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WORKING GROUP ON THE BLACK SEA (WGBS)

Report of the seventh meeting of the WGBS

Burgas, Bulgaria, 11–13 July 2018

EXECUTIVE SUMMARY

The seventh meeting of the Working Group of the Black Sea (WGBS)[1] took place from 11 to 13 July 2018 in Burgas, Bulgaria. The meeting reviewed the work carried out during the 2017–2018 intersession in relation to stock assessment, management of selected fisheries, data collection, small-scale fisheries as well as work on the interactions between fisheries and the ecosystem. It also debated on capacity-building activities within the framework of the BlackSea4Fish project and on the outcomes of the first project steering committee meeting. The WGBS welcomed the establishment of the GFCM subregional technical unit for the Black Sea, inaugurated in Burgas on 30 May 2018.

The WGBS formulated advice on: i) the status of Black Sea stocks, with all main commercial stocks assessed being considered uncertain, overexploited or depleted; ii) the management of turbot, including assessment of management scenarios in reply to recommendations adopted by the Commission; iii) data collection and quality indicators; iv) research priorities in the context of the BlackSea4Fish project, including on rapa whelk and stock boundaries.

Finally, the WGBS agreed upon its work plan for 2018–2020 in support of mid-term strategy activities that would be coordinated, among others, through the BlackSea4Fish project. The WGBS also renewed the mandate of its bureau for an additional year.

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OPENING, ARRANGEMENTS OF THE MEETING AND ADOPTION OF THE AGENDA

1. The seventh meeting of the Working Group on the Black Sea (WGBS) was held from 11 to 13 July 2018 in Burgas, Bulgaria. The meeting was attended by 26 experts from all Black Sea riparian countries as well as the European Union (EU), the Organization of the Black Sea Economic Cooperation (BSEC) and the GFCM Secretariat. The full list of experts is provided in Appendix 2 of this report.

2. Mr Simion Nicolaev, WGBS coordinator, opened the meeting and thanked the hosting country for facilitating the organization of the seventh meeting of the WGBS in Burgas, where the first GFCM subregional technical unit that was expected to provide substantial support to the work of the WGBS, was recently inaugurated.

3. Mr Dimitar Valkov, expert from Bulgaria, hosting country, welcomed participants to Burgas, recalling that the first GFCM subregional technical unit had been formally inaugurated on 30 May 2018 on the occasion of the first Steering Committee meeting of the BlackSea4Fish Project. In his address, he highlighted the specific conditions of the Black Sea and the important role of scientific work by the WGBS and its experts in this context, making reference to the important advances made in recent years. In this regard, he pointed to the recommendations adopted for the management of turbot fisheries, the actions taken for the fight against illegal, unreported and unregulated (IUU) fishing, the efforts in data collection and especially the operationalization of the BlackSea4Fish project as a further boost to enhance cooperation among riparian states. He encouraged WGBS members to pursue their endeavors during discussions.

4. The WGBS coordinator expressed satisfaction for the fact that, for the first time since the establishment of the WGBS, all Black Sea riparian countries were participating. He referred to the commitment made in June 2018 at the High-level conference on Black Sea fisheries and aquaculture with the signature of the Sofia Ministerial Declaration in support of sustainable fisheries and aquaculture in the region, two years after the Bucharest Declaration. The concrete actions pledged by riparian countries were encouraging and placed increasing expectations on WGBS work. In this context, he regarded the BlackSea4Fish Project as a much-needed tool to effectively support the countries in such work, stating that its effectiveness would be instrumental in securing in due course the membership of all Black Sea countries in the GFCM. Lastly, he mentioned the first celebration of the International Day for the Fight against Illegal Unreported and Unregulated (IUU) fishing on 5 June 2018, explaining how the GFCM had long advocated for increased awareness on IUU fishing considering the magnitude of the problem, including in the context of the Black Sea. He concluded that the GFCM would continue to promote cooperation at the regional level through the WGBS; in this context continuous commitment was expected from all participants.

5. After introducing delegates and observers, the GFCM Secretariat informed the meeting of organizational arrangements. It was noted that WGBS work linked to sustainable aquaculture development in the Black Sea was being held in the context of meetings dedicated to the establishment of aquaculture demonstrative centres (ADC) and of ad hoc technical assistance to select countries. The agenda was adopted, as attached under Appendix 1. The list of documents is reproduced in Appendix 3 and the opening speeches are included in Appendix 4.

6. The GFCM Secretariat recalled the establishment of the GFCM subregional technical unit for the Black Sea, mentioning that this unit was the first one the subregions of the GFCM area of competence and that this unit was expected to play a crucial role in more efficiently implementing priority activities in the area. The GFCM Secretariat confirmed that as the unit was established, procedures would be launched to equip the offices with dedicated personnel, including administrative staff. All countries were reminded that interns could be hosted at the unit under the FAO Internship Programme and were invited to promote this opportunity at the national level.

REPORT OF INTERSESSIONAL ACTIVITIES, INCLUDING IN THE CONTEXT OF THE BLACKSEA4FISH PROJECT

Review of relevant recommendations by the forty-first session of the GFCM

7. The GFCM Secretariat listed the recommendations adopted by the Commission at its forty-first session, detailing the provisions of Recommendation GFCM/41/2017/4 on a multiannual management plan for turbot fisheries in the Black Sea, Recommendation GFCM/41/2017/6 on the submission of data on fishing activities and Recommendation GFCM/41/2017/7 on a regional plan of action to combat illegal, unreported and unregulated (IUU) fishing, directly relevant to Black Sea riparian countries. The resolutions on the application of an international maritime organization number and on the reactivation of the working group on fishing technology adopted by the Commission were also mentioned, together with relevant pending proposals on the conservation of sharks and rays and the management of recreational fisheries.

Intersessional activities in 2017-2018

8. The WGBS coordinator presented an overview of the GFCM intersessional activities of relevance to the Black Sea on the basis of the priorities identified by the WGBS and of the work plan adopted by the Commission at its forty-first session. He mentioned activities carried out at the GFCM level in both the Black Sea and Mediterranean basins, such as: the preliminary application of data quality indicators on data submitted by countries; efforts towards the harmonization of regional surveys-at-sea; the implementation of a socio-economic survey; the work plan developed for the quantification/estimation of IUU fishing; the collection of relevant information on small-scale fisheries; the implementation of the bycatch monitoring programme, and the development of a methodology for the assessment of vulnerability of fisheries to climate change. He then moved onto the specific activities carried out in the Black Sea, recalling the work of the Subregional Group on Stock Assessment for the Black Sea (SGSABS) and of the Workshop on the assessment of alternative management measures for turbot fisheries (WKMSE-BS) as well as the support provided by the BlackSea4Fish project for the participation of Black Sea scientists in relevant meetings and activities as well as for the organization of capacity-building activities, namely trainings and participation of scientists onboard scientific vessels.

9. Specific reference was made to the importance of ensuring the active participation of Black Sea ministers and high-level representatives as well as of scientists and experts in the High-level conference on sustainable small-scale fisheries in the Mediterranean and the Black Sea (Malta, 25–26 September 2018) and in the first Forum of Fisheries Sciences in the Mediterranean and the Black Sea (FAO headquarters, 10–14 December 2018).

10. The WGBS agreed that Black Sea presence in wider regional events needed to be promoted more intensely, especially in events taking place outside of the Black Sea but still highly relevant for the area. The role of national focal points and of WGBS participants in promoting these initiatives vis-à-vis national administrations and fostering participation, as appropriate, was underlined, as well as the support that the BlackSea4Fish project could provide in this context.

Implementation phase of the BlackSea4Fish project, including outcomes of the first Steering Committee meeting

11. Mr Ali Cemal Gücü, BlackSea4Fish coordinator, provided details on the activities supported by the project during the intersession and recalled the decisions taken by the BlackSea4Fish Steering Committee on the functioning of the project, including expected outputs, implementation arrangements and project monitoring. He described the roles of the different stakeholders in the project, including national focal points, as well as the functions of the Steering Committee *vis-à-vis* the WGBS.

12. The BlackSea4Fish project was applauded as a long-awaited opportunity to effectively backstop the work of the WGBS during the intersession, benefiting all riparian countries in terms of training, facilitated participation in relevant activities, prioritization of key actions and eventual provision of

technical assistance in support of a more systematic fulfilment of requirements by riparian states, as well as improvement of the quality of scientific advice in support of decision-making.

13. Ms Valérie Lainé, expert from the European Union (EU), reiterated strong support to the BlackSea4Fish project, recognizing its role in enhancing scientific cooperation in the Black Sea.

14. The WGBS took note of the expected outputs, functioning and implementation arrangements as well as the monitoring scheme proposed for the BlackSea4Fish project, agreeing to submit the project document for endorsement by the Commission (Appendix 7).

NATIONAL REPORTS TO THE WGBS

15. The GFCM Secretariat presented, on the basis of document GFCM:WGBS7/2018/Inf.5, a synthesis of the information contained in five national reports sent by riparian countries, noting the following: i) the fleet size had generally increased, except in in Bulgaria where it remained stable and in Georgia where it decreased; ii) an increasing trend for landings was observed in Romania and Ukraine in recent years whereas the trend was steady for Bulgaria and decreasing for Georgia and Turkey; iii) some riparian countries reported information on research projects in place that could provide useful complementary information; iv) little information was submitted in relation to spatial management measures in place at the national level; v) the topics of future research needs expressed by countries were found to match the activities already launched or foreseen within the mid-term strategy, and vi) no data on incidental catches of vulnerable species was reported, including piked dogfish. The summary sheets of the national reports submitted are available in Appendix 14.

16. Ms Irine Lomashvili, expert from from Georgia, clarified that the decrease in the number of vessels reported to have occurred between 2016 and 2017 was due to the fact that there was uncertainty as to what number to report. The vessels reported for 2017 were the total number of active vessels in Georgia (26).

17. Mr Ilhan Aydin, expert from Turkey, specified that, for the first time, Turkey had been reporting data for both the Marmara Sea (GSA 28) and the Black Sea (GSA 29), hence the increase in figures such as landings and fleet. The importance to ensure that data could be comparable among years was stressed and Turkey was invited to always report on both GSAs (separately) in the future.

18. During follow-up discussions, it became evident that some definitions (such as “vessels” or “active vessels”) still generated confusion in the different countries, mainly because of different translations of the same concept. It was clarified that the definitions used in the national reports and in all reporting tools were GFCM definitions, as included in the glossaries, compendium of decisions and GFCM Data Collection Reference Framework (DCRF). It was specifically recalled that, within the GFCM, vessels were all watercraft irrespective of length and superstructure and that a vessel was considered active from the moment it had at least one day of activity in a given year.

19. The WGBS expressed concern on the limited quantity, quality and accuracy of data submitted through the national reports. It also noted that there were some inconsistencies in the information reported through the national reports compared to what was agreed in relevant GFCM fora (e.g. stock status validated by SGSABS). It was considered this was partly due to the overall structure of the national reports, which contained sections that were not considered as particularly relevant for the Black Sea. In this regard, several participants also mentioned the issue of duplicated information between the national reports and other mandatory GFCM reporting tools (e.g. DCRF, CoC reports, etc.), making it difficult for countries to systematically submit complete data.

20. The floor was informed that the Scientific Advisory Committee on Fisheries (SAC) had raised similar concerns in relation to the usefulness of the national reports as they were currently structured, both in terms of relevance of the type of information gathered and of its use in support of management decisions. The WGBS agreed to contribute, together with the SAC, to an overall reflection regarding the format and scope of the national reports that was foreseen in the context of the second performance review of the GFCM to be launched in 2019.

21. Irrespective of the reflection being launched and any potential implications in the practice linked to the national reports, countries were still prompted to ensure that the most complete and up-to-date information be shared in the WGBS context in support of strengthened scientific advice.

ISSUES RELATED TO FISHERIES DATA COLLECTION, INCLUDING METHODOLOGIES AND DATA QUALITY

Analysis of data on fishing activities submitted in line with relevant decisions, including the implementation of quality indicators

22. The GFCM Secretariat recalled Recommendation GFCM/41/2017/6 on the submission of data on fishing activities, highlighting the possibility for contracting parties and cooperating non-contracting Parties (CPCs) to propose ad hoc fleet segment aggregations representing the activity of their fishing fleet by GSA. The decision to tentatively apply quality checks to the data submitted in 2017 by select countries was also recalled. Finally, the methodology used, including the list of thresholds for conformity and stability checks as well as the preliminary results of this analysis were presented, highlighting that a number of issues had been found, including inconsistencies in the data submitted by various CPCs. Finally, the GFCM Secretariat summarized the data submitted in 2017 in relation to turbot and piked dogfish, noting that some information was still missing but underlining that, thanks to the improved collaboration, the Russian Federation had submitted information on turbot and discussions had started towards the regular submission of national data to the GFCM.

23. The WGBS praised advances made in the field of data quality, noting the importance of implementing these checks more systematically so to ensure a solid base of information in support of decision-making. The WGBS coordinator further underlined the need for the establishment of a system reporting the outcomes of quality appraisal back to the administrations; it was suggested this issue be discussed at the upcoming session of the Commission.

24. The WGBS was reminded that as Recommendation GFCM/41/2017/6 had been adopted, reporting the outcomes of the quality assessment would have implications not only for the quality of transmitted data but also in terms of compliance through an analysis of the Compliance Committee (CoC).

25. Regarding data on turbot and piked dogfish, Ms Pinelopi Belekou, expert from the EU, echoed by the GFCM Secretariat, underlined the fact that the main purpose of establishing the status of data submission during the WGBS was to identify possible problems towards best fulfilling the requirements of recommendations in place, while issues on compliance should be discussed within the framework of the CoC. It was noted that some of the missing data were related to the fact that, in some countries, there had been no target fishery (i.e. the quotas were set to zero) for either or both of these species. CPCs were reminded that the absence of landings as well as the presence of those species in by-catch should be reported so that the WGBS could provide accurate advice. In this respect, some CPCs asked for additional technical assistance on data submission.

Data collection methodologies for select mid-term strategy activities

26. The GFCM Secretariat presented the four documents to be used as guidelines for relevant mid-term strategy data collection activities, namely the monitoring of discards, the monitoring of incidental catches of vulnerable species, the implementation of scientific surveys-at-sea and the collection of recreational fisheries data. It was explained that the objective of each document was to obtain a harmonized methodological framework for data collection that would be applicable to the realities of different countries so to enable the comparison of data at the regional level.

27. Following a request for clarification, it was explained that the development of these methodologies had been a participatory process involving national focal points and experts. It had also benefited from inputs during ad-hoc meetings and contributions by relevant partner organizations, the latter being applicable in particular to the data collection methodology for vulnerable species. The scope

of these documents as well as the preliminary draft versions had also presented in relevant external meetings in order to gather additional feedback.

28. The WGBS welcomed the elaboration of these documents, recognizing their strong potential in guiding data collection activities where a structured methodology was lacking or where existing processes could benefit from a harmonized approach to compare data across regions. It was clarified that these methodologies were technical guidelines that could be applied on a voluntary basis and should in no way be considered as binding.

Work plan for the estimation/quantification of IUU fishing

29. The GFCM Secretariat outlined the work plan for the estimation/quantification of IUU fishing in the Mediterranean and the Black Sea, reminding the WGBS that it comprised six activities, some of which were tailored to subregional specificities, namely: i) compilation of existing studies and reports on IUU related issues; ii) evaluation of the current status of data holdings by GFCM on IUU related issues; iii) administration of a survey covering IUU related issues at the national level; iv) creation of an IUU spatial risk assessment framework; v) independent estimate of fishing vessel activity; and vi) implementation of case studies (Appendix 8).

30. Reference was made to the discussions held on this work plan on the occasion of the twentieth session of the SAC (June 2018) and the twelfth session of the CoC (July 2018), where it was decided to endorse and launch activities 1 to 3 of the work plan, whereas activities 4 to 6 would be discussed during a dedicated expert meeting tasked with evaluating advances made in the field and deciding accordingly on the way forward. The WGBS agreed to follow the same *modus operandi*.

31. The WGBS agreed to contribute by providing comments on activity 3, the survey towards facilitating the estimation of IUU fishing, noting that, once finalized, the survey would be sent to national focal points for further distribution at country level.

Provision of advice on the status of fisheries

32. The GFCM Secretariat outlined discussions held during the intersession towards improving the provision of advice (meeting on the formulation of advice on fisheries – WKADVICE, FAO headquarters, March 2018), including through the establishment of benchmark assessments (to be carried out every 3–4 years), an external review process and the proposal of a detailed work plan to address the advice on priority species. The need to ensure that advice formulated for the Commission be based on the most recent possible data, reiterated by several GFCM members on various occasions, was underlined.

33. The WGBS fully supported the idea of benchmark and updated assessments (Appendix 13), and agreed that the benchmark assessment should be subject to a specific meeting with regional and external experts where decisions would be taken as a group; this needed intense preparation. The GFCM Secretariat stood ready to provide assistance in such preparation work both at the national and regional level.

34. Participants discussed on the possibility of involving external experts in the benchmark assessment process as well as on the modalities for their participation; they agreed on the need to have external appraisal of the data and methods used, while, on the other hand, data preparation should start at the national level. The WGBS underlined the important role of external experts in helping develop regional capacity in all aspects related to the provision of advice on the status of the stocks, as the common goal was to have regional experts fully independent in preparing data and performing stock assessments in the future. In this context, the selection criteria for external experts were discussed and it was noted that their technical capabilities would be as important as their capacity development skills.

35. The expert from Turkey underlined the fact that the biggest problem in the region was related to data and remarked the importance of involving all regional experts, including those responsible for data collection, in the benchmark process.

ACTIONS TOWARDS SUSTAINABLE SMALL-SCALE AND RECREATIONAL FISHERIES

36. Recalling the need to improve the characterization of small-scale fisheries (SSF) in the Mediterranean and the Black Sea, the GFCM Secretariat presented the work underway to test a characterization matrix, in line with ongoing processes at the global level within FAO. The tool was aimed at describing a fishing unit across multiple dimensions or characteristics of scale in a flexible way, for the matrix to be applied to diverse types of fishing activity across different regions. It was underlined that this preliminary testing would inform further discussions at the regional level.

