, but were not recorded in similar surveys during 1998 (Jukic-Peladic *et al.* 2001). In the south Ligurian and north Tyrrhenian Seas, this species can be considered rare based on capture rates, from 1985 to 2005 only 10 specimens were caught (352-566 m of depth) (Serena *et al.* 2005). In the waters of Tunisia, it is also considered locally rare, with only 11 specimens recorded caught from 1971-2007, and all but one of these caught prior to 1982 (Mnasri *et al.* 2009). Recent observations in Mallorca suggest that the species is more common in this area, at least locally, with 19 specimens recorded at a single landing site (Palma port) between January and March 2009 (G. Morey and O. Navarro pers. comm.).

Habitat(s) Like other skates, this species is benthic. It occurs in offshore shelf waters and on upper slopes, in waters of 50-800m depth (Ungaro *et al.* 2008). Traditionally, it was thought to be found mainly around 100m depth on sandy and muddy bottoms, though it has been suggested that its depth range has significantly contracted and it is now more abundant in deeper waters. For example, within the Mediterranean, *L. circularis* was previously found on shelf and slope bottoms between 70-275m (mainly at around 100m), but now it is found in deeper waters between 500-800m (Baino *et al*. 2001).

Threats

Existing and potential threats The main threat to this species is unsustainable bycatch in fisheries in the Mediterranean. Although little is known of the life history of this species, like other large skates, it most likely has slow growth and low fecundity. This, combined with its large size, even for juveniles, make this species especially vulnerable to fishing exploitation (Brander 1981, Walker and Hislop 1998, Dulvy *et al*. 2000, Dulvy and Reynolds 2002). All size classes and life-stages are taken in fishing nets, even the eggs (which are often found in the trawl cod-end, Ragonese *et al.* 2003), because the legal mesh size used in much of the Mediterranean is ~20mm. The depth range of this species (50m-800m) lies entirely within the range of intensive demersal fisheries in the Mediterranean. Therefore it will not be protected by the ban on bottom trawling below depths of 1000m in the Mediterranean, adopted by the General Fisheries Commission for the Mediterranean (GFCM) in February 2005.Benthic trawl effort has increased both numerically and in technological terms in the shelf and slope area of the Mediterranean over the last 50 years. For example, the Gulf of Lions area was initially exploited by small-scale benthic trawl fisheries comprising 27 small low powered boats with a total nominal horse power of 2,700hp; more recently effort has increased to a total of 19,940hp (1974-1987). Since then half of the fishing effort has been displaced to targeting small pelagic fish (Aldebert 1997). The Adriatic Sea is subject to trawling mainly by Italian, Croatian, Slovenian, and Albanian fleets, however, no landings data are available (Jukic-Peladic *et al*. 2001).

ExploitationThis species is of local fishery importance in the Mediterranean Sea (Serena 2005). The sandy ray is captured as bycatch of multi-species trawl fisheries and offshore bottom longlines in the Mediterranean. All size classes and life-stages are taken in fishing nets, even the eggs (which are often found in the trawl cod-end, Ragonese *et al.* 2003), because the legal mesh size used in much of the Mediterranean is ~20mm. No official data on sandy ray catches in the Mediterranean are available.

Proposed protection or regulation measures

Uplist from Annex III to Annex II and implementation of strict legal protection through national legislation and GFCM.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Leucoraja melitensis*(Clark, 1926)

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Rajiformes

Family: Rajidae

Genus and Species : *Leucoraja melitensis*

Known Synonym(s) :*Raja* (*Leucoraja*) *melitensis* (Clark 1926)

Common name (English and French): EN - Maltese Skate or Ray; FR - Raie de Malte

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

IUCN Red List status:

Global (Mediterranean endemic): Critically Endangered A2bcd+3bcd+4bcd

Justification for the proposal :

This Mediterranean endemic skate is considered to be under imminent threat of extinction. It has undergone significant range contraction in this region, most likely as a result of incidental fishing pressure. All size classes are vulnerable to accidental catch in trawl, trammel and gillnet fisheries, due to the small mesh size of the nets used in the region. It is now rare or absent from areas where it was formerly common and its range now appears to be restricted to the Sicilian channel. As a result, *Leucoraja melitensis* was listed as Critically Endangered on the IUCN Red List of Threatened Species in 2006. The species' remaining range is subject to intense trawling activity and therefore legal protection and possibly protected areas will be essential to conserve the current, small population.