37. The testing of this matrix in order to understand its potential usefulness in improving the characterization of fisheries in general, and of SSF in particular, was welcomed. It was agreed that this would be done in the context of the socio-economic survey planned in select countries in the context of mid-term strategy activities or through ad-hoc case studies.

38. Ms Lomashvili specified that her country did not have appropriate legislation in place to regulate SSF, which undermined the submission of appropriate data on SSF vessels and activities to the GFCM. As the ministry did not have the authorization to use expert data in this context as it was not considered reliable, such information would possibly be submitted only when an appropriate reporting system for SSF would be set up.

39. Subsequently, reference was made to the draft handbook for data collection on recreational fisheries, which was expected to be tested through pilot studies in the Mediterranean (in this respect, Tunisia was already identified by the SAC as a case study) and in the Black Sea. It was recalled that, on the basis of the outcomes of these studies, the next meeting of the Working Group on Recreational Fisheries (WGRF) should consolidate this experience, together with comments on its application, into a revised version of the handbook.

40. Turkey proposed itself as one of the pilot sites and the WGBS was in agreement. It was specified that such case study would be carried out on a step-by-step approach, based on: i) analysis of the current licensing system in place for recreational fisheries; ii) building of the statistical universe of recreational fishers; iii) implementation of a sample survey using stratified random sampling to collect data on the characteristics of recreational fishing, including effort and economic expenditures; iv) data collection.

FORMULATION OF ADVICE IN THE FIELD OF FISHERY MANAGEMENT

Overall status of Black Sea stocks and technical management measures

41. The GFCM Secretariat reminded the WGBS of the common set of six indicators agreed to define the good environmental status (GES) of exploited populations – spawning stock biomass (SSB), total landings, fishing mortality, fishing effort, catch-per-unit-effort and bycatch – remarking that their descriptions had already been approved by the WGBS at its sixth session. Regarding their use for the determination of a regional status, the example of the Mediterranean was mentioned: the collaboration between GFCM and UNEP/MAP resulted in the analysis being developed and included in the Ecological Objective 3 (EO3 – commercially exploited fish) of the UNEP/MAP Mediterranean Quality Status Report; notably, a traffic light approach was suggested for the evaluation of SSB at the regional level. The WGBS was invited to comment on such analysis and to propose a similar or alternative solution for the Black Sea, acknowledging that this was a way to provide a basin-level appraisal of stock status while gauging the extent to which the objectives of the mid-term strategy were being met and the management measures adopted were being effective.

42. The WGBS positively commented on the fact that, in the Black Sea, a very large percentage of the catches was being assessed by virtue of the fact that anchovy and sprat alone comprised approximately 80 percent of catches. Nevertheless, the WGBS coordinator, echoed by other delegates, noted that in the Black Sea only a small number (7–8) of stocks was commercially relevant and that, in this view, the best approach would be to take into consideration the trends in each indicator for each stock as well as an overall appraisal of the status of Black Sea stocks. In addition to this, participants underlined the importance of species interactions as well as of evaluating regional good environmental status using multispecies criteria in addition to single-species ones. In this respect, they provided a

number of examples including the alternating yearly fluctuations of Black Sea anchovy and European sprat as well as the feeding interaction (competition) between juvenile turbot and rapa whelk.

43. The BlackSea4Fish coordinator suggested body condition as a possible useful indicator for the Black Sea. He outlined the outcomes of work done in Turkey on establishing a relationship between: i) body condition and environmental conditions in red mullet, and ii) the rate of loss of body condition in winter and the subsequent year's recruitment success in anchovy. Mr Valodia Maximov, expert from Romania, reminded the group of the significant work done on the influence of the environment on sprat and anchovy recruitment. Mr Oleksander Chashchyn, expert from Ukraine, stressed the importance of considering zooplankton biomass in this kind of assessment as it comprised a food source for many crucial species in the Black Sea. Participants from all countries highlighted the important work done by all riparian countries in collecting data on zooplankton as well as the obligation of all Black Sea countries to carry out environmental monitoring towards producing the State of the Environment report of the Black Sea Commission, suggesting that the common analysis of these data would be beneficial towards assessing the good environmental status of the Black Sea in terms of commercial resources. The WGBS acknowledged that this kind of work was already included in the work programme of the BlackSea4Fish project and should be a key action of its work plan.

44. In this respect, the WGBS discussed the possibility of changing the template for reporting the status of the stocks in order to consider not only current advice per species, but also the trends in current advice as well as the trends in catches by country as well as an ecological summary to account for species interactions (Appendix 9). It was proposed that the BlackSea4Fish project could coordinate work towards proposing a set of indicators for the production of such ecological summary and propose them to the next meeting of the SGSABS.

45. The GFCM Secretariat then presented an overview of the overall status of Black Sea stocks (as reproduced in Appendix 5), noting that the SGSABS had reviewed and assessed eight out of nine priority species in 2017 providing advice for all eight species. No assessment was carried out for Atlantic bonito at the subregional level while the stock of rapa whelk was assessed for the first time using data limited stock assessment methods. An analysis of trends in the advice provided over the years 2015–2017 (in terms of overexploitation ratio – $F_{current}/F_{MSY}$) revealed that out of the five stocks for which quantitative estimates of $F_{current}$ and F_{MSY} were produced, four (turbot, black sea anchovy, horse mackerel and whiting) showed decreasing overexploitation ratios. In this respect, turbot was notable with a decrease in overexploitation rate from 5.38 in 2015 to 3.10 in 2017. In comparison, the overexploitation status of European sprat showed a slightly increasing trend over the same period.

46. The GFCM Secretariat summarized the situation by species as follows:

Turbot: the stock was considered overexploited and in overexploitation. Catches of turbot were found to be decreasing overall; this was coupled with some signs of improvement from the direct surveys in Bulgaria and Romania and from an indirect appraisal of the northern part of the basin. Model results highlighted slightly positive trends in SSB. Recovery may be facilitated further through strengthened effectiveness of management measures, including improved MCS towards curbing IUU fishing. The quality of the 2017 assessment was still affected by the lack of Georgian catches for turbot, a detailed analysis of surveys, and the contrasting signals given by the stock in different areas of the region. A benchmark assessment was proposed by the SGSABS for 2018.

Black Sea anchovy: the stock was considered in overexploitation, and the use of a nominal CPUE as a tuning index was discussed; methods to account for quantifiable effects causing changes in catchability were identified by the SGSABS.

Piked dogfish: the stock was considered depleted with $F_{current}$ being approximately 11 times F_{MSY}; the advice was to implement a recovery plan and reduce F by more than 90 percent. Information on piked dogfish remains scarce: a better description of targeted and bycatch fisheries interacting with this species was considered necessary. The fact that advice was based on information coming from Romanian waters only (where the species is bycatch) was noted and an in-depth analysis of trawl surveys in the area was deemed necessary. The monitoring and reporting of bycatch information was still considered insufficient but crucial.

European sprat: the stock was considered uncertain. Two alternative models were used by the SGSABS to provide advice on the status of the stock and these yielded different results: a benchmark assessment was suggested for 2018.

Horse mackerel: the stock was considered in overexploitation and issues related to the nominal Turkish CPUE used to tune the XSA model were identified. The SGSABS suggested a benchmark assessment be carried out in 2018.

Red mullet: the stock was considered uncertain with signs of overexploitation; the assessment presented worrying trends with high catches in the final years and decreasing SSB and recruitment. Issues were identified on the treatment of trawl survey data. The advice was to reduce fishing mortality on a precautionary basis.

Whiting: the stock was considered in overexploitation and the SGSABS noted the fact that discards were not included in the assessment, despite being, in some countries, the biggest source of fishing mortality for this species.

Azov Sea anchovy: the stock was found to be sustainably exploited.

Rapa whelk: a number of alternative assessments was run, consistently showing that the fishery was close to maximum sustainable yield and suggesting care should be taken in expanding this fishery further.

Altantic bonito: a number of attempts were made to analytically assess Atlantic bonito in the Black sea and surrounding seas. The available data did not allow the successful use of any one of these models. Further scientific work was recommended as was the evaluation of the possibility of using a different management approach for this species (e.g. management based on data limited advice – catch trends, escapement rates, etc.). Owing to the fact that the species is nearly only fished by the Turkish fleet on a seasonal basis, the SGSABS recommended to reconsider its inclusion as a priority species for the Black Sea.

47. Finally, the GFCM Secretariat reminded the WGBS of other general issues related to the improvement of advice on the status of Black Sea stocks, including: i) the overall problem concerning the lack of fishery-independent surveys comprehensively covering the distribution of the main commercial species; ii) the scarcity of information on bycatch and discards, and iii) the absence of Georgian catch statistics for turbot, red mullet, piked dogfish and whiting caught by small artisanal boats fishing inshore with no obligation to record their landings.

48. Mr Chashchyn, commented on the current approach for assessing turbot stocks as, in the Black Sea, turbot was assumed to be one single stock. Notwithstanding the conclusions of SGSABS, he pointed to an unbalance in the data currently available for turbot, since most of the information used for stock assessment was collected in the southern part of the Black Sea, whereas it was known – also based on the Black Sea geographical features determining certain migration patterns – that most turbot landings occurred in the northern part. He called for the BlackSea4Fish project to provide specific assistance to northern Black Sea countries to collect more data towards a more accurate stock assessment and in order to contribute to discussions on stock boundaries. Mr Chashchyn further commented on the fact that different stock dynamics between the northern and southern parts of the basin were also evident for horse mackerel, and the situation of Black Sea anchovy, when taking into account catch-per-unit-effort, appeared to be better in Georgia than elsewhere.

49. The WGBS noted with pleasure the first signs of reversal in the trend of the overexploitation rate of turbot and underlined that the constructive evolution of fishing mortality seemed to have been confirmed, possibly due to the gradual application of management measures by riparian countries, meaning the stock was line with the provisions of recommendation GFCM41/2017/41. Mr Aydin recalled the raising activities carried out in Turkey where the wild stock had been restocked with approximately 10 000 juveniles per year in recent years. Mr Chashchyn intervened to also explain that the reason for enforcing one month of closure in Ukraine during the turbot spawning season (instead of two as prescribed by Recommendation GFCM41/2017/4) was to compensate for the three-month winter closure which was necessary to protect the large aggregations of turbot in the overwintering grounds off Ukraine.

50. In the context of the management of turbot, the GFCM Secretariat presented the outcomes of the Workshop on the assessment of management measures (WKMSE) which, in the Black Sea, concentrated on turbot. After recalling the contents of Recommendation GFCM41/2017/4, the GFCM Secretariat illustrated the approaches used to simulate and assess the outcomes of six alternative management scenarios, including the establishment of a Total Allowable Catch (TAC) as per the recommendation (see conclusions and recommendations for a summary of the management scenarios and the main findings). The GFCM Secretariat also outlined the roadmap for the improvement of advice on turbot formulated by the WKMSE, illustrating the three steps foreseen (provision of all raw input data, performance of a benchmark assessment, and revision and improvement of the MSE model) and summarized the technical comments to support the WGBS on quota allocation foreseen by Recommendation GFCM41/2017/4 (see conclusions and recommendations).

51. The WGBS endorsed the advice provided by the WKMSE, including the roadmap, acknowledging that the results were consistent with those of the previous year and were considered to produce robust average trends that should be taken into account for management purposes.

52. With respect to piked dogfish, Ms Belekou from the European Commission, noted that, given the extreme lack of information for this species, collection of data from all riparian countries, including on bycatch from fisheries targeting other species, should have priority over addressing the implementation of a recovery plan. The WGBS also agreed that there was a need for more information on the Bulgarian longline fishery targeting piked dogfish, including the length frequency distributions of these catches.

53. Mr Violin Raykov, expert from Bulgaria, underlined the importance of better understanding the situation of sprat, in light of the fact that the size and age of this species in catches had been decreasing and it was important to determine whether this was due to either i) the change in distribution of fishing effort towards shallower (20–40 m depth) waters inhabited by smaller individuals, or ii) exploitation, or iii) a combination of both. In this respect, and to investigate the contrasting results of both assessment methods used in the 2017 SGSABS, the WGBS welcomed a benchmark assessment for this species in 2018.

54. Mr Raykov pointed out the fact that whiting constituted, in many countries, the discards of fisheries targeting other species; the WGBS agreed on the importance of collecting discard data and including them in the yearly assessments for whiting.

55. Ms Lomashvili noted that while, on the one hand, Georgia did not have the appropriate legislation in place yet regarding the collection and reporting of catches taken by the inshore traditional fishery, on the other hand, unofficial data of unknown quality were available. Time would therefore be needed before official data on this fishery could be provided, following an amendment of national legislation. The GFCM Secretariat reminded the WGBS that for all species, turbot in particular, precautionary advice on the status of the stocks would be required even in the absence of appropriate data and, for this reason, invited Georgia to make expert data available for analysis by the SGSABS.

56. Regarding the issue of Atlantic bonito, Mr Aydin recalled that there was a strong feeding interaction between this species and Black Sea anchovy, and the removal of Atlantic bonito from the list of priority species should be evaluated with care. The WGBS was reminded that there were data collection and advice obligations related to priority species and that, therefore, if Atlantic bonito were to remain on the list, the advice on the status of this stock would necessarily have to be provided by 2020. The WGBS agreed that Atlantic bonito was important in the Black Sea ecosystem and had an important economic impact when it appeared in catches. In spite of this, its presence in catches was characterised by strong fluctuations, and the WGBS suggested that it be taken off the list of priority species but kept as a focus for the work of the BlackSea4Fish project.

57. Mr Aydin presented the preliminary results of a project aimed at studying stock boundaries for turbot in the Black Sea, implemented by SUMAE in partnership with the Institute of Fisheries and Marine Ecology (IFME) of Ukraine and started in 2015. The project objectives were to: i) investigate connectivity among turbot populations; ii) evaluate the level of discreteness between the isolated Black Sea populations and other Mediterranean populations; iii) catalogue genetic resources; and iv) characterise genetic resources for stock identification. After describing the methodology and

available samples (from Turkey, Ukraine, Romania and Georgia) used for analysis, he explained that the first results showed some differences in various genetic markers among turbot samples from different areas, which could support the hypoythesis of different turbot populations in the Black Sea. Mr Aydin also underlined the fact that genetic studies on stock structure were also being carried out for other commercially important Black Sea species such as European sprat and he invited all riparian countries to send samples for analysis.

58. The WGBS welcomed the project and its outcomes. All participants agreed that presenting such initiatives during relevant meetings was essential for knowledge sharing and would support the work of the WGBS. Ms Belekou remarked that the subdivision of Black Sea stocks into multiple stocks or substocks should only be contemplated in the presence of strong scientific evidence. The WGBS agreed that more information was required on genetics and migration of crucial commercial Black Sea stocks, turbot in particular, towards identifying their stock identity, remarking that the regional approach was good but that some species might need a more local approach to better understand population dynamics. The WGBS proposed that all available data and information be compiled towards initiating the process. It was recalled that the BlackSea4Fish project could support work related to stock boundaries.

59. Ms Belekou underlined, in light of the Bucharest and Sofia declarations, the importance of working towards reflecting on the situation of rapa whelk since it was concurrently a non-indigenous species (NIS) and a species whose commercial importance had been increasing dramatically over the past decades. In this respect, she introduced a proposal for future actions (Appendix 6) including the immediate adoption of a set of initial transitional measures (fishing authorizations and lists of authorized vessels/landing points) to ensure that the fishery be maintained at MSY, while collecting the necessary information to determine future management through a detailed and comprehensive two-year research project, and taking advantage of and enhancing existing research activities in the region. This research project would foresee the collection of information on the biology and ecology of the species, of fishery-dependent and independent data, and of socio-economic data, towards the performance of quantitative assessments to determine stock status and the formulation of future management proposals through the evaluation of alternative management scenarios.

60. The WGBS acknowledged the importance of formulating a clear action plan for rapa whelk, which had been present in the ecosystem for a long period but had progressively invaded the Black Sea in the last decades, with unknown impacts on the environment and on other species through environmental/feeding/competitive interactions and due to the development of a substantial fishery whose impact on other commercial species (e.g. juvenile turbot) was not entirely understood. The WGBS agreed on the need to collect information as outlined by the proposal in Appendix 6 as well as on the possibility of investigating possible changes in the gear used to fish rapa whelk, i.e. from beam trawler to less invasive methodologies such as the collection by divers. In this latter respect, the WGBS was reminded of the fact that the SAC had reactivated the Working Group on Fishing Technology (WGFiT) and that this forum was available for future discussion on all issues pertaining to fishing gear technology. The WGBS underlined the importance of making the most of available information and existing projects. In this respect, Ms Elitsa Petrova-Pavlova, expert from Bulgaria, recalled the intense research activity carried out in Bulgaria on rapa whelk since 2015; Mr Aydin did the same for Turkey.

Interactions between fisheries and marine ecosystems and environment

61. In view of the development of an adaptive plan for climate change, in line with the mid-term strategy, the GFCM Secretariat presented the outcomes of an expert meeting, co-organized with the FAO Fisheries and Aquaculture Departement and WWF, where the potential implications of climate change on Mediterranean and Black Sea fisheries had been identified. As an outcome of this meeting, a roadmap towards an adaptation strategy had been proposed, focusing on a vulnerability assessment to be carried out through pilot studies in relevant areas.

62. The WGBS fully supported the roadmap and the proposed methodology for the assessment of vulnerability to climate change. It was suggested to test it in one case study linked to small pelagic fisheries, which were considered as those most potentially affected by climate change and by related consequences such as the proliferation of non-indigenous species.

63. In relation to ongoing bycatch monitoring work, it was recalled that the Commission had decided to keep pending a proposal for an amendment of Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area of application. Its importance was underlined as it would allow to align the related GFCM recommendation currently in place to the measures already applied by other bodies, thus strengthening existing GFCM shark finning regulations.

64. It was noted that the provisions of the pending proposal only made reference to the shark species listed in the annexes of the SPA/BD Protocol, which was not applicable to the case of the Black Sea where relevant provisions in place were those established in the context of the Black Sea Commission. Notwithstanding the importance of the proposal and agreeing with its rationale, the WGBS advised to revise it and include relevant provisions for the Black Sea, so to ensure that discussions at the Commission towards a possible adoption of this recommendation could be supported by all GFCM members.