Biological data The species reaches a maximum reported size of ~50cm total length (TL) and both sexes have an average size at maturity of 40cm TL (Bauchot 1987, Notarbartolo di Sciara and Bianchi 1998, Stehmann and Burkel 1984). Breeding occurs throughout the year; however, ovulating females have been observed mainly in spring and autumn (Stehmann and Burkel 1984, Serena 2005) and produce 10–56 eggs/year (Bauchot 1987). Specimens recorded in the Strait of Sicily between 1985-2001 ranged in size from 9-42cm TL. Age at maturity, longevity, size at birth, reproductive age, gestation time, fecundity, rate of population increase and mortality are not known.

Brief description of the species A small-bodied skate, with sporadic markings on the dorsal side, including a distinct eyespot on each wing.

Distribution (current and historical) *L. melitensis* is endemic to the southwestern and south central Mediterranean. Historically, this species was restricted to a relatively narrow area of this region, where it was moderately common off Tunisia, common around Malta and rare off Algeria and Italy (Stehmann and Burkel 1984, Bauchot 1987, Serena 2005). It has also been reported from the Aegean Sea off Greece (Bertrand *et al*. 2000). *L. melitensis* was also reportedly present, historically, in the Gulf of Lions, Ligurian Sea (Aldebert 1997), although it was not recorded during trawl surveys in this area carried out from 1992-1995 (Aldebert 1997). It is possible that it during earlier surveys in the Gulf of Lions, catches were actually of *L. naevus*, which is widespread in the western Mediterranean. *L. melitensis*' current range appears to be restricted to the Sicilian channel (Ragonese *et al.* 2003). It is now rare off Malta (Schembri *et al*. 2003) and rare or absent off Tunisia (Bradai 2000).

Population estimate and trends This species was common to moderately common in areas from which it is now absent or rare (Malta, Tunisia, possibly Gulf of Lions, France) (Stehmann and Burkel 1984, Schembri *et al*. 2003, Bradai 2000, Aldebert 1997). International MEDITS trawl surveys from 1994-1999 (Baino *et al*. 2001, Bertrand *et al*. 2000) recorded this species in only 20 out of 6,336 hauls (in the western central Mediterranean, the coasts of Tyrrhenia, Corsica, Sardinia and Sicily), suggesting that the remaining population is now small and restricted to a small area of its former range.

Habitat(s) Found on sandy and sandy-muddy substrates. While the species has been recorded from depths of a few metres to 800m, it is more commonly found between 400-800m.

Threats

Existing and potential threats This species is considered to be under imminent threat of extinction, due to a combination of its very restricted range, and ongoing incidental fishing pressure (Cavanagh and Gibson 2007). It was previously found over a relatively restricted area (approximately one-quarter of the total area of the Mediterranean), in depths where trawl fisheries operate (Ungaro *et al.* 2006). Benthic trawling effort over the continental shelf and slope area has increased both with respect to numerical (effort) and technological advances over the last 50 yearsin the Mediterranean Sea. This species is only rarely present in fish markets; however, it is believed that while only the large individuals are landed for consumption, most size classes are likely to be taken as bycatch in fishing nets because the legal mesh size used in much of the Mediterranean region is small, at~20mm diameter. In the remainder of this species' range within the Mediterranean (the Sicilian channel around Malta), its depth distribution coincides with that of intensive trawling activity.The strait of Sicily is the most intensely exploited region of the Italian coast, with the most fishing vesselsin operation, compared to other areas of the basin.

ExploitationThis species is taken as bycatch of demersal trawl, gillnet and bottom longline fisheries (Bauchot 1987), although it may be too small to be taken regularly by the latter gear. Historically, it was taken in these fisheries off Tunisia (Bauchot 1987) and other areas of its former range. The remainder of this species' range (the Sicilian channel around Malta) is intensely exploited, largely by Italian multipurpose artisanal vessels using bottom longlines, gill-nets, trammel nets and trawls (trawl vessels constitute 11% of the fleet) (Relini *et al*. 2000). Skates are taken as bycatch and mainly discarded by these fisheries (Ragonese *et al*. 2003), although nothing is known of post-discard survival. Tunisian and Maltese vessels also operate in this area, although these fleets are not thought to exert the same pressure as the Italian fleet. Official catch data for this species are not available.

Proposed protection or regulation measures

Uplist from Annex III to Annex II and implementation of strict legal protection through national legislation and GFCM as a matter of acute urgency. Identification and protection of spawning grounds.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Rhinobatos* spp

(*Rhinobatos cemiculus* E. Geoffroy Saint-Hilaire, 1817; *Rhinobatos rhinobatos* Linnaeus, 1758)

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Rajiformes

Family: Rhinobatidae

Genus and Species : *Rhinobatos* spp*: Rhinobatos cemiculus, Rhinobatos rhinobatos*

Known Synonym(s) *: Glaucostegus cemiculus*

Common name (English and French): En - Blackchin guitarfish, Common guitarfish; Fr – Raie-guitare fouisseuse, Raie-guitare commune

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

IUCN Red List status:

Global: Endangered A4cd

Mediterranean: Endangered A4cd

Justification for the proposal :

Rhinobatos spp. have undergone severe declines in abundance and area of occupancy in the Mediterranean Sea, to the point of probable local extinction in some areas. Both were once common in the northern Mediterranean, but were absent from MEDITS trawl surveys between 1994-1999, have disappeared from landings, and appear to have been extirpated in the northern Mediterranean. In contrast, *Rhinobatos* spp. are still regularly landed off Tunisia (~200T per year), mainly in the Gulf of Gabes, where they are taken as bycatch year-round and targeted during May-July by a small coastal net fleet. However, the high proportion of juveniles in these catches suggests that this population may also be overfished. The primary threat to these species is unsustainable catch in fisheries, although their inshore distribution makes them particularly vulnerable to human impacts on coastal habitats, including degradation of their shallow water nursery grounds. UNEP MAP RAC/SPA (2003) noted that there was an urgent need to assess the threatened status of *Rhinobatos* spp. Both guitarfish species have been assessed as Endangered globally and regionally in the Mediterranean Sea on the IUCN Red List of Threatened Species.

Biological data Like most elasmobranches, both *Rhinobatos* spp.are relatively large-bodied, slow-growing, long-lived, and have low fecundity. They reproduce by aplacental viviparity, producing 4-6 pups per litter. Gestation lasts 4-6 months in *R. cemiculus* and 6 months in *R. rhinobatos*; both species reproduce once or twice a year.

Data for *R. rhinobatos*: Whitehead *et al*. (1984) reported that *R. rhinobatos* reaches a maximum size of 100cm total length (TL) and Capapé *et al*. (1996) and Enajjar *et al.* (2008) reported maximum lengths of 162cm TL and 120cm TL, respectively, in the Gulf of Gabes, southern Mediterranean. Enajjar *et al.* (2008) and Enajjar (2009) recently studied the reproductive biology of this species in the Gulf of Gabes. They report that females and males reach maturity at 79cm TL and 70cm TL, respectively. Gestation lasts 10-12 months and parturition takes place from the end of summer to the beginning of autumn. Size at birth is 25-29cm TL (Enajjar *et al.* 2008). Fecundity averages about 5 pups per year in this area. Başusta *et al.* (2008) studied the age and growth of this species off Turkey in the northeastern Mediterranean. Male and females ranged in age from 1-15 and 1-24 years, respectively. Total length ranged from 42 to 147 cm for females and 39 to 124 cm for males. In waters off Alexandria, Abdel-Aziz *et al.* (1993) reported that females matured at 87 cm, and reached a maximum size of 181 cm, while males matured at 70 cm, and reached a maximum of 172 cm length.

Data for *R. cemiculus*: Whitehead *et al*. (1984) reported that *R. cemiculus* reaches a maximum size of 180cm, and Capapé *et al*. (1996) reported 230cm TL in the Gulf of Gabes, southern Mediterranean. An important nursery area has been identified along the Lebanon coasts (F. Serena pers. comm.). Enajjar (2009) recently studied the reproductive biology of this species in the Gulf of Gabes. Males and females reach maximum sizes of 166cm TL and 205cm TL, respectively. Males are mature at 112cm TL and females at 139cm TL. Fecundity averages about 6 pups per year in this area. In Tunisia, average length of fully developed fetuses is 40 cm (Capapé and Zaouali 1994).

Brief description of the species Brown back with a white underside, with elongated body, flattened head and trunk and wings, distinctive of guitarfish.

Distribution (current and historical) Both species occur in the Eastern Atlantic and Mediterranean Sea; *R. rhinobatos* occurs from the southern Bay of Biscay, and *R. cemiculus* from northern Portugal, ranging south to Angola. Historically, both species occurred throughout the Mediterranean Sea, but nowadays they are absent or rare throughout much of the northern Mediterranean and may have been extirpated there (Capapé 1989, Whitehead *et al*. 1984, Quignard and Capapé 1971, Fredj and Maurin 1987, Doderlein 1884, Baino *et al.* 2001, Relini and Piccinetti 1991, G. Morey pers. comm.). Both species are absent from the Black Sea (Serena 2005).