WGBS WORK PLAN FOR 2018-2020

65. The WGBS discussed its preliminary work plan, based on the outcomes of wider regional work undertaken in the context of the GFCM as well as of WGBS intersessional work, including in the context of the first implementation phase of the BlackSea4Fish project.

66. The WGBS discussed and agreed on a three-year work plan (2018–2020) for the assessment of priority species, based on the discussions held at the Workshop on the provision of advice (WKADVICE) as well as on inputs provided by experts and on parallel work by the SAC on the same topic. The proposed stock assessment work plan by priority species is provided in Appendix 11.

67. Based on the experience matured in the Mediterranean and on discussions held within the WKADVICE, the WGBS discussed on whether the advice on stock status and management should be based on a one-year lag between data and advice (data year + 1) rather than on a two-year lag (data year + 2) mentioning that it may be useful to start with a particular fishery. The main shortcoming identified was related to the yearly production of catch data, which would have to be brought forward from June/July so that advice could be formulated on time for the annual session of the Commission.

68. Following extensive discussions, the WGBS adopted its 2018–2020 work plan as follows:

Stock assessment and strengthened advice

- Continue to investigate on the stock identification for the main commercial species, especially for turbot, red mullet, horse mackerel, and piked dogfish.
- Compile raw data by country for all priority species so to ensure adequate assessment of stock status. This should include time series on landings, length distribution of landings, age length keys for the fleets, as well as bycatch and discards where available.
- Ensure the implementation of surveys-at-sea that provide fishery-independent indices of abundance for the main commercial species, including through the harmonization and extension of existing surveys.
- Organize data preparation and benchmark sessions in line with the agreed calendar for the provision of advice, as included in Appendix 11.
- Conduct training activities to increase the capacity to perform quantitative assessments of stock status.
- Continue compiling socio-economic fisheries data, including on small-scale fisheries, in line with the agreed survey methodology and roadmap for data collection, with a view to providing accurate, timely and complete baseline data on fisheries for its integration in management advice.

Data collection and quality indicators

- Streamline the communication flow with contracting parties and cooperating non-contracting parties (CPCs) for the exchange of information on data quality assessment through the DCRF online platform.
- Implement conformity, stability and consistency quality indicators, together with timeliness and completeness, on the DCRF online platform for all the data transmitted by CPCs.
- Initiate the harmonization with the DCRF of data reporting requirements set in existing GFCM recommendations, including on management plans; update the DCRF manual accordingly and release the related transmission tools on the DCRF online platform.

Sustainable small-scale and recreational fisheries

- Compile information on the characterization of small-scale fisheries through data collected from the socio-economic survey.
- Pilot the *Manual on data collection for recreational fisheries in the Mediterranean and the Black Sea* in Turkey and, if necessary, update the manual according to pilot study outcomes.

IUU fishing

- Support the implementation of the work plan for the estimation/quantification of IUU fishing, in particular support the implementation of the survey towards facilitating the estimation/quantification of IUU fishing

Interactions between fisheries and the marine environment and ecosystems

Bycatch and fishing technology issues

- Produce a regional review on the current state of bycatch in the GFCM area of application.
- Keep on implementing, with relevant partners, a bycatch monitoring programme and related training activities, to collect representative data and facilitate the potential adoption of management measures towards the reduction of bycatch rates.
- Develop a catalogue of fishing gear, on the basis of the template on fishing technology by fishing gear and fisheries to be filled by experts (Appendix 4 of the WGFiT report).

Advances towards an adaptation strategy for climate change and non-indigenous species

- Implement the methodology for the assessment of the vulnerability of fisheries in the Mediterranean and the Black Sea to the effects of climate change in select case studies in the Black Sea, starting by small pelagic fisheries.
- Work towards the identification of potential management measures for those species considered as non-indigenous species that have become a target fishery, in particular for rapa whelk.
- Analyse the impact of other non-indigenous species, including *Mnemiopsis* and other gelatinous species in the Black Sea ecosystem.

MEETINGS

Meeting	Place/Date
Stock assessment data preparatory meeting	TBC 1–5 October 2018
Subregional group on stock assessment in the Black Sea (SGSABS), including a benchmark session on European sprat	TBC 5–9 Nov. 2018
WGSSF	February 2019
Workshop on age reading of selected species	TBC
SGSABS benchmark session for turbot	TBC 2019
Workshop on the assessment of management measures for Black Sea case studies	TBD 2019
Eighth meeting of the WGBS	Trabzon, Turkey June/July 2019
Working Group on the allocation of total allowable catch (TAC) for Black Sea turbot	Trabzon, Turkey June/July 2019

69. The representative of Turkey announced that the first Symposium on fisheries and aquatic science (SOFAS) was foreseen to be organized in Trabzon, Turkey, in September 2020; he expressed hopes that countries would provide their support to the event and invited the GFCM and WGBS to actively contribute to its preparation. The WGBS welcomed the organization of such a symposium. In this respect, the representative of the EU mentioned that it could offer a good opportunity to take stock of the progress in the implementation of the Sofia Declaration.

70. The WGBS coordinator also informed participants that the Black Sea Commission organized, every 5 years, a scientific conference in the Black Sea, where the participation and contribution of WGBS would definitely be of great added value.

71. Overall, the importance to promote the participation of Black Sea scientists in events was recognized and countries were prompted to actively engage in these activities. In this regard, it was recalled that the BlackSea4Fish project could support the participation of Black Sea scientists to relevant events.

72. The WGBS agreed to submit its work plan for endorsement by the Commission, taking note that activities would be distributed over the timeframe of the implementation of the mid-term strategy and would be conducted according to the Commission's priorities and to the availability of funds, especially through the BlackSea4Fish project.

CONCLUSIONS AND RECOMMENDATIONS

73. The WGBS reached the following conclusions and recommendations:

General conclusions

- In line with the commitment made in the Bucharest and Sofia declarations, CPCs have agreed to actively contribute to the implementation of strategic activities towards achieving the sustainability objectives set by the mid-term strategy for 2020. With the support of the BlackSea4Fish project, they pledged to ensure the WGBS work plan be duly followed, making necessary resources available, replying to requests of information and timely submitting appropriate data.

- With respect to the BlackSea4Fish project, the WGBS endorsed the final project document (Appendix 7), which integrates the work plan proposals made during the WGGBS, and agreed to submit it to the GFCM in order to guide the implementation of proposed activities in the next intersession.
- The WGBS noted that countries were facing setbacks in compiling some of the fields requested by the national reports. Concerns were expressed regarding potential redundancies between information requested through national reports and other GFCM requirements (e.g. DCRF) or provided by specific subsidiary bodies (e.g. SGSABS for the status of the stocks). The WGBS recognized that the current format of the national reports should be improved and proposed to reflect on their use and/or structure towards better promoting their utility as a support to fisheries management.

Data submission, quality and collection

- The WGBS agreed on the importance of timely submitting data towards facilitating the provision of advice on the status of the stocks and the management of priority species in particular, and improving its quality. Nevertheless, the WGBS highlighted the need for some riparian states to receive further technical assistance with the aim of contributing to progress and quality of data submitted to the GFCM.
- The WGBS supported the implementation of the data quality assessment process through agreed indicators (timeliness, completeness, conformity, stability, consistency) on a permanent basis but highlighted the importance of making CPCs aware of the outcomes of this assessment through an efficient reporting system.
- The WGBS praised the important efforts done in the drafting of the four documents to be used as guidelines for relevant mid-term strategy data collection activities, namely the monitoring of discards, the monitoring of incidental catches of vulnerable species, the implementation of scientific surveys-at-sea, and the collection of recreational fisheries data. The WGBS agreed that the objective of each document was to contribute to a harmonized methodological framework for data collection that would be applicable to the realities of different countries and would enable the comparison of data at a regional level. The WGBS further agreed that these documents would be used on a voluntary basis as reference instruments in the execution of mid-term strategy activities.

Work plan for the estimation/quantification of IUU fishing

- The WGBS proposed to endorse the first three activities of the work plan for the estimation/quantification of IUU fishing as reproduced in Appendix 8, including the survey towards facilitating the estimation of IUU fishing at the national level (activity 3). The WGBS also agreed that an expert meeting would be required to evaluate advances made and provide advice on additional activities (4–6) foreseen to complete the estimation, in coordination with the CoC, as appropriate.

Provision of advice on the status of fisheries

- The WGBS endorsed the concept of benchmark and update assessment and agreed on terms of reference (ToRs) for dedicated benchmark meetings (reproduced in Appendix 12), stressing the importance of data preparation work.
- The WGBS supported the assistance of external experts, on an ad-hoc basis, in the process, noting how this contribute to empowering Black Sea scientists and providing opportunities for capacity building. The WGBS underlined that the main criteria for the selection of these experts should be their technical capabilities (in data preparation, understanding of the stock and/or modeling) and capacity-building skills.
- Acknowledging the outcomes of the Expert meeting on the provision of advice (WKADVICE), the WGBS agreed on the importance of providing advice on the status of stocks to the Commission with a lag of only one year (data year + 1) instead of two (data year + 2) as is currently the case, at least for those stocks covered by management plans. In this respect, the

WGBS discussed the possibility of bringing forward the SGSABS to May each year, acknowledging however potential difficulties of doing so in terms of provision of data for the stock assessment. The WGBS agreed to consider a testing phase for certain fisheries to be selected during the next session.

Actions towards sustainable small-scale and recreational fisheries

- The WGBS was in favour of testing the FAO matrix for characterizing fisheries towards improving the characterization of SSF
- The WGBS agreed that the draft handbook for data collection on recreational fisheries be tested in the Black Sea through a pilot study in Turkey. On the basis of these outcomes, the next meeting of the Working Group on Recreational Fisheries (WGRF) should consolidate this experience, with comments on its application from both the WGBS and the SAC, into a revised version of the handbook.

Advice on the status of Black Sea stocks and their management

Indicators of Good Environmental Status

- The WGBS acknowledged the work carried out in the Mediterranean on the definition of GES indicators at the regional level and agreed that, in the Black Sea, owing to the limited number of commercial stocks, indicators should provide information on a stock-by-stock basis in addition to a regional perspective. To this end, the WGBS proposed a new template for the reporting of advice on priority species including information on current advice, trends in advice and trends in catches by country (Appendix 9). In addition to this, the WGBS also proposed that an ecosystem summary be produced and submitted to the WGBS.
- The WGBS agreed to work, within the framework of the BlackSea4Fish project, on devising appropriate ecological indicators to provide an ecosystem summary relating commercial stock attributes (e.g. body condition) to the ecosystem and the environment and including ecosystem interactions.

Status of the stocks

- The WGBS acknowledged that the status of all main commercial Black Sea stocks assessed, except for Azov Sea anchovy, was in overexploitation or uncertain (see Appendix 5 for complete advice). In particular, the alarming state of piked dogfish was acknowledged. Nevertheless, the WGBS highlighted that, of the five species assessed quantitatively, four (turbot, black sea anchovy, horse mackerel and whiting) showed signs of reverting trends in the overexploitation index (F_{curr}/F_{MSY}) since 2015, turbot in particular whose index had decreased from 5.38 in 2015 to 3.10 in 2017.
- The WGBS provided additional comments on the advice on the status of specific priority stocks as follows:
    - *European sprat*: the WGBS endorsed the proposal of the SGSABS to carry out a benchmark assessment in 2018 (ToRs provided in Appendix 12), noting that particular attention should be given to this species owing to i) its uncertain status, ii) the expanding fishery, and iii) the decreasing size and age of catches. The WGBS also suggested the acoustic survey be extended to cover the entire Black Sea and that the establishment of a management scenario evaluation framework in the future would be desirable.
    - *Piked dogfish*: the WGBS noted that prior to the implementation of a recovery plan as advised by the SGSABS, there was a strong need to improve the data available for this species including from target and bycatch fisheries as well as the quality of fishery-independent data. The collection of data on catch-at-length for the longline fishery targeting this species in Bulgaria was strongly recommended.
    - *Whiting*: the WGBS highlighted the fact that, in some countries, whiting mainly comprised discards of fisheries targeting other species; in this respect, the WGBS

strongly recommended information on discards be collected and included in the assessment of this species.

- *Atlantic bonito:* the WGBS acknowledged the fact that Atlantic bonito was relevant for the Black Sea ecosystem and had an important economic impact in some particular countries, but that the abundance and catches showed large fluctuations. The WGBS recommended to remove it from the list of priority species but was in favour of including it in the work of the BlackSea4Fish project and asked CPCs to make efforts to provide data at least on catches.

Management of priority species

Turbot

- The WGBS endorsed the quantitative analysis carried out by the WKMSE on the potential effects of alternative management scenarios (Appendix 13) and submitted the following advice for consideration of the Commission:
    - Protracting the fishing regimes carried out to 2016 (F status quo) would result in turbot biomass continuing to decrease towards a collapse.
    - When fishing mortality was reduced by means of i) enforcing a TAC (644 tonnes) as per Recommendation GFCM41/2017/4 and eradicating IUU or ii) reducing F to F_{MSY} or iii) imposing a five-year catch ban, the stock quickly recovered to relatively large biomass values with low risk to B_{LIM}. When ensuring $B > B_{pa}$ and $F < F_{MSY}$ by 2020, in order to maintain B_{PA}, F would have to be lower than F_{MSY}, but the catches recovered to values around 2000 tonnes. When the TAC is enforced but IUU catches were assumed to continue (TAC + 50% IUU assumed in the SGSABS), the stock was still predicted to recover on average, but uncertainty and thus the risk of biomass dropping below B_{LIM} increased.
- The WGBS acknowledged that in the process of performing the MSE, a number of issues emerged that allowed to identify problems related to the provision of advice on both stock status and management scenarios. Data quality and the possibility that there could be more than one stock were identified as the two main potential reasons for these problems. The WGBS endorsed the proposed three-step roadmap for the improvement of advice, as follows:
    - Provision of all raw input data, including available socio-economic data, and their revision according to the work plan provided in Appendix 12;
    - Performance of a benchmark assessment (see ToRs in Appendix 12), including the definition of the most appropriate assessment unit(s) as well as the evaluation of alternative models; and
    - Revision and improvement of the MSE model according to the outcomes of the benchmark assessment.
- The WGBS recommended that the Working Group on Quota Allocation foreseen in Recommendation GFCM/41/2017/4 take into account the following technical information: i) the estimation of MSY at the Black Sea level in order to facilitate the estimation of a sustainable TAC, and ii) the provision of adequate supporting information for the allocation of national quotas including reliable historical catches by country, and, if possible, information on socio-economic aspects, biomass distribution at sea and extent of available habitat for the species by country. The WGBS agreed that the quantification of IUU fishing would be a crucial aspect linked to the estimation of TAC and the allocation of quotas and should be given the appropriate importance in the process, as provided for by Recommendation GFCM/41/2017/4.

Rapa whelk

- The WGBS noted that, although rapa whelk was included in the list of GFCM priority species as both a demersal species and a non-indigenous species, it is now established in the Black Sea ecosystem and has become the target of a valuable fishery. For this reason, the WGBS agreed that the species should be under management consideration within the GFCM framework. In

this respect, an advice on potential management targets and measures should be sought with the support of the BlackSea4Fish project and through the work of the SGSABS.

- Given the interactions between the rapa whelk fishery and other commercial species, notably turbot juveniles, the WGBS suggested possible changes in fishing gear and adequate alternatives be explored.
- The WGBS advised to implement a set of initial transitional measures for rapa whelk fisheries, following the precautionary approach, while setting up a research project (2019–2020) to collect data in order to inform a potential management plan for the fishery (Appendix 6).

Interactions with the environment

- The WGBS supported the future adoption of the pending recommendation on fisheries management measures for conservation of sharks and rays in the GFCM area of application (amending Recommendation GFCM/36/2012/3) but advised that it be revised referring, for the case of the Black Sea, to the provisions of the Black Sea Commission. In this respect, the WGBS suggested to compare the appendixes of the SPA/BD Protocol for the Mediterranean Sea and the relevant provisions of the Black Sea Commission in order to facilitate discussion among CPCs at the upcoming session of the GFCM.
- The WGBS supported the roadmap towards an adaptation strategy to climate change effects on fisheries and endorsed the methodology proposed for the assessment of vulnerability to climate change (Appendix 10). In this respect, the WGBS proposed a case study on small pelagic fisheries be considered in the Black Sea, in light of their interaction with non-indigenous jelly-fish species, and suggested to organize before 2020 an expert session to take stock on progress made.

ELECTION OF THE WGBS BUREAU

74. The GFCM Secretariat informed participants about the status of the current Bureau, composed of Mr Simion Nicolaev as coordinator, Mr Galin Nikolov as vice-coordinator and Mr Ilhan Aydin as second vice-coordinator, noting that their mandate had been renewed several times since the establishment of the WGBS. The GFCM Secretariat also recalled the relevant provisions governing the election of the WGBS Bureau, explaining that, despite the request by the Commission to elect a new Bureau, formal applications to replace the current bureau (both the coordinator and the two vice-coordinators) were not in place at the time of the election.

75. The tireless and outstanding work of the current Bureau was praised by all participants, especially in light of the implementation of the mid-term strategy and of the first phase of the BlackSea4Fish project. The WGBS unanimously agreed to defer the final decision to the upcoming forty-second session of the GFCM, suggesting to consider the possibility of extending the mandate of the current Bureau for an additional year, thus allowing CPCs to actively engage and identify suitable candidates for the next WGBS Bureau.

ANY OTHER MATTER

76. Following a request for clarification, it was recalled that the WGBS was composed of representatives and experts nominated by the national focal points to the GFCM in the administrations of the different countries. These national focal points have the role, *vis-à-vis* the GFCM or the WGBS, to ensure the active participation of their respective countries in GFCM work, as appropriate, including i) implementation of relevant activities at the national level in line with agreed commitments; ii) liaison with the network of national experts to contribute to the formulation of advice; iii) alignment with GFCM decisions in place and submission of required data and information; iv) coordination of the participation of their country in meetings and capacity-building activities. The BlackSea4Fish focal points were also recently nominated to discuss the implementation of the project, including budgetary aspects, within the framework of the BlackSea4Fish Steering Committee and in line with WGBS priorities (as included in the BlackSea4Fish project document).

77. The WGBS reiterated its satisfaction in seeing ex**p**erts from the Russian Federation, non-contracting party to the GFCM, in attendance at the seventh meeting, after having also taken part in other relevant GFCM activities in the Black Sea during the intersession. The WGBS expressed hopes that fruitful collaboration in the context of the WGBS and the BlackSea4Fish project would continue.

78. All countries were invited to promote among their networks the opportunity for young scientists and students to be hosted at the subregional technical unit in Burgas within the framework of the FAO Internship Programme. Interested candidates should contact the GFCM Secretariat and the BlackSea4Fish project coordinator, who would explain application procedures and so that terms of reference for an internship, in support of the BlackSea4Fish project, could be developed.

DATE AND VENUE OF THE EIGHTH MEETING OF THE WGBS

79. The expert from Turkey proposed that the eighth meeting of the WGBS be held in Turkey, tentatively at the Central Fisheries Resources Institute in Trabzon, subject to the confirmation by relevant authorities.

80. The WGBS thanked Turkey for the kind offer and agreed that its eighth meeting would be held tentatively in June/July 2019. A decision on the exact dates would be taken at the forty-second session of the Commission.

CLOSURE OF THE MEETING AND ADOPTION OF THE REPORT

81. The WGBS thanked the Government of Bulgaria for hosting the meeting. Gratitude was expressed to the WGBS coordinator for chairing the meeting and for his efforts all year long in support of WGBS activities. Additional thanks were expressed to the two vice-coordinators for their precious efforts and to the BlackSea4Fish Project coordinator for his crucial role in the implementation of priority activities in the Black Sea.

82. Gratitude was also expressed to the GFCM Secretariat for backstopping the WGBS and facilitating the coordination and implementation of its activities throughout the intersessional period.

83. The conclusions and recommendations, as well as the work plan and appendices, were adopted on Friday 14 July. The full report was adopted by e-mail.

Appendix 1

Agenda

1. Opening and arrangements of the seventh meeting of the WGBS
2. Report of intersessional activities, including in the context of the BlackSea4Fish project
   - Summary of 2017-2018 intersessional activities
   - Implementation phase of the BlackSea4Fish project, including outcomes of the first meeting of the BlackSea4Fish Project Steering Committee
3. National reports to the WGBS
4. Issues related to fisheries data collection, including methodologies and data quality
   - Status of data collection and submission by riparian countries
   - Methodologies to support data collection (bycatch monitoring, IUU assessment, etc.)
   - Implementation of quality indicators
   - Provision of advice on the status of fisheries
7. Actions towards sustainable small-scale and recreational fisheries
8. Formulation of advice in the field of fishery management
9. WGBS work plan for 2018-2020
10. Election of the WGBS Bureau
11. Date and venue of the eighth meeting of the WGBS
12. Any other matter
13. Adoption of conclusions and recommendations and closure of the meeting

Appendix 2

List of experts

ABAKUMOV Sergey (Russian Federation)
AYDIN Ilhan (Turkey)
BELEKOU Pinelopi (European Commission)
BELOUSOV Vladimir (Russian Federation)
CHASCHYN Oleksandr (Ukraine)
ERBAY Murat (Turkey)
FIRIDIN Sirin (Turkey)
GOERGIEVA Yoana (Bulgaria)
GUCHMANIDZE Archil (Georgia)
LAINE Valérie (European Commission)
LECHEV Dobrin (Bulgaria)
LEONCHYK Yevhen (Ukraine)
LOMASHVILI Irine (Georgia)
MAXIMOV Valodia (Romania)
NIKOLOV Galin (Bulgaria)
NISTORICA Tatiana (Moldova)
NISTREAN Alexei (BSEC)
PETROVA-PAVLOVA Elitsa (Bulgaria)
PHARTSVANIA Archil (Georgia)
RADU Gheorghe (Romania)
RAYKOV Violin (Bulgaria)
VALKOV Dimitar (Bulgaria)

GFCM SECRETARIAT

BERNAL Miguel
GÜCÜ Ali Cemal (BlackSea4Fish)
MORELLO Elisabetta Betulla
SESSA Margherita

Appendix 3

List of documents

GFCM:WGBS7/2018/1	Provisional agenda and timetable
GFCM:WGBS7/2018/2	Executive report of WGBS fisheries intersessional activities, including under the BlackSea4Fish Project, recommendations and work plan
GFCM:WGBS7/2018/Inf.1	List of documents
GFCM:WGBS7/2018/Inf.2	Provisional list of participants
GFCM:WGBS7/2018/Inf.3	Report of the forty-first session of the General Fisheries Commission for the Mediterranean (GFCM) (Montenegro, 16–20 October 2017)
GFCM:WGBS7/2018/Inf.4	Report of the sixth meeting of the Working Group on the Black Sea (WGBS) (Romania, 13–16 June 2017)
GFCM:WGBS7/2018/Inf.5	National reports to the WGBS by riparian countries
GFCM:WGBS7/2018/Inf.6	Conclusions of the Workshop on management strategy evaluation (Bulgaria, 10–11 July 2018)
GFCM:WGBS7/2018/Inf.7	Report of the first steering committee meeting on the GFCM BlackSea4Fish Project (Bulgaria, 30 May 2018)
GFCM:WGBS7/2018/Inf.8	Report of the Working Group on Fishing technology (WGFiT) (Tunisia, 17–18 April 2018)
GFCM:WGBS7/2018/Inf.9	Report of the meeting for the preparation of the High-level meeting on small-scale fisheries (FAO headquarters, 2 March 2018)
GFCM:WGBS7/2018/Inf.10	Report of the expert meeting on the formulation of advice on fisheries (FAO headquarters, 1 March 2018)
GFCM:WGBS7/2018/Inf.11	Report of the Expert Meeting on Climate Change Implications for Mediterranean and Black Sea Fisheries. Rome, 4 to 6 December 2017. Fisheries and Aquaculture Report No. 1233. Rome, Italy.
GFCM:WGBS7/2018/Inf.12	Report of the Subregional group on stock assessment in the Black Sea (SGSABS) (Bulgaria, 15–19 November 2017)
GFCM:WGBS7/2018/Inf.13	Report of the first meeting of the Working Group on Small-Scale and Recreational Fisheries (WGSSF) (FAO headquarters, 12–13 September 2017)
GFCM:WGBS7/2018/Inf.14	Results of the GFCM survey on fisheries data quality: assessment of data quality control process carried out at the national level by CPCs of the GFCM
GFCM:WGBS7/2018/Dma.1	Scientific surveys in the Mediterranean and the Black Sea: protocol for demersal and acoustic pelagic surveys
GFCM:WGBS7/2018/Dma.2	Manual on data collection for recreational fisheries in the Mediterranean and the Black Sea
GFCM:WGBS7/2018/Dma.3	Monitoring discards in Mediterranean and Black Sea fisheries: methodology for data collection
GFCM:WGBS7/2018/Dma.4	Monitoring the incidental catch of vulnerable species in the Mediterranean and the Black Sea: methodology for data collection
GFCM:WGBS7/2018/Dma.5	Carbonara, P., ed. 2018. *Handbook on fish age determination: a Mediterranean experience.* Studies and Reviews. General Fisheries Commission for the Mediterranean. Rome. Draft before publication

GFCM:WGBS7/2018/Dma.6	Matrix for the characterization of fishing activities
GFCM:WGBS7/2018/Dma.7	Climate change impacts, vulnerabilities and adaptations: Mediterranean Sea and the Black Sea marine fisheries. In Barange, M., Bahri, T., Beveridge, M., Cochrane, K., Funge-Smith, S., Poulain, F. (Eds.) 2018. Impacts of Climate Change on fisheries and aquaculture: Synthesis of current knowledge, adaptation and mitigation options. FAO Fisheries Technical Paper 627 (in press).
GFCM:WGBS7/2018/Dma.8	Manual of the GFCM Data Collection Reference Framework (DCRF) – Version 2018.1 (available in English)

Appendix 4

Opening speeches

Opening address by Mr Dimitar Valkov
Executive Agency for Fisheries and Aquaculture of Bulgaria

Dear Ladies and Gentlemen,
Dear colleagues,
Dear friends,

I am pleased to welcome all of you here, in Bulgarian sea coast. I hope the first meeting was very fruitful and its conclusions will give us more energy to continue with the seventh session of the Working Group on the Black Sea.

First of all I would like to thank the GFCM and the European Commission for starting the process of adoption and implementation of new measures related to management, monitoring and surveillance of fisheries in the Black Sea. All of us are aware with the specific conditions in the Black Sea – its salinity is significantly lower than the salinity of ocean and other open seas and in practice there is no life in depths greater than 200 meters, due to the high concentration of toxic gas. But even restricted fisheries areas and the low biodiversity, the Black Sea fisheries has a good potential for further developing. But this development is impossible without reliable management system in place, and in order to have good management system and to ensure sustainable exploitation of stocks we need good scientific advice. That's why I am happy to have you all here and to work together on the adoption of appropriate management and conservation of the most valuable species in the Black Sea.

Last decades, we have done many steps towards the proper management and monitoring of turbot fishing activities and the fight against the IUU fisheries in the Black Sea. We started with national rules for allocation of fishing opportunities and national quota regime in the beginning of this century. In the second decade, after our accession in the European Union, we started the implementation of monitoring, control and surveillance plan; we have improved our risk assessment methodology; we started a good cooperation with other national authorities; we put in place a joint inspection programme together with our friends and neighbors from Romania with the coordination from EFCA, and one of the most important things – we extended the scope of our joint monitoring and control activities to all economic valuable species in the Black Sea.

Last years we started with the long process of the adoption of new measures towards the management, conservation and sustainable exploitation of living marine resources, applicable for the whole region, with the active involvement of the European Commission and GFCM. I believe that the recent important steps – adoption of the recommendation for turbot fisheries in Black Sea, the launching of the project BlackSea4Fish and the Black Sea Pilot project for monitoring and surveillance will evolve and very soon we will have holistic management system for turbot in Black Sea, based on harmonized legislation, high-quality scientific advice and strong control.

Last, but not least, I would like to appreciate the progress we made in regards with data collection and the enhanced cooperation between all riparian countries, taking into consideration the role of GFCM and European Commission in this process. I believe our cooperation will continue in a manner to achieve our most important task – to protect the biodiversity of Black Sea.

Thank you very much for your attention!

Opening address by Mr Simion Nicolaev

Chairperson of the Working Group on the Black Sea

Distinguished Delegates,
Representatives of organizations,
GFCM Secretariat colleagues,
Ladies and Gentlemen,

I am pleased to be here in Burgas today and to welcome all of you to the 7th meeting of the GFCM Working Group on the Black Sea, which is being hosted by Bulgaria in the city where the premised of the BlackSea4Fish Project have been inaugurated last month. First and foremost, I want to express my words of gratitude to the hosting country and I am very happy to be back for this occasion in Burgas. Every year the WGBS sees a steady but decisive increase in participation, both at country level as well as at organizational level. We should rejoice about this trend and I would like in particular to extend my appreciation towards new-comer participants who joined this setting for the first time.

On the 7th of June the "*High-level conference on Black Sea fisheries and aquaculture*" was held in Bulgaria. Almost two years after the Bucharest Declaration signed in October 2016, various Black Sea countries and the European Union renewed their commitment to Black Sea fisheries and aquaculture and six went on to sign the Sofia Ministerial Declaration in support to sustainable fisheries and aquaculture in the region. Under the umbrella of the GFCM, the high-level representatives of Black Sea riparian countries have pledged to take concrete action in order to ensure a future for the coastal communities in this area as well as for all the people depending on fish caught in the Black Sea. The conference, organized by the GFCM in close collaboration with the Bulgarian Government and in partnership with the European Commission, offered a unique opportunity to discuss key challenges on fisheries and aquaculture and to further dialogue and cooperation among all countries concerned.

Thanks to the Sofia Ministerial Declaration you have reaffirmed your willingness, as stated in the Bucharest Declaration already, to foster the environmental, economic and social sustainability of Black Sea fisheries and aquaculture. The Sofia Declaration sets concrete objectives and actions that should help develop a more efficient cooperation in the Black Sea. This should be achieved thanks to greater solidarity and coordination among all countries in order to fight IUU fishing, improve data collection and science, strengthen fisheries management and support sustainable small-scale fisheries and aquaculture. The various threats to this unique marine basin come from environmental conditions and human activities that have to be properly addressed if we are to secure the region's ecological and economic wealth and boost blue growth. Should we be able to do that, we will render a great service not only to the depleted living marine resources of the Black Sea but also to ongoing efforts to promote cooperation towards sustainable fisheries and aquaculture in the region. The challenge is daunting, however, this should not be a deterrent but rather an incentive for us to join forces and move forward.

In this regard, a number of important developments have taken place just recently. A main element to be highlighted is the launching of the BlackSea4Fish project under the framework of the GFCM. The BlackSea4Fish Project is a much-needed tool in support to the GFCM Working Group on the Black Sea and to the mandate of the GFCM in this region. With the inauguration of the sub-regional unit, this project is now fully operational. I would like to recall that this initiative falls under the targets of the GFCM Mid-term Strategy (2017-2020), Target 5 in particular, in the context of our efforts to enhance capacity building and cooperation. Thanks to your cooperation we have finally been able, in coordination with all riparian countries, to consolidate the project's structure, coordination mechanisms, work plan and follow through with the operationalization of this sub-regional technical unit. We thank all experts and research institutes, coordinators and the donor – the European Union – for their contribution and support to the BlackSea4Fish project. Looking at the positive experience and results of FAO Regional Projects in the Mediterranean Sea, I am optimistic that the BlackSea4Fish project will ensure the results we are pursuing together. I am fully convinced of the need for us to work joint and to continue federating the efforts of riparian countries. An effective project will be instrumental to secure in due course the membership of all Black Sea countries in the GFCM.

Another important event we must all take into account is the celebration of the first "International Day for the Fight against Illegal Unreported and Unregulated (IUU) fishing". The GFCM has long advocated for the need of increased awareness on IUU fishing, considering the magnitude of the problem. It is indeed recognized that IUU fishing activities seriously undermine fisheries management around the world, including in the GFCM area of application that also comprises the Black Sea. Curbing IUU fishing is therefore a priority for the WGBS, consistent with the five targets of the mid-term strategy towards the sustainability of Black Sea fisheries. The GFCM brought a critical contribution to the FAO-led process. The international day is an unprecedented occasion for us to raise awareness about IUU fishing and its devastating consequences and we are confident that observing this international day in the Black Sea will help us to strengthen efforts and collaboration in support of the mandate of the WGBS.

The GFCM will continue to promote cooperation at regional level through the medium of the WGBS. This particular meeting is very important because there are some proposals, which we will discuss in-depth, of special relevance to the management of the fisheries. In addition to the expected progress on management measures, let's not forget that you had already an opportunity to provide inputs in relation to the assessment of Black Sea turbot fisheries over the last two days. These fisheries remain a top priority for the GFCM and it is my expectation that this meeting will come to a mutual understanding and agree on actions which are necessary to preserve the living marine resources of the Black Sea. The recent progress we have made is encouraging but it is not enough. We must up the ante and show our continuous commitment to present and future generations.

I wish you success in your endeavors and I thank you for your attention!

Appendix 5

STATUS OF BLACK SEA STOCKS

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
29	Turbot (*Scophthalmus maximus*)	SAM	1950–2016	0.82	0.26	3.1	2008	3535	0.57	Overexploited and in overexploitation	Implement a recovery plan	Quality of the input data was improved in relation to last year, with information on catch at age from Turkey provided both for 2015 and 2016. Total catches were available for all countries, but age composition was still only available for a fraction of the catch. Russian East catch at age composition was applied to raise the Georgian landings in 2015 and 2016. Russian West catch at age composition was applied to raise Ukrainian landings in 2015 and to convert the Ukrainian length composition into ages for 2016. Advice was based on an updated assessment with the same assumptions as in 2015. IUU estimates continue to be uncertain and estimated as in 2016. Management measures are being implemented in the riparian states in response to Recommendations GFCM/40/2016/6 and GFCM/39/2015/3 and will be implemented in response to GFCM/41/2017/4. Positive trends observed on some of the surveys in 2015 and 2016 are corroborated with a general positive trend in SSB; fishing mortality shows some increase in 2016

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
												but the average of the last three years (2014-2016) is stable.
29	Black Sea anchovy (*E. encrasicolus ponticus*)	XSA	1988–2016	*0.47	*0.4	*1.18	**532358**	-	-	In overexploitation	Reduce fishing mortality	The final assessment was carried out with the same settings as in 2016. Catches were included by fishing season. Russian Fed. (2015-2016) catches were added. Georgian and Turkish catch at age available (landings of other countries added to Turkish landings). Gislason method used to estimate natural mortality. Turkish and Georgian commercial CPUE were included.