Population estimate and trends There has been a marked decline in the abundance and extent of occurrence of both species in the Mediterranean Sea. *R. rhinobatos* and *R. cemiculus* were historically common in the northern Mediterranean. For example, Doderlein (1884) reported their daily presence in the Palermo fish market. However, they have disappeared from bottom trawl surveys, from the Alboran to Aegean Sea within the MEDITS international programme and from landings in Mazzara del Vallo, Sicily (M. Vacchi pers. comm.). They appear to have been extirpated from this area (Relini and Piccinetti 1991). In the Balearic Islands, both species were considered typical inhabitants of unvegetated sandy bottoms (De Buen 1935). Older fishermen reported their relative frequency during the first half of the 20th century, but nowadays they seem to be extirpated from the area (G. Morey pers. obs). Given that the two species are demersal, occurring over shelf bottoms at maximum depths of about 100m, their connection with extra-Balearic populations is probably very low. Granier (1964) reported that *R. rhinobatos* was commonly landed in the southern coast of the Mediterranean Sea but that by

that time, it had become scarce on the northern coast (Granier 1964). Nowadays, both *Rhinobatos* species in the Mediterranean are common off Tunisia, mainly in the Gulf of Gabes, where they are regularly landed as bycatch of trawl fisheries year-round and targeted during May-July by traditional nets (Enjjar *et al.* 2008, M.N. Bradaï pers. comm. 2009). Landings data for recent years show a steady trend, with ~200t of Rhinobatos spp landed per year. Landings in this area are characterised by a high proportion of immature fish (Notarbartolo di Sciara *et al.* 2007).

Habitat(s) Guitarfish are benthic, living over sandy, muddy, shell and occasionally macro-algal covered substrates. They inhabit shallow water on the continental shelf; *R. cemiculus* occurs to depths of 100m, whilst *R. rhinobatos* occurs from the intertidal zone to 180m depth.

Threats

Existing and potential threats The primary threat to guitarfish in the Mediterranean Sea is unsustainable catch in fisheries. The limiting life-history characteristics and inshore habitat of these guitarfish make them particularly vulnerable to population depletion over much of their ranges. Pregnant females and adult males congregate in inshore waters for mating and parturition, where they are exposed to coastal fisheries; such fishing pressure has been heavy, for example, in Iskenderun Bay (Turkey) (Başusta *et al.* 2008). Habitat degradation may also impact these species' shallow inshore nursery grounds. Low levels of interconnectivity between geographical subpopulations make these species vulnerable to localised declines and mean that recolonisation may be very slow. Given their vulnerable life histories and inshore distribution, the observed population declines in the Northern Mediterranean are very likely to be repeated throughout the remainder of these species' ranges (ICES 2010); such severe declines have also occurred in other guitarfish species globally (Fowler *et al.* 2005). The lack of data about guitarfish populations and impacts of fishing and habitat loss represents a further threat to the persistence of these species.

Exploitation These species are taken as bycatch of a variety of fishing gears, including trawls, trammel nets, and gill nets. They are easily captured in coastal artisanal fisheries. No information is available about directed fishing for guitarfish in the Mediterranean Sea, but they are known to be targeted for their high-value fins in other areas (e.g. Western Africa). These species are easily caught by trawls, such as the Egyptian commercial trawl fishery off the coast of Alexandria. In Turkey, *R. rhinobatos* has been exploited by trawlers since 1990, and is sold by kebab restaurants along the Aegean and Mediterranean coasts (Çek *et al.* 2009). Occasional catches have also been reported by fishers in Malta, although it could not be confirmed whether individuals caught were *R. cemiculus*, *R. rhinobatos*, or both species (Schembri *et al.* 2003). In the Gulf of Gabes, Tunisia, *R. rhinobatos* and *R. cemiculus* are landed as bycatch of trawl fisheries year-round. They are also targeted during May-July using traditional nets by a small coastal fleet (maximum of ten boats). This fleet generally targets other chondrichthyan species, such as *Carcharhinus plumbeus* and *Mustelus* spp. (M.N. Bradaï pers. comm. 2009). Regular catches of ~200t of *Rhinobatos* spp per year have been recorded for the last six years in this fishery. In addition, official data from the FAO show Mediterranean catches of these species in recent years by Albania, Greece, Libya, and Palestine, averaging a total of 65 T/year for the last ten years (FAO 2011). No official landings data are available from other countries that are also likely to capture these species in the Mediterranean (including Lebanon, Turkey, Syria, and nations along the North African coast) (ICES 2010).

Proposed protection or regulation measures

Uplist from Annex III to Annex II and strict protection in coastal waters by Parties to the Barcelona Convention. In addition, development of fisheries research programmes and a management plan under GFCM, on the basis that these species are still regularly taken in Tunisian waters.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Galeorhinus galeus*(Linnaeus, 1758)

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Carcharhiniformes

Family: Triakidae

Genus and Species : *Galeorhinus galeus*

Known Synonym(s) :

Common name (English and French): EN - Tope, FR Requin hâ

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

IUCN Red List status:

Global: Vulnerable A2bd+3d+4bd

Mediterranean: Vulnerable A2bd

Justification for the proposal :

Survey and fisheries data suggest that *Galeorhinus galeus* has declined significantly in the Mediterranean Sea and it is now only rarely seen as bycatch. Overfishing from incidental catch, together with habitat degradation caused by intensive bottom trawling are considered the main factors that have produced the decline of the Mediterranean stock. UNEP MAP RAC/SPA (2003) noted that management programmes for sustainable fisheries catch should be developed and implemented for this species but that has not happened along many years since then.

Biological data The life history parameters of *G. galeus* varies between regions. The maximum size recorded in the Mediterranean is ~200cm total length (female) (Capape and Mellinger 1988), larger than in some other regions. Differences are also apparent in the size at maturity in different regions. Size at maturity ranges between 120-135cm for males and 134-140cm for females in various regions (Olsen 1954, Capape and Mellinger 1988, Peres and Vooren 1991, Freer 1992). Reproduction is aplacental viviparity with average litters of 20–35 pups, with as few as 6 and as many as 52 observed with an average of 35 in the Eastern North Pacific (Ripley 1946, Ebert 2003)) produced in spring or early summer after a gestation period of ~12 months; the young vary in length at birth between 26–40cm, depending on the region. The litter size increases in larger females. Females appear to breed every year in the Mediterranean. These animals are very long-lived and are estimated to live for up to 60 years, although estimates vary (from around 22 years to around 40 years to up to 60 years) with region and ageing methods used. In Australia, tags have been returned from animals at liberty for more than 40 years. Age at maturity is 8–10 for males and 10–15 for females (Olsen 1954, Peres and Vooren 1991, Freer 1992, Walker 1999, Ebert 2003). The annual rate of population increase has been estimated by Cortés (2002) at 1.077 (95% C.I. 1.037 to 1.128) and the natural mortality by Smith *et al*. (1998) at 0.113.

Brief description of the species Slender, long-nosed shark, with a grey dorsal surface and white below, and oval shaped eyes.

Distribution (current and historical) Widespread in temperate waters. Occurs throughout the whole Mediterranean Sea, but absent from the Black Sea (Serena 2005).

Population estimate and trends Declines have occurred in the Mediterranean Sea, and it is now only rarely seen as bycatch. It was once common in coastal waters of the Mediterranean. It had high catch rates in fish traps but analyses of these catch series showed a sharp decline even at the beginning of the twentieth century. It was caught in bottom long line surveys in the Tuscan Archipelago (Mancini, 1922) and Adriatic Sea (Kirinčić and Lepetić, 1955), but there is no record of this species from trawl surveys in the last 30 years from the same areas. *Galeorhinus galeus* appears sporadically in scientific surveys and in places where fishing exploitation is relatively low. It seems more abundant in the west Ionian Sea and Aegean Sea. Analysis of MEDITS trawl survey data from 1994-1999 shows a very low frequency of occurrence for *G. galeus* in the Mediterranean (only 5 positive of 6336 hauls or 0.05 %), although it should be noted that trawling is a minor threat to this species and numbers in trawl surveys would not be expected to be high. Off Italy, Relini *et al*. (2000) reported the capture of *G. galeus* in only one of the11 zones studied as part of the Italian national project (9,281 hauls in total, around the Italian coast, from 1985-1998), although data on biomass for this species were not provided. Tuna trap data from the Northern Tyrrhenian Sea from 1898 to 1992 shows a dramatic decrease in the abundance of *G. galeus* catches (80 individuals between 1898-1905; only eight for the 1906-1913 period and zero from 1914-1922) (Vacchi *et al*. 2002). These data can be interpreted as an indication of early depletion of the population, at least in shallow waters in this area. This could also have occurred in other Mediterranean areas, where similar fisheries operated historically. Data from the Medits survey for the Adriatic Sea were compared with those from the Hvar survey, carried out in 1948 (Jukic-Peladic 2001). Although no data on individual species biomass are reported, *G. galeus* appeared in the 1948 survey, but not in the Medits survey. Data on elasmobranch landings from the long-line fleet at the Palma de Mallorca (Balearic Islands) central fish auction wharf reported only one specimen in 1996 (B. Reviriego pers.comm.), six in 1999 (G. Morey pers.comm.) and recent regular visits have reported no further specimens. In addition, *G. galeus* was not reported in the official landing statistics, since it did not appear in the 1999-2001 period, thus exacerbating the difficulty of monitoring the population. For the Spanish long-line fleet off the Levantine coast, operating mainly in the Alboran Sea and around the Balearic Islands, the observed catch rate (as bycatch) of *G. galeus* is about five specimens per ship and year (D. Macías pers.comm.) In Tunisian waters, where fishing pressure is lower than off the northern Mediterranean coasts, the species is considered to be very rare (Bradai 2000).