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
29	Piked dogfish (*Squalus acanthias*)	XSA	1989-2016	-	-	-	-	-	-	Depleted	Implement a recovery plan	XSA model was run with the same configuration as last year incorporating one more year of data, and was run in STECF 2017 (EWG 17-14). As last year, there were strong uncertainties in the assessment as it relied on biological information from Romanian surveys only. The catch for the Russian Federation was updated and no catch data were available for Georgia; dogfish is protected in Turkish waters. The absolute level of catches as bycatch of other fisheries was considered underestimated. The F current estimated by the model was nearly 12 times higher than the calculated Funique assumed in 2015 and 2016 (F_{unique} from ICES 2014). In spite of uncertainties, the population is still considered depleted due to the very low presence in the catches and a large decrease in estimated biomass. F should be reduced by more than 90%.
29	European Sprat (*Sprattus sprattus*)	SAM	1997–2016	*[0.37 – 0.59]	*0.4	*[0.93 – 1.48]	-	-	-	Uncertain	Do not increase fishing mortality	The ICA model performed at the STECF (EWG 17-14) was reviewed and it was noted that the fits at age of some of the main indices were overestimated possibly providing an over-optimistic view of the stock. A SAM model was attempted with a reduced set of indices excluding those with bad internal consistency diagnostics. The outcomes of the SAM model, in terms of exploitation rate, include the outcomes of the ICA within their confidence intervals but

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
												on the lower (more optimistic) bounds. SAM highlights a risk that the stock is fished above MSY. A range of estimates of exploitation rates is provided and a benchmark assessment to decide between models has been planned for 2018.
29	Horse mackerel (*Trachurus mediterraneus ponticus*)	XSA	2005–2016		*0.4	*1.78	-	-	-	In overexploitation	Reduce fishing mortality	The model was run with the same configuration as in 2015, incorporating one more year of data. The use of a nominal CPUE index (sliced into ages using a catch at age matrix from the catches themselves) to tune the XSA model was challenged. The sensitivity of model outcomes to this was tested using a separable VPA and sensitivity runs of the XSA model. Total catches of Ukraine, Georgia and the Russian Federation were incorporated for the first time. The model was tuned with Turkish CPUE. Information from other countries was requested for future stock assessments, as in previous years. The need to improve the CPUE index and to use a fishery-independent data from hydroacoustic surveys was remarked. The use of a production model was discussed and discarded owing to lack of contrast in the catch time series. A benchmark assessment was proposed for 2018.
29	Red mullet (*Mullus barbatus*)	XSA	1990-2016	-	-	-	-	-	-	Uncertain with signals of overexploitation	Reduce fishing mortality	This assessment was based on the work carried out by the STECF EWG (17-14). Georgian data are not recorded and were not available. Issues were raised over the fact that

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
												the data for the Turkish bottom trawl survey, which is carried out in spring and autumn, were combined into one single index for tuning. The fact that one season covered the period of recruitment to the fishery and the other one did not, raised concerns. The assessment presented worrying trends with high catches in the final years coupled with decreases in SSB and Recruitment. Limitations raised in previous years have yet to be addressed, and an advice to reduce fishing mortality was provided on a precautionary basis.
29	Whiting (*Merlangius merlangus*)	XSA	1994–2016	*0.78	*0.4	1.95	-	-	-	In overexploitation	Reduce fishing mortality	The 2017 assessment was an update of the 2016 assessment. It was carried out using revised input data with respect to 2016, in particular regarding the Turkish and Romanian trawl survey data. Uncertainties in the level of discards remain so they were not included. Information on age structure is fragmentary. Catch at age data were missing for Bulgaria (2016), Georgia (2013-2016), Ukraine (2014-2016) and Russian Federation (2012-2013).

GSA	Species	Methods	Time series of catches used in the final model	$F_{current}$ *$E_{current}$	F_{unique} *E=0.4	F/F_{unique} *E/E=0.4	$B_{current}$	B_{MSY} *B_{pa} **B_{lim}	B/B_{MSY} *B/B_{pa} **B/B_{lim}	Stock status	Scientific advice	SGSABS comments
29	Rapa whelk (*Rapana venosa*)	CMSY VIT SPiCT	2000-2016								Care should be taken in expanding this fishery	The CMSY model performed by the STECF (EWG 17-14) was not considered appropriate owing to the poor fits and issues on how to incorporate a virgin biomass that in the case of an alien species should be near 0. As an alternative, four length cohort analyses (2014, 2015, 2016, and 2015-2016 combined) were run with VIT, as well as a SPiCT model with landings and a nominal CPUE for Turkey. The results of these runs consistently showed that the Rapa whelk fishery is already reaching MSY, suggesting care should be taken in expanding this fishery further.
30	Azov Sea anchovy (*Engraulis encrasicolus maeoticus*)	Surplus production models – Pella Tomlinson (COMBI 4.0)	2000-2016	0.522	0.550	0.949	166527	162448	1.03	Sustainably exploited	Do not increase fishing mortality	This is the first time an assessment of Azov Sea anchovy is presented at the SGSABS. The estimates based on the production model were performed according to the standard stock assessment scheme and increase the validity of the estimates of the stock status of the Azov anchovy adopted by the bilateral Russian-Ukrainian Commission. The estimated TAC was 81788 tons.

Appendix 6

Key elements of the regional research programme on rapa whelk in the Black Sea

Introduction

There is high need of Black Sea scientific and research projects aimed to fill gaps of knowledge on rapa whelk, a high commercial value species in the Black Sea. There was an increase in the coverage and the quality of data on the abundance of Rapa whelk with some data on length and age composition and based on them, the first Rapa whelk scientific assessment carried out by the GFCM Subregional Group on Stock Assessment in the Black Sea scientific working group, in 2017. However, the overall lack in the Black Sea of fisheries-independent surveys covering the regional distribution of the main commercial species in a comprehensive manner persists.

Main features of the regional research programme on rapa whelk in the Black Sea

• Clear objectives defined in advance (e.g. biomass in ton, abundance in no/sqkm2, spatiotemporal distribution patterns)

• Priority given to the collection of data useful for the provision of the scientific advice in support of management (length, age, life-cycle)

• Combination of fishery dependent and fisheries independent sources of information to ensure a regular monitoring

• All Black Sea CPCs should be involved;

• The Black Sea regional research programme should also provide guidelines and facilitate harmonization, standardization of protocols, coordination and comparison of results obtained by past, ongoing and future national, regional and international research programmes addressing rapa whelk, such as GFCM BlackSea4Fish Project.

Work packages

Work packages are designed to address the main issues required as before-mentioned, as well as to address the need to evaluate the social and economic aspects of this fishery, in the context of the sustainable management and exploitation of the stock.

Work Package 1 – Biology and Ecology

Work Package 2 – Fishery independent data collection – Surveys at sea

Work Package 3 – Fishery dependent data collection

Work Package 4 – Stock assessment

Work Package 5 – Socioeconomic elements

Work Package 6 – Management proposals

Main objectives of each work package

WP 1 - Biology and Ecology of rapa whelk, including demography: Studies on size/ density, abundance, biomass, recruitment, growth, reproduction, physiology, environmental parameters, habitat, feeding and by-catches surveys. Ecology: Genetics, interactions with other species, impacts of fishing gears to marine environment.

WP 2 - Fishery independent data collection through multiannual demersal beam trawl/dredges surveys at sea, e.g. biomass and abundance indices, size/age distribution, by-catches.

WP 3 - Fishery dependent data collection through port sampling, e.g. landings, length/distribution, fishing techniques used and vessels engaged to the fishing activity, value, and through observers on board, e.g. by-catches, days at sea.

WP 4 - Stock assessment: Investigation on methodologies for assessing the status of Rapa whelk, including by compiling historical data.

WP 5 - Socioeconomic elements: Socioeconomic survey on the sector, trade, markets and development of economic indicators, external aspects affecting the fishery, economic sustainability of related fishing gears.

WP 6 - Management proposals: identification of possible additional measures through MSE, for the sustainability of the rapa whelk fisheries.

Implementation of the regional research programme

The GFCM shall:

- Assess progress in the different work packages,

- Define standardized methods (e.g. in ageing) as well as research protocols, and

- Organize capacity building activities.

Appendix 7

BlackSea4Fish project document

Draft

Project Title:	**Technical cooperation to support fisheries management in the Black Sea**
Participating Countries:	Bulgaria, Georgia, Romania, Russian Federation, Turkey, Ukraine
Starting date:	2017
Donor(s):	European Commission

Executive Summary:

Dramatic environmental changes have occurred in the Black Sea ecosystem, which have also been accompanied by changes in the abundance and distribution of commercial species. Apex pelagic predators have shown an important decline, while anchovy, a key species in the ecosystem and the stock that sustains the region's largest commercial fishery, collapsed in the late 1980s and displayed abrupt fluctuations since then. Other species, such as sturgeon, are considered to be threatened by different human activities. Beyond these, there are some evidences that illegal, unreported and unregulated fishing as well as by-catch may be noticeably high for certain fisheries in the Black Sea. It is also recognized that small-scale fisheries which play an important role in providing income and ensuring food security, particularly within economically vulnerable coastal communities in the Black Sea tend to be undervalued, potentially leading to their marginalization in the decision-making process.

On the other hand, almost all commercially exploited species are known to be a unit stock shared by the BS countries. Riparian countries, in an attempt to ensure sustainability in the exploitation of the stocks have been implementing various fishing regulations. However, the noticeable decrease observed in the landings indicates that these measures may be insufficient or even may have antagonistic effects on the stocks.

All these issues at stake necessitated a regionally influential, widely recognized institutional arrangement, and eventually, the Working Group on the Black Sea (WGBS), developed as an ad hoc mechanism for scientific work and decision-making for Black Sea riparian States was created. Although some work to support the WGBS has been carried out in recent years, the tasks assigned to the WGBS work program proposed to the Commission each year continued to grow, including in terms of cooperation among riparian countries. With a view to promoting this cooperation further, a new initiative to support sustainable fisheries in the Black Sea through a scientific and technical project (the BlackSea4Fish Project) was discussed during the last meeting of the WGBS (April 2016) and endorsed by the fortieth session of the Commission (May 2016).

The BlackSea4Fish cooperative regional project would therefore contribute to further bridging gaps at the regional level and to endowing the WGBS with the necessary resources to ensure that the Mid-term Strategy (2017-2020) for the sustainability of Black Sea fisheries is efficiently implemented.

The project seeks to address the problems in the Black Sea implement activities and produce solutions under five main challenges and outputs, namely: 1) Scientific advice in support of management, 2) Sustainability of small-scale fisheries and the livelihoods for coastal communities, 3) Fight against Illegal, Unreported and Unregulated fishing, 4) Mitigation of unwanted interactions between fisheries and marine ecosystems and environment, and 5) Cooperation, outreach and dissemination of project results.

CONTENTS

ACRONYMS

BSAS	Black Sea Acoustic Survey
BlackTrS	Black Sea Trawl Survey
CoC	GFCM Compliance Committee
COMECON	Council for mutual economic assistance
CPCs	Contracting parties and Cooperating non-contracting parties
CSOs	Civil Society Organizations
DCF	Data Collection Framework
DCRF	GFCM Data Collection Reference Framework
DEPM	Daily Egg Production Method
EFCA	European Fisheries Control Agency
IUU	Illegal, unreported and unregulated (fishing)
mid-term strategy	mid-term (2017-2020) strategy towards the sustainability of Mediterranean and Black Sea fisheries
MSE	Management Strategy Evaluation
MCS	Monitoring, Control and Surveillance
MoU	Memorandum of Understanding
NIS	Non-indigenous species
PSC	Project Steering Committee
RFMO	Regional Fisheries Management Organization
RPOA-SSF	Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea
RPOA-IUU	Regional Plan of Action against Illegal, Unreported and Unregulated (fishing)
SA	Stock Assessment
SAC	GFCM Scientific Advisory Committee on Fisheries
SDG	Sustainable Development Goal
SGSABS	GFCM Subregional Group for Stock Assessment in the Black Sea
SO2	FAO's Strategic Objective 2
SSF	Small-Scale Fisheries
STECF	EU Scientific, Technical and Economic Committee for Fisheries (STECF)
VMS	Vessel Monitoring System
WGBS	GFCM Working Group on the Black Sea
WGIUU	GFCM Working Group on Illegal, Unreported and Unregulated (fishing)
WGVMS	GFCM Working Group on Vessel Monitoring System

INTRODUCTION AND RATIONALE FOR THE PROJECT

Setting aside its limited connection to the Mediterranean Sea through the narrow strait of Istanbul, the Black Sea is landlocked. Since this enclosed sea is located on a deep depression and 90% of its volume is anoxic, fish and fisheries have concentrated on the narrow continental shelf. Its hydrography is characterized by a basin scale cyclonic boundary current encircling the entire Black Sea. Despite its size, the Black Sea displays significant regional differences with regards to climatic features. The North is extremely productive, however, the surface temperature in winter may get colder than its major fish species can tolerate. At the same period, the South offers warm shelter. The majority of the fishes are therefore forced to undergo long range, transboundary feeding, spawning and overwintering migrations.

Where natural resources are confined to geographically discrete regions but spread across different political territories, integrated and internationally coordinated resources management strategies become crucial. There have been various efforts in the past to ensure cooperative and concerted management of the Black Sea marine living resources. These initiatives have played important roles in enhancing cooperation in the area, but the regional management of Black Sea fisheries remained weak until the GFCM Working Group on the Black Sea (WGBS) was established and met for the first time in Constanta, Romania, on 16-18 January 2012.

Since then, the number of stocks for which a scientific advice is provided has significantly increased and the level of cooperation towards the sustainable exploitation of the common marine living resources has boosted, especially after Georgia and Ukraine obtained the status of cooperating non-contracting parties in 2015 and the Russian Federation became more actively involved in the scientific work of the GFCM. The adoption of the Bucharest Declaration in October 2016 on occasion of the High-level meeting towards enhanced cooperation on Black Sea fisheries and aquaculture has been an important milestone towards regional cooperation.

Among others, this declaration recognized the existence of an incipient regional project manned by the GFCM, namely the BlackSea4Fish project, and called upon all riparian countries and relevant parties to cooperate in its implementation. Right after the adoption of the Bucharest declaration, a brainstorming meeting was held to discuss the challenges that this project needed to address. Under the aegis of the GFCM, initial challenges identified included the need to provide timely data and information, to encourage the active participation of scientists in technical work, to improve the evaluation and management of fishery resources, to protect marine biodiversity and marine ecosystems from harmful bycatch and discarding practices and to reduce the incidence of illegal, unreported and unregulated (IUU) fishing. Most importantly, there was agreement that the project had to support the work of the WGBS – which in the meantime had proven to be a very active setting to foster cooperation, seeing the tasks assigned to its workplan progressively increase each year. The need for more solid support to its work was evident in light of the alarming state of Black Sea fisheries and ecosystems and the need for strong scientific advice in support of management decisions. The BlackSea4Fish project therefore came about as the tool which would contribute to further bridging gaps at the regional level, helping the riparian countries, where needed, to overcome regional priorities and infrastructure needs and endowing the WGBS with the necessary resources to ensure that its workplan is efficiently implemented.

SECTION 1 – EXPECTED PROJECT OUTPUTS

OUTPUT 1: SCIENTIFIC ADVICE IN SUPPORT OF MANAGEMENT STRENGTHENED

Only 40 percent of the landings in the GFCM area of application currently come from stocks for which scientific advice is provided to the Commission, and an even smaller percentage of the landings results from fisheries that are subject to management plans. In view of this, it is recognized that there is a need to improve the coverage and quality of advice on the status of key stocks and increase the percentage of landings from fisheries regulated by specific multiannual management plans. Although the advice in the Black Sea covers a relatively higher percentage of the catches in the area, some of

the assessments are based on data limited methods, and there is a need for an efficient data collection, governed by the principles of the GFCM Data Collection Reference Framework (DCRF). In addition, the advice should also be based on a thorough analysis based on models that better respond to Black Sea specificities and on the systematic integration of comprehensive information for more efficient fisheries management. The suitability of the measures within multiannual management plans in place has to be assessed and alternative scenarios tested to be able to adapt the plans accordingly, where necessary, to ensure these effectively contribute towards the restoring the state of key fisheries, maintaining populations at levels capable of producing maximum sustainable yield, and promote their sustainability. It is crucial to foster a science-policy interface towards sound scientific advice in support of management, by working on integrating all relevant elements (e.g. socio-economic and ecosystems-related aspects) in the formulation and implementation of management plans.

This output aims at increasing the existing scientific knowledge in support of fisheries management and towards the adoption of necessary decisions to revert the current overexploitation rates, limiting the percentage of stocks outside biologically safe limits.

Improved data collection and analysis on Black Sea fisheries and ecosystems

The origin of the datasets used today to structure management advice for the Black Sea dates back to the first expert groups of the EU Scientific, Technical and Economic Committee for Fisheries (STECF) that met in 2009. In these datasets, the EU part of the Black Sea was represented by the data collected under the Data Collection Framework (DCF) of the European Commission, while information for the other riparian countries was provided by independent national experts. Because of this approach, the source and the quality of data representing the non-EU side of the Black Sea remained, to a significant extent, unclear. Following the creation of the GFCM Subregional Group for Stock Assessment in the Black Sea (SGSABS) as a subsidiary body of the WGBS, and the significant improvements made with the establishment of the GFCM Data Collection Reference Framework (DCRF), the quality and traceability of the data provided by GFCM member countries has increased considerably. However, the data provided by the countries through the DCRF is not always sufficient to apply some of the stock assessment models used. An additional – and significant – amount of fishery data is also collected through fisheries surveys carried out at universities and other research institutes in the countries, and an important part of this data, which has not been made available in the stock assessment work done under SGSAS, is stored in the archives of the institutes and scientists.

Another dimension of the data deficiency problem stems from the inaccessibility to historical data. Considerable amount of fisheries data has been collected during the former Union of Soviet Socialist Republics period, and some other data collected in the countries were also published as grey literature. Such data sets are currently not accessible for stock assessment.

It has also been noted that data collected by some of the Black Sea cooperating non-contracting parties of the GFCM are not complete or exhaustive, or not in line with the requirements of the DCRF. Compatibility of the existing data collection formats used throughout the region, the kind of biological and socio-economic data collected, the correct application of requirements of the DCRF are some other critical obstacles standing in front of reliable stock assessments and of good management advice. Moreover, the importance of small-scale fisheries (SSF) and unreported fishing data has often been disregarded in the stock assessments. Little information existing on SSF underlines the crucial importance of data collection for this activity.

Solution to the problem require the definition of a common regional ground ensuring consistency, and in connection, i) setting up of a regional database in which biological and statistical data to be rescued from their depositories, collected so far and to be collected by the CPCs; ii) structuring stock assessment formats; iii) developing sampling methodologies related to small-scale fisheries and DCRF requirements. It is also crucial to recover, update and utilize historical information up to the inception of this project, if possible, and share it with scientists in the Black Sea riparian countries.

The objectives of this activity are expected to be achieved through:

1.1.1: Survey of literature to compile basic biological information on all priority stocks from all fisheries. The survey will also serve to address information gaps and to harmonize biological information compiled by Black Sea experts and institutes to be used in joint stock assessments

1.1.2: A data collection workshop organized to identify data deficiencies, determine areas where data collection is problematic, and recover existing but unreachable data

1.1.3: Pilot landing site surveys conducted in the problematic areas under the guidance of topic experts organized to assist countries in designing or improving their national data collection programs, in particular for the priority species

1.1.4: A database created to archive and secure existing, new and recovered data for the use of SGSABS

1.1.5: A series of tagging experiments to resolve uncertainties associated with migratory behavior of fishes, particularly stock boundaries, biology and ecology of Turbot and Atlantic Bonito.

Mark-Recapture survey conducted to obtain information about recent status of pelagic predator stocks, such as Atlantic Bonito and bluefish, which were historically important for the fishery of the all riparian states, however exploited only by few countries nowadays

1.1.6: Biological sampling carried out by a regular monitoring program involving the use of observers on board

Methodology

The project will ensure that the data collection will be consistent with the objectives of the mid-term strategy towards the sustainability of Mediterranean and Black Sea fisheries (mid-term strategy). In this context, and without prejudice to additional species, the GFCM has agreed upon a list of priority commercial species by subregion for which the production of advice is deemed crucial for addressing pressing management needs. The list of priority species agreed for the Black Sea are as follows:

	Black Sea	
Pelagic species	*Engraulis encrasicolus*	*Trachurus mediterraneus*
	Sprattus sprattus	*Sarda sarda*
Demersal species	*Merlangius merlangus*	*Scophthalmus maximus*
	*Rapana venosa**	*Mullus barbatus*
Non-indigenous species	*Rapana venosa**	
Species of conservation concern	*Squalus acanthias*	

** Potentially subject to management*

A fundamental step planned towards improved data collection and analysis on priority species, fisheries and ecosystem is to address gaps and weaknesses in available information. This issue has been elaborated in the fifth SGSABS and an inventory of available data for the major commercial species has been tabulated by the participants (*Appendix 7/I* of the report). Initially, these inventories will guide to reach the raw data which will be archived in a regional database for the Black Sea region. The same inventory will also serve to define problematic areas and species, where systematic sampling is lacking. The priority will be given to the basic biological data required to run accurate stock assessments and to provide useful management advice, at least for priority species. At this stage the project will provide for an opportunity to contact all members of the project and seek their cooperation in giving access to the historical data series of riparian countries. Previously published articles, reports and grey literature will also be included in the database. Additionally, outputs and deliverables provided by previous ad-hoc projects such as Perseus, CoCoNet and Devote will also be taken into consideration to complete the regional database.

A data collection workshop will compile, harmonize and format biological and socio-economic data on Black Sea fisheries, both at the national and regional level. Another aspect of the data collection will endeavor to identify recent alien species, in particular non-indigenous species and "Mediterranization" trends. National experts participating in this workshop will have to submit the raw data used for stock assessment for relevant species using the form prepared by the project. This step also necessitates setting up rules for data security protocol respecting any confidentiality requirements and ensuring protection of data privacy, as well as data quality control standards.

The cases proven to be problematic with regards to data collection and submission will be supported through bilateral technical assistance. The data related to SSF where they have significant impact on Black Sea ecosystems but yet go unreported, will be considered within the assistance context. With that respect, local pilot data collection surveys addressing critical species such as turbot are also foreseen both for on-site training of the technical staff and to fill the data gaps in the areas concerned.

Similarly, a mark-recapture survey for the data poor highly migratory pelagic stocks, such as those of Atlantic Bonito and Bluefish will be promoted and technically assisted to fill the data gaps of data on these species.

In addition to this, the BlackSea4Fish project will also enable to compile information on the state, distribution and biological information of sturgeons and marine mammals, and propose selected species as priority species of conservation concern, as appropriate.

Overall, the role of the BlackSea4Fish project will be to assist countries in designing or improving their national data collection programs, in particular for the priority species mentioned, consistent with the DCRF requirements and in line with the objectives of the mid-term strategy. National efforts to this end are expected to be monitored by the project. National fishing fleet characteristics, commercial catch or landing data and fishing effort statistics may be completed with relevant biological data. Furthermore, basic economic data such as price of fish, fuel, labor and variable costs will be examined and collected.

Improved scientific advice

During the fifth meeting of the SGSABS, scientific advice was provided on the status of eight stocks in the Black Sea: turbot (*Scophthalmus maximus*), Black Sea anchovy (*Engraulis encrasicolus ponticus*), European sprat (*Sprattus sprattus*), horse mackerel (*Trachurus mediterraneus ponticus*), piked dogfish (*Squalus acanthias*), whiting (*Merlangius merlangus*), red mullet (*Mullus barbatus*), rapa whelk (*Rapana venosa*) and Azov Sea anchovy (*Engraulis encrasicolus maeoticus*). Information was also analyzed for Atlantic bonito (*Sarda sarda*), but no stock status or advice was provided due to insufficient information made available to the Group. Based on the above, the advice provided covers a large percentage of the total catches in the Black Sea. Some of these stocks, however, were in fact data-limited stocks and more data required to run accurate stock assessments and provide useful management advice.

The situation described in relation to the data collection also applies to the stock assessment. Most of the assessments carried out in the Black Sea continue to use the methods, assumptions and some of the time series used in early STECF meetings during the late 2000s. In these meetings, the stocks were assessed by experts outside the Black Sea and the assessments were based on data made available during the meetings without the possibility to assess in detail the quality of the data. With that regard, SGSABS in its fifth meeting examined the data used in the assessments and listed some important uncertainties associated with stock assessment results. The SGSABS particularly noted the following issues: i) stock identification of main commercial species, especially for red mullet, horse mackerel piked dogfish and turbot; ii) data borrowing to overcome deficiencies caused by lack of length distribution of landings for all the main commercial species, as well as age length keys; iii) direct and indirect fisheries affecting piked dogfish, including the spatial distribution of fishing effort and catches, and the existence of complementary/seasonal fisheries; iv) limited information on Rapa whelk

abundance, distribution and length, and age estimations; v) the estimation of bycatch of priority species, including: estimates of bycatch of piked dogfish from the different fleets; vi) the estimates of discards of whiting, including discards by age, and further scientific evidence of the discards of turbot from the Rapa whelk beam trawl fishery, as the critical sources of uncertainty. Additionally, limited surveys at sea that provide fishery-independent indexes of abundance for the main commercial species and the need for more flexible stock assessment models, with the objective of better accommodating model assumptions, uncertainties on biological parameters and fisheries characteristics, and fragmented data were listed to be considered to improve the accuracy of the stock assessments.

The project will attempt to address information gaps and harmonization needs underlined by SGSABS to ensure to perform joint stock assessment.

The objectives of this activity are expected to be achieved through:

1.2.1: Two level training on the fundamentals of stock assessment; at first level, training of one/two experts (trainers/coaches) from each CPC; at the second level, facilitating the trainers involved in the first phase to train national technical staff in their own language (sub-activity: preparation of the course content of the stock assessment courses to be provided by the national coaches);

1.2.2: Workshops/training courses on age determination of problematic species (i.e anchovy, red mullet, Rapa Whelk, piked dogfish)

1.2.3: Otolith exchange exercise to evaluate uncertainties in the catch at age data associated with ageing

1.2.4: A workshop/collegium on the stock identification for the main commercial species, especially for red mullet, horse mackerel piked dogfish and turbot

1.2.5: Meetings of the subregional group on stock assessment in the Black Sea

1.2.6: Workshops on Management Strategy Evaluation (MSE) for turbot fishery

Methodology

The main methodology will be to organize technical workshops, working groups and training on selected issues, namely on stock assessment methodologies and age reading for anchovy, European sprat and horse mackerel, red mullet and Rapa whelk. An otolith exchange exercises among the experts involved in ageing will also be carried out regularly following relevant methodologies to estimate uncertainties associated with ageing and to evaluate the impact of the trainings on ageing.

As has already been experienced in the similar trainings offered in the Black Sea on various occasions, the language is the main obstacle for the technical staff participating in the activities. Therefore, in order to maximize the benefit to be gained by the participants, the trainings are planned to take place in successive phases. The project will prepare background information on the existing models currently used and a compilation of the key methodological issues. This information will include the type of models used/can be used in stock assessment, minimum data requirements, model limitations and assumptions with the objective to help the formulation of the content of the stock assessment training and the training instructions. The following step will target training of one/two national experts (trainers) familiar with fisheries science (preferably from universities and with teaching experience). The purpose of the training will be to equip the national experts with the information prepared in the first phase. At the last stage, the project will lay the groundwork for the experts participating in the previous phase to train the technical staff in their own country and in their own language.

The improvement of the expertise on stock assessment is expected to have a direct impact in the quality of the work carried out annually within the context of the SGSABS, enriching the expertise, information and discussions at the Group and therefore the quality of the advice provided yearly to the WGBS.

Joint surveys-at-sea

Joint surveys are vital for scientific exchange and data collection and the WGBS and SGSABS have previously stressed the need to carry out scientific surveys at sea in order to support stock assessment work. In particular, it was concluded that a minimum set of fishery-independent surveys covering the widest possible area should be carried out regularly in order to meet requirements for assessing the main stocks in the area. To this end, the WGBS and SGSABS have already started identifying the main survey priorities and needs in the Black Sea (see table below).

Priority joint surveys for stock assessment

Priority	Period	Type of survey	Target species	Current area covered	Potential expansion
High	TBD	Hydro-acoustic	Pelagic species (anchovy)	Turkey	Turkey (with the possibility to cover Georgia)
High	TBD	Trawl	Demersal species (turbot)	Turkey, Bulgaria, Romania, Georgia, Ukraine	*To be assessed to ensure harmonization of surveys*

These planned surveys are expected to provide information on a large number of species over large areas and to serve as tuning indices for assessment purposes, as well as provide validation on the advice on the status of the main commercial stocks. Furthermore, an international survey covering the whole Black Sea area is highly recommended. However, it needs to be noted that there are some constraints linked to the execution of such an endeavor, such as, for instance, limited or unaccepted research permits, permissions to enter national waters, visa requirements and political disputes over some marine areas.

An important concern is the storage and ownership of data collected during the joint surveys. This issue needs to be planned prior to commencing the joint survey to ensure that the data is used in the most efficient way.

Moreover, there are some more constraints linked to the execution of joint surveys, such as limited or unaccepted research permits, permissions for foreign research vessels to enter National Waters, Territorial Sea, Economic Zone and on the Continental Shelf, visa requirements for scientific and technical research activities conducted by foreigners and international organizations. These hurdles standing in front of this initiative need to be cleared out by competent national authorities in accordance with the international and national law. Therefore, before undertaking any execution of joint surveys, all necessary authorization should be obtained from the competent authorities of the countries which has full sovereign rights and the authority to apply all conditions and to make all the arrangements for the foreign marine scientific researches (MSR) to be conducted in their national waters, particularly discretion intended to allow or deny MSR activities, whenever it deems necessary, even while such activities are going on.

The objectives of this activity are expected to be achieved through:

1.3.1: Inception workshop on preparation of common surveys

1.3.2: Harmonization and synchronization of the ongoing demersal trawl surveys conducted in the Black Sea, with possibility to extend the geographic range towards non-surveyed areas

1.3.3: Joint small pelagic surveys (Hydro-acoustic or DEPM) covering the entire geographical range of the species in question during the period of sampling

1.3.4: Exchange of experts among the research vessels during the ongoing fisheries surveys for the purpose of training

1.3.5: Analysis of the data collected during the joint surveys

OUTPUT 2: SUSTAINABLE SMALL-SCALE FISHERIES SUPPORTED TO IMPROVE LIVELIHOODS FOR COASTAL COMMUNITIES

It is recognized that small-scale fisheries play an important role in providing income and ensuring food security, particularly within economically vulnerable coastal communities, with an impact on both men and women, the latter being significant participants particularly in postharvest and processing activities. However, available data to measure small-scale fishing activity are limited and fragmented and the integration of this sector in formal data collection processes can also vary widely from country to country. Furthermore, only superficial data is available at the regional level on the economic vulnerability of this sector, its impact on women's empowerment, its provision of decent work or its role within the regional value chain. Due to these data and organizational limitations, small-scale fisheries tend to be undervalued, potentially leading to their marginalization in the decision-making process. In addition, information on the biological and economic dimensions of recreational fisheries at the regional level is limited. Preliminary work also indicates potential interactions, both positive and negative, between small-scale fishing and recreational fishing activities, however, more study is needed to better understand this relationship.

This output aims to implement actions to enhance and disseminate the available knowledge on small-scale fisheries and recreational fisheries with a view to supporting livelihoods in small-scale fishing communities, including the promotion of decent work.

Execution of a comprehensive survey on the characteristics of small-scale fisheries, including socioeconomic aspects

SSF are the predominant fisheries in the Black Sea, representing approximately 90 percent of the region's fishing fleet, but approximately 29 percent of total landing value from the region's capture fisheries. Despite this, they play a crucial role in sustaining livelihoods in the region's coastal communities, however, more detailed data is not available on SSF activity or its socio-economic impact. This lack of data leads to an undervaluing of the role of SSF and hinders policy interventions to support this sector. While general data are available at the regional level, more detailed data is needed in order to inform management decisions to support these fisheries.

In this regard, a regional survey will be carried out for all fleet segments, allowing for appropriate comparison between small-scale fisheries and other fishing activities. The survey will serve to harmonize data collection methods (in line with the GFCM Data Collection Reference Framework) and facilitate consideration of this sector within policy interventions. Capacity development will be enabled too, in that national experts will be trained on data collection methodologies, which can be further followed through future data collection activities.

The objectives of this activity are expected to be achieved through:

2.1.1. Preparation of socio-economic survey sampling plans and training of samplers in select Black Sea riparian states where help is needed
2.1.2. Execution of socio-economic survey data collection
2.1.3. Analysis of socio-economic data

Methodology

One common difficulty with fisheries-related socio-economic data is that data collection is not always designed with fisheries management in mind and therefore there may be issues ensuring the necessary data reaches the appropriate fisheries management authorities. For this reason, it is foreseen that a socio-economic sample survey will be carried out in relevant Black Sea countries. In order to undertake the survey, national experts will be assisted in designing a survey sample, in line with the methodology guidelines which have been prepared. The survey will seek to address socio-economic data collection needs (as foreseen in the DCRF) and will serve to fill in gaps in regular ongoing data collection activities. Beyond required socio-economic data, additional variables will be collected on select topics, such as

to support gender disaggregated data, to collect data on labour mobility and data to improve the subregional characterization of small-scale fisheries. The methodology will be harmonized with similar data collection underway in other GFCM subregions and will be based on input from the Mediterranean FAO Regional Projects. The survey execution will also facilitate the development of protocols for the electronic transfer of information in order to improve efficiency. The precise implementation of the sample survey in terms of, for example, the sample size and the frequency of sampling will be determined on a case-by-case basis following discussion with the national focal points and their teams.

Evaluation of the state of recreational fisheries

In order to better understand the biological and socio-economic impact of fisheries on coastal communities, there is a need to understand the role of recreational fisheries. Despite some similarities between small-scale and recreational fisheries, including potential overlap and synergies between the two, the latter deserves specific attention. Preliminary information available on recreational fisheries at the regional level indicates enormous variations among countries regarding existing data collection, management efforts and legislative frameworks for these fisheries. At the same time, individual case studies indicate potential significant impacts of this sector. Better data collection is therefore needed in order to understand the biological and socio-economic impact of recreational fisheries and to consider these impacts in management measures, ensuring they do not undermine efforts towards the sustainable exploitation of stocks.

The implementation of this activity will result in the development of a common methodology for the assessment of recreational fishing in the Black Sea, as well as the piloting of this methodology through select strategic national-level pilot studies.

The objectives of this activity are expected to be achieved through:

2.2.1 Identification of study population for pilot study on marine recreational fisheries in a country requesting help

2.2.2 Data collection for pilot study on national marine recreational fisheries in one Black Sea country

2.2.3 Data analysis and revision of recreational fisheries data collection manual

Methodology

A data collection manual will address various data collection methods, including determining appropriate target populations, designing the sample frame, various techniques for collecting data and estimation methods towards producing accurate data on fishing effort, catch, and socio-economic impact for marine recreational fisheries at the national level.

The country for the pilot study will be selected based on potential existing marine recreational fishing data collection systems and eventual constraints. As the recreational fishing data collection manual aims to provide a harmonized methodology for data collection in the Mediterranean and Black Sea, the countries selected across both basins to participate in the pilot study should represent a range of potential challenges and scenarios for data collection. For example, the methodology is intended to be applicable for countries with and without licenses or formal registries of the recreational fishing population and allow for the collection of either off-site or on-site surveys. New approaches, including smartphone apps may also be considered for testing.

Support the establishment of regional platform(s) for professionals of the small-scale fisheries sector

The limited participation of small-scale fisheries in the decision-making process can, to a certain extent, be attributed to the need for coordination of these fisher stakeholders at the national and regional level. Important progress has been made to build platforms and associations to promote collaborative

knowledge-sharing and ensure participatory approaches for the management of small-scale fisheries. However, progress to this end has been uneven throughout the region and many small-scale fishers are still not supported by mechanisms for effective participation in decision-making. Therefore, there is a need to create an enabling environment for such mechanisms. Efforts have been deployed to take stock of existing local, national and subregional platforms, however, further action is needed to ensure a bottom-up approach to addressing the needs of small-scale fishers at the regional level.

A tailored roadmap to support SSF organizations in the Black Sea is needed and consultations/workshops with existing SSF organizations, national administration and other stakeholders will be carried out in order to refine the roadmap through a bottom-up approach and through ample stakeholder consultation.

The objectives of this activity are expected to be achieved through:

2.3.1 Organization of national stakeholder capacity building workshops to support the participatory development of national strategies towards implementing the "Regional Plan of Action for small-scale fisheries in the Mediterranean and the Black Sea"

Methodology
Building on the outcomes of the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea (Malta, 2013) and the Regional Conference on Building a Future for Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea (Algeria, 2016), and within the context of the mid-term strategy, the GFCM will hold a High-level meeting on small-scale fisheries in the Mediterranean and Black Sea (Malta, 25-26 September 2018). During this meeting, it is foreseen that a Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea (RPOA-SSF) will be adopted, in line with the globally endorsed Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (2014).

The RPOA-SSF calls on the GFCM to support countries in implementing the actions therein. In line with the spirit of the RPOA-SSF, the identification of national priorities and the development of a national strategy for the implementation of the RPOA-SSF should be done in consultation with stakeholders. As such, the GFCM proposes carrying out national stakeholder capacity building workshops in order to support national-level processes to identify priority issues for small-scale fisheries in Black Sea countries, as well as technical assistance needs, with a view to assisting countries in developing a national strategy for the implementation of the RPOA-SSF through a participatory approach.