Habitat(s) Most abundant in cold to warm temperate continental seas, from the surfline and very shallow water to well offshore (Compagno in prep). The species is primarily found near the bottom but ranges through the water column even into the pelagic zone. A coastal-pelagic shark of temperate continental and insular waters, often found well offshore (but not oceanic) as well as at the surfline, in shallow bays, and in submarine canyons. Found at depths of 2 to 471m (Compagno in prep). The species appears to have fairly discrete pupping and nursery areas, which are often in shallow, protected bays and estuaries (Olsen 1954).

Threats

Existing and potential threats Overfishing from incidental catch, together with habitat degradation caused by intensive bottom trawling are considered the main suspected factors that have produced the decline of the Mediterranean stock. Stock collapses (declines of >80%) documented in the Northeast Pacific, Southwest Atlantic and Australia demonstrate the extreme vulnerability of this species to fisheries exploitation (Walker *et al.* 2006).

Exploitation Although no direct fisheries for *G. galeus* exist in the Mediterranean, it was traditionally caught as bycatch in gillnets and trammel nets in the Northern Adriatic Sea, also as bycatch of semi-industrial (Adriatic Sea and Sicily) and artisanal fisheries in pelagic and demersal nets, deep longlines, drift lines and troll lines (Fisher *et al*. 1987). A small directed gillnet fishery targeting *Mustelus spp.* and *Squalus spp*. operated off the Balearic Islands in the past which reported catches of *G. galeus*. In recent times, only bottom trawl and longline fisheries have reported continuous bycatch of *G. galeus*, and such reports are very rare nowadays. The development of the bottom trawl fisheries in the Mediterranean over the first half of the 20th century in the northern range, and during the latter half in the southern range, is considered as one of the principal factors responsible of the decline of many demersal elasmobranch species. The meat of this species is retailed in European markets, from catches in the Northeast Atlantic and (formerly) Mediterranean and from imports. Its fins and liver oil are also utilised.

Proposed protection or regulation measures

Uplist from Annex III to Annex II. Mandatory reporting and live release of bycatch. ID and protection of nursery grounds.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Proposed by :

(Indicate here the Party(s) introducing the amendment proposal)

Species concerned: *Sphyrna* spp:*Sphyrna zygaena*(Linnaeus 1758),.*Sphyrna lewini* (Griffith & Smith, 1834). *Sphyrna mokarran* (Rüppell, 1837)

Amendment proposed :

- ■ Inclusion in Annex II
- ☐ Inclusion in Annex III
- ☐ Removal from Annex II
- ■ Removal from Annex III

Taxonomy

Class : Chondrichthyes

Order : Carcharhiniformes

Family: Sphyrnidae

Genus and Species : *Sphyrna zygaena, Sphyrna lewini, Sphyrna mokarran*

Known Synonym(s) :

Common name (English and French): EN – Smooth Hammerhead, Scalloped hammerhead, great hammerhead ; FR - Requin-marteau commun, Requin-marteau halicorne, Grand requin-marteau

Inclusion in other Conventions :

(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)

IUCN Red List status of species

Global:

S. zygaena: Vulnerable A2bd+3bd+4bd

S. lewini: Endangered A2bd+4bd

S. mokarran: Endangered A2bd+4bd

Justification for the proposal :

Sphyrna spp. are estimated to have declined by up to 99% over 107 years in the northwestern Mediterranean Sea. *Sphyrna zygaena* is the main species of hammerhead shark reported from the Mediterranean, but there are also very sporadic records of *S. lewini* and a single record of *S. mokarran* from the region. Unsustainable catch in fisheries is the main threat to these large semipelagic sharks. Their epipelagic nature exposes them to a variety of fisheries, particularly longlines and gillnets, as bycatch in tuna and swordfish fisheries. They are also highly valued in the global shark fin trade. UNEP MAP RAC/SPA (2003) noted that there was an urgent need to assess the threatened status of *Sphyrna* spp. in the region. The available trend data suggest that the species meet the IUCN Red List criteria for Critically Endangered, regionally, in the Mediterranean Sea. Given the evidence for significant, rapid declines in *Sphyrna* spp., continued high fishing pressure and problems with accurate identification to species level, need of inclusion of the entire genus in Annex II is warranted.

Biological data Published biological data on *S. zygaena* are limited. Compagno (1984) reported that the species reaches a maximum size of 370-400cm total length (TL). Stevens (1984) reported that off the east coast of Australia males mature at about 250–260cm TL and females at about 265cm TL. Castro and Mejuto (1995) reported gravid females between 220 and 255cm fork length, but gave no relationship between fork and total length. Bass *et al*. (1975) reported a female *S. zygaena* from South Africa that appeared to have recently mated in February and another female caught in November that contained full-term embryos. Stevens (1984) reported that off the east coast of Australia parturition occurs between January and March, with ovulation at about the same time. The gestation period off eastern Australia appears to be 10–11 months. Castro and Mejuto (1995) reported 21 gravid females with a mean litter size of 33.5 from the waters of western Africa. Off eastern Australia Stevens (1975) reported litter sizes between 20–49 (mean 32). The sex ratio of embryos is 1:1 (Stevens 1984, Castro and Mejuto 1995). Compagno (1984) gave the size at birth as 50–61cm. Smale (1991) reported juveniles with open umbilical scars from South Africa at sizes between 59 and 63cm. Possible pupping grounds and nursery areas for this species include the northern Gulf of California and shallow coastal waters off southern Brazil and Uruguay (Vooren 1997, Vooren and Klippel 2005). Although maximum age has yet to be determined for this species, it is thought that the lifespan of the smooth hammerhead may be 20 years or longer (FLMNH 2008). Further information is required on the biology and life-history parameters of this species.Removal of hammerhead sharks, top marine predators, may have significant and complex effects on the marine ecosystem (Stevens *et al.* 2000; Baum and Worm 2009).

Brief description of the species Large hammerhead shark, olive-grey back with a white underside and pectoral fin tips that are dusky coloured below.

Distribution (current and historical) *Sphyrna zygaena* is found in temperate and tropical seas, with a wider range than other members of its family (Compagno in prep). The full extent of this species' range in tropical waters may be incompletely known at present, due to probable confusion with the more abundant *S. lewini* (Compagno in prep). The smooth hammerhead appears to be less common in the central Mediterranean, in comparison to the western regions of this sea. Records from the Mediterranean indicate that *S. zygaena* was present, at least historically, in the Adriatic, Tyrrhenian, Ligurian, and Alboran Seas (Megalofonou *et al.* 2000; Feretti *et al.* 2008). *Sphyrna mokarran* is very rare, with only a single specimen recorded in the Mediterranean in Camogli, Ligurian Sea, Western Mediterranean (Boero and Carli, 1977 *in* Bradai *et al*., 2010), introduced probably via Gibraltar.

Population estimate and trends Specific data on *Sphyrna zygaena* populations are generally unavailable in many areas, because catches of hammerhead sharks are often grouped to include several *Sphyrna* species. In the central Mediterranean Sea, there are few recent records of *Sphyrna* species. A total of 16 records of *S.zygaena* were collected in the eastern Adriatic from the 19th century to the 1950s, including reported catches were distributed throughout whole of the eastern coast. A higher number of records were reported during the 19th century in comparison to the 20th century (10 vs. 6, respectively) and the species has not been reported in this area since 1956 (Soldo and Jardas 2002). Although it occurs in open waters of southern Adriatic, it is only caught very rarely (Bello 1999). Megalofonou *et al.* (2000) only recorded four specimens during their survey of shark bycatches and discards in Mediterranean large pelagic fisheries in 1998-1999 (one in the Adriatic, two in the Ionian Sea and one in Spanish Mediterranean waters). There were only 13 records of *S. zygaena* in the Northern Tyrrhenian and Ligurian Seas from the 1960s-1995 and there are no reports of this species during the last five years (F. Serena pers. comm.). Ferretti *et al.* (2008) compiled nine time series of abundance indices from commercial and recreational fishery landings, scientific surveys and sighting records, to reconstruct long-term population trends of large sharks in the northwestern Mediterranean Sea. Of the taxa for which there were enough data to investigate, hammerhead sharks (*Sphyrna* spp.) declined the fastest; they appeared to disappear from coastal waters after 1963 and catches declined consistently in pelagic waters in the early 1980s in all sectors.

Meta-analysis showed an average instantaneous rate of decline of -0.17 (CI 95%: –0.34, –0.003; time range 178 years) in abundance and –0.36 (CI 95%: –0.56, -0.1–6; time range: 107 years) in biomass, which translated into an estimated species decline of >99.99% in both cases. Walker *et al.* (2005) also report that the species has virtually disappeared from the central-southern Mediterranean Sea since 1986.

Habitat(s) *Sphyrna zygaena* is a coastal-pelagic and semi-oceanic shark, occurring from shallow inshore waters over continental and insular shelves to depths of at least 20m and probably deeper, offshore (Compagno in prep., Compagno *et al.* 2005). The nursery habitat of this species is smooth sandy substrate in shallow waters, down to depths of 10m (Casper *et al.* 2005).