OUTPUT 3: ILLEGAL, UNREPORTED AND UNREGULATED FISHING COUNTERED
Illegal, unreported and unregulated (IUU) fishing is regarded as one of the most dangerous threats to the conservation and management of fisheries. Whilst vessels engaged in IUU fishing continue to operate under flag of convenience or with very weak controls from the part of the flag States concerned, the Mediterranean and the Black Sea are not beyond the grasp of illegal operators. These include vessels of riparian countries that fish in contravention of GFCM management measures, national regulations and international treaty provisions. Additionally, vessels flying the flag of countries that are currently not Members to the GFCM, including from distant water fishing nations have also been sighted in the Mediterranean and the Black Sea in recent years. This is a source of great concern, due also to the increasing linkages between IUU fishing and fisheries crime. The SDG 14.4 recognizes the imperative need to end IUU fishing by 2020 thus calling upon all RFMOs to step up their efforts. The GFCM is not a stranger to this call, and building on the early work carried out during the Joint GFCM-BSC Workshop on IUU Fishing in the Black Sea, held in BSC Headquarters Istanbul, Turkey, 25-27 February 2013 has designed a dedicated roadmap to counter IUU on the Black Sea. In this context, and against the background of its Regional Plan of Action to fight against IUU fishing (RPOA-IUU) adopted at the forty-first session of the Commission as Recommendation GFCM/41/2017/7, the GFCM is expected to tackle IUU fishing under several different angles.

This output aims at assessing IUU fishing rates in the Black Sea and operationalizing a modular approach to Vessel Monitoring System (VMS) and control systems. This approach will ultimately contribute to the evaluation of the implementation of the RPOA-IUU.

Actions towards the assessment of IUU fishing

A methodology for the assessment of IUU fishing in the Black Sea needs to be devel. This activity will focus on reporting about the ongoing work within FAO, including the preliminary development of an applicable methodology, to relevant GFCM subsidiary bodies, including the WGBS. This will trigger progress in the work towards the estimation of IUU fishing, which could be jump-started and tested in the context of the EFCA-GFCM pilot project in the Black Sea on turbot fishery. Overall, the activity will be developed following the actions outlined by the RPOA-IUU adopted in 2017, and it will allow to gain a better understanding of the requirements for estimating IUU fishing in the Black Sea.

The objectives of this activity are expected to be achieved through:

3.1.1. Regional review on IUU issues

3.1.2. Quantitative survey on IUU issues

3.1.3. Case study for the assessment of IUU fishing for turbot fishery

Methodology

A number of the littoral countries have research efforts ongoing on IUU related issues and in combination with reports to the GFCM Working Group on IUU fishing (WGIUU), these records form a useful picture of the current state of knowledge on IUU issues in the region. This information will provide a picture of Black Sea countries' progress in addressing IUU and could be used to evaluate overall trends as well as to address specific questions, such as shifts in IUU effort in the region in response to increased interdictions in some countries. Quantitative surveys covering IUU related issues across littoral countries could also provide information on both key targets for estimation by country, and useful data for making those estimates. One key outcome of the survey would be a clear picture, by country, of the relative priorities in tackling the various components of IUU fishing: strictly illegal behaviors, those related to issues with reporting, and those related to a lack of regulation on particular activities. Finally, based on the survey method identified by subactivity 3.1.2, upon the request of riparian States of the Black Sea, a case study on turbot to assess IUU fishing may be developed to enhance the data quality to be collected in their EEZ of countries.

Support to the implementation of Vessel Monitoring System (VMS) and related control systems in connection with small-scale fisheries and scientific assessment

An effective regional VMS has been increasingly recognized by all RFMOs as a must-have tool in the fight against IUU fishing. Many RFMOs have progressively shifted from a decentralized VMS towards a regional one. In 2009, when the GFCM adopted Recommendation GFCM/33/2009/7 on minimum technical standards for the establishment of VMS, the Commission agreed that this instrument would have served as a cornerstone for the development of a regional VMS in due course. Nonetheless, the main challenge that the GFCM has been facing in the process remains the uneven level of capacity among its Contracting parties and Cooperating non- contracting parties (CPCs) in terms of Monitoring, Control and Surveillance (MCS) and the imperative necessity to also encompass SSF. Painstaking analysis has been carried out to identify gaps and priorities relating to the establishment of VMS and this has revealed, among others, a need for a modular approach towards a regional control system taking into consideration the composition of the national fleet, including small-scale vessels. Progress on the implementation of VMS and control systems, including the provision of technical assistance, has started four years ago through the Working Group on VMS and related control systems (WGVMS). Work is expected to follow through the deployment of a regional VMS and control system, including

in the Black Sea. To this end, the project will support in particular the running of tests upon request of countries in support to the establishment by them of national control systems fully-encompassing and inclusive of e-inspection reports related features and integration of controls-related data (e.g. AIS, GPRS, VMS, etc.).

The objectives of this activity are expected to be achieved through:

3.2.1 Technical assistance to Black Sea riparian countries in the context of MCS

Methodology
The implementation of this activity upon the request of Black Sea riparian States will revolve around the provision of technical assistance by the BlackSea4Fish project to CPCs in light of their needs. Furthermore, with the operationalization of the regional VMS and control system, the BlackSea4Fish project is expected to steer efforts by CPCs in a harmonized fashion. Testing of transponders, including for small-scale fisheries, and assessment of national VMS will be performed in close coordination with select CPCs. Exchange of VMS data between national systems in place in some CPCs and the regional system will also be tested.

OUTPUT 4: UNWANTED INTERACTIONS BETWEEN FISHERIES AND MARINE ECOSYSTEMS AND ENVIRONMENT MONITORED

Healthy and productive marine ecosystems are key to supporting maximum sustainable yield and facilitating Blue Growth. Fisheries is one of the main direct and indirect drivers of Blue Growth on coastal communities, and while fishing activities have some negative impacts on the ecosystem, changes in the ecosystem conditions and/or the negative effect of non-fisheries related human activities on the ecosystem also negatively affect fisheries. Bycatch (discards and incidental catches of vulnerable species) is considered an important threat both to the fish stocks and ecosystems and to the profitability and sustainability of fisheries and the current lack of comprehensive data on discard rates hampers the adoption of effective management measures. In addition to bycatch, non-indigenous species (NIS) and climate change are modifying the Black Sea ecosystem, creating at the same time new stressors and in some cases new opportunities for fisheries, and requiring countries and relevant parties to discuss adaptation strategies to address these issues.
In addition to protecting biodiversity, MPAs have proven to be beneficial in the recovery of species, habitats and populations, and are recognized for their role in strengthening the resilience of ecosystems. In addition, small-scale fisheries can contribute to sustainable development. Although not very common, Fisheries Restricted Areas are one of the fishing management tools used in the Black Sea, requiring further elaboration through cooperation among riparian states. The project will consider this option, which has the potential to improve the state of the stocks, to contribute socio-economic benefits to the region, and to tackle conflicts among different segments of the fleet, namely industrial and artisanal.

This output aims at implementing a bycatch monitoring programme, and working towards the compilation of information in support of the adoption of adaptation strategies for climate change and non-indigenous species in the Black Sea.

Implementation of a bycatch monitoring programme

Usually discarding constitutes a reduction of future harvesting opportunities and it may have negative consequences for the environment and ecosystem. Data on the total catch and bycatch rates (for both discards and incidental catches of vulnerable species) have the potential to inform us of the need for and the effects of technical measures, as well as to provide us with information on the ecological and economic aspects of fisheries management. In the Black Sea, however, studies on bycatch cover only a small proportion of the total fishing activity, indicating a shortage of information. The issue of discards in particular has been acknowledged as an important constraint to performing reliable stock

assessments. Considering that a monitoring system for discards and incidental catches of vulnerable species is lacking in most riparian countries, bycatch rates are often uncertain and/or not based on empirical direct observations. In such cases, discards may represent a major source of uncertainty about the real fishing mortality rates exerted on stocks. On the basis of the standard methodologies developed by the GFCM on the collection of data on discards and incidental catches of vulnerable species, such as sturgeons and picked dogfish a bycatch monitoring programme will be supported with a view to expanding discard/bycatch surveys and standardizing practices in order to address knowledge gaps, compare fisheries, test potential methods, and eventually develop tools aiming at their mitigation.

The objectives of this activity are expected to be achieved through:

4.1.1. Training of onboard observers
4.1.2. Data acquisition through observers at sea, self-sampling and questionnaires at landing points
4.1.3. Analysis of collected data, including through dedicated expert meetings

Methodology
Bycatch data are expected to be monitored mainly by organizing on-board observations, to be complemented by information obtained through direct dialogues with fishers and/or provided directly by fishers through self-sampling. The objective is to obtain representative data on discards for at least the main fishing activity responsible for the bulk of discards (i.e. trawling is usually characterized by high discard values in the area). The programme will take into account spatial and temporal variability in order to detect seasonal differences in the volume and demographic structure of the discards in trawler activities. In addition to representative data on the discard component of total bycatch from Black Sea fisheries, the programme is expected to also obtain information on the incidental catch of vulnerable species that could occur during sampled fishing operations, with a view to facilitating the adoption of required management measures towards the reduction of bycatch rates.

Compilation of relevant information relating to non-indigenous species (NIS) and the potential impacts of climate change on fisheries and ecosystems, towards the establishment of an adaptation strategy

Due to its enclosed nature and its geographical characteristics, the Black Sea is especially sensitive to the challenges created by the introduction of NIS and the expected effects of climate change. In recognizing these expected challenges, it is crucial to compile information, assess the current knowledge and provide advice on the risks, vulnerabilities and opportunities generated by these two interlinked phenomena, towards the establishment of an adequate adaptation strategy, which should include improved monitoring programmes, increased understanding of ecological mechanisms and socio-economic impacts as well as the valuation of fisheries products.

Within the framework of the BlackSea4Fish project, the implementation of this activity will ensure the necessary follow-up on the results of the above-mentioned expert meetings in the Black Sea subregion.

The objectives of this activity are expected to be achieved through:

4.2.1 Assess vulnerability to climate change in selected case studies
1.1.1 Implement a monitoring plan for NIS

Methodology
A dedicated Expert meeting on the potential Climate Change Implications for Fisheries in Mediterranean and Black Sea (December 2017, Italy) produced a methodology and a matrix for the assessment of vulnerability to climate change that are expected to be tested in select case studies. Similarly, a joint GFCM UN Environment/MAP Sub-Regional Pilot Study Meeting for the Eastern Mediterranean on Non-Indigenous Species in Relation to Fisheries met twice and produced elements

for a monitoring plan for NIS that was revised by and will be put in place in other Mediterranean subregions. The same effort could be done in the Black Sea, in order to consolidate knowledge on major NIS species, including relevant information (volume and tonnes of main species, etc.) and interactions with relevant fisheries and subsequently develop and implement a pilot monitoring plan inclusive of i) the sources of data, ii) the main observation platforms; iii) proposed indicators; and iv) a roadmap on the next steps, including towards the potential management of the resource.

OUTPUT 5: COOPERATION, OUTREACH AND WELL DISSEMINATED RESULTS

Supporting and reinforcing the actors taking part in the process of producing scientific advice and tackling priorities at the national and regional levels is crucial towards successfully reaching the project's objectives. Capacity-building, staff training and cooperation among the different stakeholders needs to be promoted at all levels in order to ensure increased participation in relevant activities and awareness of achievements and opportunities. Reaching all relevant stakeholders will reinforce the role of the project and allow for a tailored design of future actions, that is in line with national needs and fits regional priorities in support of the work of the WGBS. In parallel, sharing the outputs of the project to as large a part of the Black Sea coastal community is important for the project to reach its primary goal, provided that the security and privacy of the data collected within the framework of the project is ensured.

This output aims at promoting and disseminating project results to relevant stakeholders, with a view to attracting participation in its endeavors and supporting its progress, as well as strengthening cooperation among stakeholders.

Outreach and dissemination

Multinational cooperation in the management of the marine living resources and regulating the fishery under one roof is a rather new concept for the Black Sea fisheries stakeholders, and the administrations of some of the riparian countries. Therefore, it is natural that such an undertaking requires a dedicated effort towards the dissemination of information on the objectives of the WGBS and of the project and its role in the Black Sea. Also, the implementation of the decisions taken by the GFCM in the Black Sea depends largely on the how well the facts behind the decisions taken are communicated to the stakeholders. Having regard to the significant impact of IUU activities in the Black Sea, the need to raise awareness in the region on the threats posed by IUU fishing is evident.

The objectives of this activity are expected to be achieved through:

5.1.1: A dedicated webpage within the official GFCM website to: i) communicate the results and the news about the project; ii) to broaden and diversify pool of BS fish and fisheries experts; iii) to provide an efficient tool for communication and discussion among the experts;

5.1.2: A regional web-based platform (possibly in connection with FishForum 2018) created to facilitate Black Sea experts to communicate (the networking platform will enable scientists, fisher organizations and other stakeholders of the region to interact more frequently and efficiently with each other)

5.1.3: Participation of project experts to relevant international/regional/national events.

5.1.4: Organization of and/or participation in nationally/regionally organized initiatives to raise public awareness

5.1.5: Preparation and dissemination of dedicated communication products on the project and its outputs

Methodology

The promotion of the BlackSea4Fish project will be ensured through relevant websites, social networks, posters, brochures, videos and educational materials in local languages. The cooperation of local partners/NGOs for the dissemination of the project's result will also be sought.

Institutional regional cooperation and staff training

Institutional strengthening is important to ensure that national entities dealing with fisheries in the Black Sea have an adequate structure, capacity and technical competence to undertake fundamental tasks in connection with fisheries management, collect fisheries statistics and perform assessment on the status of stocks and fisheries.

Increasing the participation and involvement of experts from Black Sea riparian countries in the work of the GFCM is a prerequisite and can be considered as part of the capacity-building program established in the context of the mid-term strategy. A pool of Black Sea experts in fisheries and fisheries-related sciences is crucially needed in order to jumpstart many of the activities to be performed within the BlackSea4Fish project. In this respect, enhanced regional cooperation would also be crucial to facilitate the exchange information and samples as well as collaboration between staff and scientists from different countries and institutions. Furthermore, cooperation restricted to institutes is dull, it also needs to involve civil society organizations, national coast guards, fisheries cooperatives and harbor masters who are responsible for port state control and fishing vessels. Staff training activities, such as training of inspectors, are needed to develop capacities of national administrative staff in addressing multi-disciplinary issues related to fisheries management in the Black Sea.

Methodology
In addition to the training activities and workshops given above under other outputs, which would also serve to improve institutional regional cooperation, cooperation between research institutes will be enhanced by supporting bilateral exchange of experts. With that respect, ongoing fisheries surveys conducted by the countries and/or the surveys organized by the project, such as pilot landing site surveys will be considered.

SECTION 2 – RELEVANCE

ALIGNMENT AND STRATEGIC FIT

As a UN specialized agency, the FAO contributes to the global implementation of the sustainable development goals (SDGs) through a strategic framework, of which Strategic Objective 2 specifically aims to increase and improve the provision of goods and services from fisheries in a sustainable manner, addressing in particular multi-sectoral approaches for ecosystem management, capacity building, governance frameworks and the like. The GFCM is an FAO Article XIV body and regional fisheries management organization (RFMO) part of the Fisheries and Aquaculture Department, supports the achievement of UN targets, as well as the international obligations stemming therefrom, including the FAO Strategic Objectives.

COMPARATIVE ADVANTAGES

As FAO decided back in 1949 to establish the GFCM (under Article XIV of the FAO Constitution), there is a long-standing recognition as to the need to defer to this commission the responsibility to tailor global sector policies on fisheries and aquaculture of FAO to the specificities of the Mediterranean and the Black Sea. FAO, through the GFCM, is the best placed to execute the project and deliver quality results, more specifically FAO comparative advantages and strengths Numbers 1 (Authority and status as a global intergovernmental organization); 3 (Unparalleled information source and institutional memory); and 8 (Responsible financial and administrative management), because of its constitutional structure.

The GFCM is key to tailoring the implementation of FAO-developed instruments setting global standards for fisheries management to regional needs and priorities. In this regard, it has been producing technical guidelines, measures and decisions related to the sustainability of fisheries. Furthermore, the GFCM fosters dialogue among organizations sharing similar goals, thanks in

particular to memoranda of understanding (MoU) adopted by FAO on behalf of GFCM with multiple partner organizations (some of which have been entered into with CSOs, according with the 2013 FAO Framework Policy on Cooperation with CSOs) operating in the region. The partner organizations with which the GFCM has a MoU in place are either partners in the project itself or have expressed their specific interest in collaborating towards the project's execution within the context of the different outputs and activities.

The GFCM has an established network of national focal points, which is constantly updated also thanks to the involvement of FAO representations through their direct links with national authorities. Relevant FAO field offices are often involved by national authorities when informing the GFCM of national experts' nominations to GFCM activities and can play an active role in ensuring a follow up is given to GFCM activities at national level, in coordination with the GFCM. Relevant FAO regional offices are always copied in e-mail announcements related to GFCM meetings/activities and are also informed of the date and venue of the annual session of the Commission, where the work plan for the following year is adopted, being therefore aware of the work being carried out. Relevant FAO regional offices are also informed/consulted when the GFCM holds bilateral meetings with national authorities and take part as appropriate. Over the years, FAO regional offices in the Mediterranean have always shown support to GFCM activities.

Furthermore, internally, the GFCM enjoys strong cooperation with the FAO Fisheries Department and, in particular, the FAO Regional Projects operating in the Mediterranean Sea (AdriaMed, CopeMed, EastMed, MedSudMed). This is an additional element underlying the FAO comparative advantage.