Threats

Existing and potential threats Unsustainable catch in fisheries is the greatest threat to *Sphyrna zygaena*. It is caught in multiple types of fishing gear, including pelagic handlines, longlines, gillnets, purse-seines, and pelagic and bottom trawls (Bonfil 1994, Compagno in prep,). Observed population collapse of hammerhead sharks occurred after the expansion of pelagic fisheries in the Mediterranean (Ferretti *et al.* 2008) – these fisheries are ongoing.Catches in pelagic fisheries appear to be dominated by larger individuals, while inshore shelf fisheries more commonly catch juveniles (Casper *et al.* 2005). Post-capture mortality of hammerhead sharks by longline vessels is relatively high, estimated at 85% for *S. zygaena* and 83% for *S. lewini* (Cortés *et al.* 2010). Hammerhead sharks represent one of the main species exploited for the global shark fin trade (Clarke *et al.* 2006a), with fins traded from an estimated 1.3-2.7 million individuals each year (Clarke *et al.* 2006a, b). The high commercial value of its fins, combined with its low reproductive capacity, makes this species highly vulnerable to over-exploitation and population depletion. Habitat degradation may also impact the three species' shallow inshore nursery grounds.

Exploitation In the Northeast Atlantic and Mediterranean Sea, *S. zygaena* is mainly caught by longlines and gillnets, as bycatch in tuna and swordfish fisheries. Despite a ban on driftnetting in Mediterranean waters, this practice continues illegally (WWF 2005). A recent study of the Moroccan driftnet fleet operating in the Alboran Sea (southwest Mediterranean) and around the Strait of Gibraltar by Tudela *et al.* (2005) indicates that pelagic fishing pressure in this area is beyond the reproductive capacity of several other semi-oceanic shark species that were previously caught with *S. zygaena* (such as *Alopias vulpinus*). Buencuerpo *et al.* (1998) report the highest catches of *S.zygaena* in the Spanish swordfish fishery from the western African coasts and near the Strait of Gibraltar. All three species have been reportedly caught as by-catch within the Italian large pelagic fishery, although a short-term programme of longline vessel monitoring in 1991 noted the capture of only one individual of *S. zygaena* (Di Natale 1998). De la Serna *et al.* (2002) reported only 8 specimens of *S. zygaena* (0.05%) in a total 17759 sharks caught during a survey of Spanish Mediterranean Fisheries from 1997-1999. This is significantly lower when compared to results of the same fishery along the west African coast and Iberian peninsula (where 757 specimens in period July 1991–July 1992 were caught). Only *S. zygaena* and *S. lewini* are reported as individual species in the Food and Agriculture Organisation (FAO) fisheries statistics, however, hammerhead catches are often grouped one category, *Sphyrna* species. The grouping of these species makes identifying actual catches of *S. zygaena* difficult. FAO data for the Mediterranean include reported catches of *S. zygaena* for only one nation, Albania, in the Ionian Sea (2 T in 2004, and 7 T in 2006). EU data also show reported catches of 1 T of *S. zygaena* by Portugal, in 2005 (Eurostat 2011), while Spanish fisheries statistics indicate reported Mediterranean catches of 722 kg in 1997 (unspecified hammerhead species), and 36 kg and 2 kg of *S. zygaena* in 2004 and 2006, respectively (MARM 2011).

Proposed protection or regulation measures

Uplist from Annex III to Annex II. Mandatory reporting and live release of bycatch.

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Annex X - COMMON DECLARATION BY GREENPEACE, OCEANA AND WWF

Common Declaration by Greenpeace, Oceana and WWF

Distinguished delegates,

I speak on behalf of WWF, Oceana and Greenpeace.

Fragmented, sector-based management – i.e., the division of marine and maritime governance into conservation on the one hand and management on the other, and further sector-specific management divisions - has proved itself gravely inadequate. The state of the marine environment, the rapid decline of marine biodiversity, and the few properly managed marine protected areas paint a clear and dismal picture of this failure.

In the Mediterranean, our governments adopted more than a decade ago the SPA/BD Protocol. With this legal instrument they committed and equipped themselves with the necessary means to act, whenever and wherever needed, to address all threats to marine species and habitats, based on the best available science. The implementation of the Protocol rests in your hands. We expect you to respect your commitments to create a comprehensive and effectively managed network of SPAMIs and defend endangered species, regardless if they are commercially exploited or not. In fact even more so if science proves that economic interests threaten their survival.

Greenpeace, Oceana and WWF regret that the European Commission and EU members have submitted a scrutiny reservation on the scientifically sound proposals to up-list endangered and threatened shark and ray species to Annex II of the Protocol. We call on all delegates to meet their responsibilities under this Convention and do what is necessary to safeguard what remains of the populations of these species before it is too late. We also regret that it is taking so long for the countries to start the process to create SPAMIs in open seas. We urge you to increase efforts on the designation of protected areas and the protection of threatened species. At the Conference of Parties to BARCON the region will be waiting to hear the concrete measures your countries have taken on the establishment of a representative network of marine protected areas by 2012.