Mandate to Act

The FAO is the United Nations Specialized Agency on agriculture related issues, including fisheries. In order to achieve food security, the Organization relies, at the regional level, on the work of those commissions and bodies created within its constitutional remit. These include Article XIV bodies mandated to act by FAO in the interest of neighboring countries managing common fisheries. As explained in the previous section, the comparative advantage of the FAO in executing this project is the role of the GFCM in tailoring FAO global policies to the regional specificities of the Mediterranean Sea. The project is conceived in response to the priorities of GFCM Members keen to halt the pernicious effects of by-catch, an issue which is prominent on the FAO agenda. This is fully in line with FAO's Strategic Objective 2 (SO2): Increase production in agriculture, fisheries and forestry in an economic, social and environmentally sustainable manner, Outcome 1 (OO1): Producers and natural resource managers adopt practices that increase and improve the provision of goods and services in agriculture production systems in a sustainable manner; and Outcome 2 (OO2): Stakeholders in member countries strengthen governance – the policies, laws, management frameworks and institutions that are needed to support producers and resource managers in the transition to sustainable agriculture production systems. Moreover, the project is coherent with the goals, objectives and binding recommendations adopted by the GFCM at the regional level to ensure the rational management of living marine resources.

Capacity to Act

FAO capacity to act against the background of this project is enhanced by the technical expertise available at the GFCM Secretariat which can be tapped to respond to the needs of beneficiary countries. The unique role that the GFCM plays in the Mediterranean and Black Sea region brings to the fishery sector of its Members significant benefits in terms of knowledge and management which emanate from binding recommendations adopted, guidelines and regional plans in place and tools and practices developed over the years. These, together with the experience gained and lessons learnt by GFCM over the decades, gives FAO a sense of direction in terms of technical competence to select together with stakeholders priority areas of intervention where efforts can realize maximum impacts through this project.

Position to Act

Because the GFCM is the only regional organization mandated to manage fisheries in the Mediterranean and Black Sea with the power to adopt binding recommendations on all its CPCs, no other organizations established under international law can compare. This warrants the FAO position to act in the Black Sea region in relation with the actions being pursued through this project.

CONTEXT ANALYSIS

The GFCM's recently released assessment The State of Mediterranean and Black Sea fisheries (SoMFi 2016) highlights the impact of fisheries providing jobs for over 40 thousand people, and in particular the small-scale fisheries sector. Indeed, almost 90% of the fishery of the region is of small-scale nature, but the share of this fishery is less than one-tenth of the total landings. This is partly due to the fact that the resource is dominated by the schooling anchovy that can only be fished on an industrial scale. Moreover, a large percentage of the fish caught by industrial fishing is used for industrial purposes, and processed in the fishmeal and fish oil factories. For this reason, in addition to its importance for the fishery, the anchovy stock that fished over half a million tonnes in the past, also supports industry-based economy in the region. It is worth stressing that currently not all six riparian countries are members to the GFCM and this is a factor that in the past prevented the availability of adequate data an information on the status of the stocks and the fishing activities being conducted.

Stakeholder Engagement

Regional cooperation in the management of fishery through a RFMO is a fairly new concept for the Black Sea fisheries stakeholders. In order to prevent possible negative reactions that may arise from misperception, and to ensure recognition of the project, the stakeholders will be involved in the project through awareness activities. These activities will aim to accurately describe the role of the WGBS and the objectives of the project to the stakeholders throughout the project cycle.

Partnerships

The project will be implemented by the GFCM Secretariat in coordination with relevant organizations that have entered into a memorandum of understanding with the GFCM (e.g. ACCOBAMS, Black Sea Commission, BSEC) and in line with the priorities set by the WGBS. The implementation and results of the project will periodically be examined and monitored, in particular on the occasion of WGBS sessions.

Knowledge Management and Communication

Taking account the expected project impact, one of the main challenges is to ensure that the project contributes to enhancing the capacity of CPCs for policy making by improving the access to and the use of relevant information. This will be pursued by using the existing GFCM channels, such as putting all information collected to the disposal of experts through the organization of open expert meetings, serving the objectives designed by the WGBS. In particular information on status of resources will be discussed through the SGSABS and the main conclusions will be put forward to CPCs first in the WGBS and then at the level of the annual meeting of the Commission. In addition to that, dedicated knowledge management tools are been developed at the Secretariat, including through interactive tools to make information available to a variety of users through online services.

Knowledge Sharing

Data and information collected through various channels, including workshops, surveys, questionnaires, stock assessment formed filled by the experts, will be stored in and shared through a regional database as well as through the tools available at the GFCM (sharepoint, webpage). These tools will ensure security and privacy of the information provided by the countries.

In order to ensure the effective participation, dialogue and the dissemination of knowledge and good practices among the Black Sea riparian countries and relevant parties, focal points responsible for overseeing the implementation of project activities and ensuring follow-up at the national level (e.g.

appointment of experts to meetings, submission of data and information, support to regional initiatives, etc.), are appointed: Mr Galin Nikolov (Bulgaria), Ms Irina Lomashvili (Georgia), Ms Valérie Lainé (European Commission), Mr Simion Nicolaev (Romania), Mr Vladimir Belousov (Russian Federation), Mr Erdinc Gunes (Turkey) and Mr Vasyl Turok (Ukraine).

Communication

Communication will rely on GFCM IT tools (sharepoint, webpage) as well as new dedicated tools to be developed by the project (see Output 5). In addition, communication with CPCs and partners will be facilitated through the regular work of the WGBS and the active communication between the GFCM Secretariat and Black Sea riparian states.

SECTION 3 – FEASIBILITY

IMPLEMENTATION ARRANGEMENTS

FAO, through the GFCM, will be responsible the provision of technical guidance during project implementation. In addition, it will act as financial and operational agency and will be responsible for the financial and operational execution of the project. According to the workplan and budget of the project, contracting services will be delivered on the basis of FAO rules and procedures, as well as financial services. A Project Steering Committee (PSC) is set up to provide oversight and coordinate project implementation, composed of nominated focal points of the six Black Sea riparian countries and the EU.

Institutional Framework and Coordination

The project, being interregional, will be implemented from the BlackSea4Fish project HQ (Burgas, Bulgaria) and will be germane to FAO policies in place, as applicable to the work of the GFCM and consistent with the practice of previous and ongoing grants. The GFCM Secretariat will oversee the project's execution by backstopping all activities foreseen, in strong coordination with national focal points in Black Sea countries (located in the Fisheries Department of relevant Ministries – agriculture, food or environment/climate change, depending on countries) and relevant partner organizations. This oversight and coordination will entail substantial work by the GFCM Secretariat, including through dedicated experts allocated to oversee the activities of the BlackSea4Fish project to tackle all interrelated aspects of the project as well as the involvement of stakeholders concerned and the constant liaison with relevant partner organizations, with a view to avoid overlaps, promote synergies and exploit complementarities where mandates and strategies in place have common objectives. In line with GFCM's framework for cooperation, there will also be an interdisciplinary partnership made of those relevant organizations with a mandate over the Black Sea that entered into a MoU with the GFCM. GFCM's coordination will also ensure positive interactions with similar activities organized across the competence area (Mediterranean and Black Sea), as launched in the context of the mid-term strategy.

Government inputs

The project objective, outputs and activities all entail the direct involvement of the six Black Sea riparian countries and of the EU. Each riparian state will be part of the project steering committee, through an officially nominated national focal point. Contracting Parties and Cooperating non-Contracting Parties are expected, per the practice of the Commission and in light of their obligations stemming from the GFCM constitutive agreement, to provide technical inputs in the context of the implementation of the project and throughout its execution, as they will be consulted regularly through GFCM scientific subsidiary bodies. In particular, this means in kind contributions to the project execution (e.g. time of the national experts involved in the various activities as well as any resources that might be needed in connection with the facilitation of field-activities, organization of meetings or other activities by hosting countries). It is hoped that the same level of involvement will also be displayed by the Russian Federation, the only GFCM non-Contracting Party of the area.

National research institutes are expected to be directly involved in the execution of activities, by providing support, experts and assisting national focal points in the development of project activities.

A GFCM subregional technical unit is established in Burgas, Bulgaria, at the offer of the Bulgarian Government, to backstop the operations of the Project – an opportunity to directly take action for the region from within the region and to create a supporting space from where project operations can effectively thrive. The technical unit comprises of two fully equipped offices and the use of a meeting room and is meant to host relevant staff entirely dedicated to the implementation of project activities.

Project inputs

The GFCM Secretariat, which will provide in-kind inputs, is expected to be supported by the Project Coordinator, (re-)appointed annually as well as, in due time as the subregional technical unit becomes operational, selected national and international professional and support staff (including consultants, temporary administrative support staff, interns, etc.) for the implementation of this project. The above resources will assist in the different outputs of the project through their varying levels of experience (junior vs senior consultants).

Funding is expected to cover the following:

a. national experts to coordinate/implement the various activities at national level;
b. technical consultants, including ad-hoc support on specific scientific issues, publications and translation, communication-related issues, etc.;
c. travel costs for national experts' participation in meetings and capacity building activities, as appropriate;
d. technical equipment, including in support to scientific surveys at sea;
e. expendable Procurement, for the printing of publications, miscellaneous office equipment;
f. interpretation and translation costs in the languages of the region, as relevant to the project for meetings and activities as appropriate;
g. contracts to support the smooth execution of project's meetings and activities, e.g. SharePoint licenses, Azure resources and visualisation tools, technical tools to support the set-up of relevant databases;
h. administrative costs

RISK MANAGEMENT

Potential risks to the project

The most significant assumption in the project is that all Black Sea riparian states agrees that the marine living resources are in jeopardy, and that there is an urgent need for cooperative action to ensure their sustainability. This assumption is rooted from Bucharest declaration signed by all riparian states after the GFCM High-level conference towards enhanced cooperation on Black Sea fisheries. On the other hand, geopolitical instability in the region, and quickly changing political winds, which can easily influence the willingness of the countries to cooperate, stands as a potential risk to the project.

MONITORING AND REPORTING

Monitoring Arrangements

Project monitoring arrangements are integrated into the GFCM existing institutional setting whereby various expert groups of scientific nature report to the WGBS (and Scientific Advisory Committee – SAC-, if appropriate) which validates the scientific advice and submits it to the GFCM for the adoption of potential measures based thereon. This means that, in reviewing the scientific work emanating from project activities, the WGBS will advise accordingly whether additional work is required or if the advice is solid enough to be submitted to the GFCM to support the decision-making process. In turn, yearly, the Steering Committee will revise the workplan proposed by the WGBS and stemming from other

relevant sources, allocating the necessary resources, thus agreeing on regional priorities for the next year(s).

Reporting

Regular contact with beneficiary countries will be maintained, through the steering committee (online and face to face meetings) and the meetings of the WGBS, in order to monitor progress and take into account any factor that may affect the implementation of the project and its activities. The national focal points will also be requested to report, as appropriate, on advancement at national level.

Project advancement and results will be reported to the WGBS as well as through the relevant GFCM subsidiary bodies to keep the whole membership, partner organizations and relevant stakeholders informed at all levels. This information will thus be included in background documentation for the WGBS technical workshops and working group, the annual session of the WGBS and subsequently the annual session of the GFCM.

Annex I: Work plan

	2018				2019				2020			
Activities	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
OUTPUT 1. Scientific advice in support of fisheries management												
Activities related to Turbot stock												
Preparation of a standard template facilitating the entry of raw data used in the STECF and GFCM assessments so far.			Aug									
Submission of raw data by CPCs			By Sep									
Review of raw data by an external expert assigned by GFCM			Oct									
Otolith exchange exercise (Turbot)												
Tagging exercise					One month within this period							
Compilation and review of studies related to stock unit of Black Sea Turbot			One month within this period									
Benchmark Assessment					June							
MSE												
Activities related to Black Sea anchovy stock												
Workshops/training courses on age determination				Dec	Jan							
New Assessment with SAM				Oct								
Benchmark Assessment												
MSE												
Activities related to European Sprat stock												
Analysis of existing acoustic survey data			Oct									
Otolith exchange exercise (Sprat)												
Benchmark assessment				Nov								

	2018				2019				2020			
Activities	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Activities related to European Rapa Whelk stock												
Expert inventory - Data gathering												
Rapa whelk scientific survey							Jul				Jul	
Rapa whelk landing port survey				Oct - (?)	-Mar			Oct-	-Mar			
Benchmark assessment												
MSE, including socioeconomic perspective												
Activities related to horse mackerel												
Data preparation			-Oct									
Activities related to predators (Atlantic Bonito and BlueFish)												
Review of historical literature												
New assessment												
Multispecies assessment												
Mark-Recapture survey												
Activities related with the joints surveys at sea												
Review of GFCM's common survey protocol for its applicability to the BS												
Joint small pelagic surveys (Hydro-acoustic and/or DEPM)				?	?							
Harmonized / synchronized demersal trawl surveys			?									
Exchange of experts among the research vessels during the ongoing fisheries surveys for the purpose of training			DM ?	SP	SP		DM	SP	SP			
Analysis of the data collected during the joint surveys.						?						
Biological sampling carried out by observers on board.			?	?	?	?						

	2018				2019				2020			
Activities	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
OUTPUT 2. Sustainable small-scale fisheries to improve livelihoods												
2.1.1 Preparation of socio-economic survey sampling plans and training of samplers in select Black Sea riparian states												
2.1.2 Execution of socio-economic survey data collection												
2.1.3 Analysis of socio-economic data												
2.2.1 Identification of study population for pilot study on national marine recreational fisheries in one Black Sea country												
2.2.2 Data collection for pilot study on national marine recreational fisheries in one Black Sea country (TURKEY)												
2.2.3 Data analysis and revision of recreational fisheries data collection manual												
2.3.1 National stakeholder capacity building workshops												
OUTPUT 3. RPOA and modular MCS to assess and counter IUU fishing												
3.1.1 Regional review on IUU issues												
3.1.2 Quantitative survey on IUU issues												
3.1.3 Case study to test IUU fishing estimation methods for turbot fishery												
3.2.1 Technical assistance for the use of VMS												
OUTPUT 4. Interactions between fisheries and marine ecosystems and environment												
4.1.1 Training of observers for the bycatch monitoring programme												
4.1.2 Bycatch data collection												
4.1.3 Analysis of bycatch data												
4.2.1 Assessment of vulnerability to climate change in select case studies												

	2018				2019				2020			
Activities	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
OUTPUT 5. Cooperation, outreach and dissemination of results												
Project webpage												
Training on basic population dynamics and stock assessment												
Follow-up training on advance assessment models (SS3)												
Training course on ECOPATH with ECOSIM												
Public awareness campaigns												
- Thematic art competitions- drawing/painting (@ primary schools)												
- Participating international and national events associated with fisheries (FishForum, FABA, SOFAS, etc.)												
Production of communication materials (Posters and leaflets)												

Annex II Budget

	Estimated budget per year (€)
OUTPUT 1. Scientific advice in support of fisheries management	
1.1 Improved data collection and analysis on fisheries and ecosystems	**82,000**
1.2 Improved scientific advice	**40,000**
1.3 Surveys at sea	**396,000**
OUTPUT 2. Sustainable small-scale fisheries to improve livelihoods	
2.1 Execution of a comprehensive regional survey on the characteristics of small-scale fisheries, including socioeconomic aspects	**50,000**
2.2 Evaluation of the state of recreational fisheries	**25,000**
2.3 Support the establishment of regional platform(s) for professionals of the small-scale fisheries sector	**20,000**
OUTPUT 3. IUU fishing countered	
3.1 Actions towards the assessment of IUU fishing	**50,000**
3.2 Support to the implementation of Vessel Monitoring System (VMS) and related control systems in connection with small-scale fisheries and scientific assessment (voluntary basis)	**57,000**
OUTPUT 4. Interactions between fisheries and marine ecosystems and environment	
4.1 Implementation of a bycatch monitoring programme	**70,000**
4.2 Compilation of relevant information relating to non-indigenous species and potential impacts of climate change	**25,000**
OUTPUT 5. Capacity-building and technical assistance for fisheries and aquaculture	
5.1 Institutional regional cooperation	**15,000**
5.2 Outreach and dissemination	**59,000**
Human resources (coordinator, administrative assistance, other)	**150,000**
Admin and other support costs	**90,000**

The estimated total expected budget for BlackSea4Fish project activities amounts to around 1.100.000 Euros per year

Appendix 8

WORK PLAN FOR THE ESTIMATION/QUANTIFICATION OF IUU FISHING IN THE MEDITERRANEAN AND BLACK SEA

1. Introduction

The Food and Agriculture Organization of the United Nations (FAO) has been acting at the global level to promote responsible fishing practices and to curb IUU fishing. Among the instruments available are FAO Code of Conduct for Responsible Fisheries and the FAO International Plan of Action to Prevent, Deter and Eliminate IUU fishing (IPOA-IUU).

The FAO is acting as a custodian for several Sustainable Development Goals (SDGs) included in the 2030 Agenda for Sustainable Development, which were adopted by world leaders at the UN Sustainable Development Summit 2015 (New York, 25–27 September). These include SDG 14.4 whose aim is to end Illegal, Unreported and Unregulated (IUU) fishing by 2020. To support the achievement of targets stemming from SDG 14, in 2016 the GFCM launched the Mid-term Strategy (2017-2020) towards the sustainability of Mediterranean and Black Seas fisheries. Target 3 of the GFCM Mid-term Strategy is of particular relevance to IUU: Curb Illegal Unreported and Unregulated (IUU) Fishing, through a Regional Plan of Action (RPOA). Ultimately, at its 41st session in 2017, the GFCM has adopted the RPOA-IUU. This seminal legal instrument will be key to curb IUU fishing in the Mediterranean and the Black Sea regions together with the numerous recommendations, resolutions and decision[2] adopted to date.

While the work done by the GFCM on IUU fishing has concentrated mainly on aspects related to Monitoring, Control and Surveillance (MCS), little progress has been made towards the development of a scientific plan of action for the quantification/estimation of IUU. Two roadmaps have been adopted by the GFCM in 2013 and 2014 for the purpose of fighting IUU fishing in the Black Sea (GFCM 37th annual session, May 2013 Croatia), and in the Mediterranean Sea (GFCM 38th annual session, FAO Headquarters, May 2014). These roadmaps had already expressed the need to develop, and agree on, standard methodologies to evaluate IUU catches and trade of fishing products in support of scientific advice. The GFCM Working Group on IUU Fishing of the GFCM advised that such a task should be carried out in coordination with the FAO as the Organization is in the process of developing a global methodology to assess IUU fishing.

In light of the above, this draft work plan for the estimation/quantification of IUU Fishing in the Mediterranean and Black Seas has been drafted, proposing a stepwise framework to quantify and assess IUU based on an agreed methodology tailored for the GFCM area. More specifically, the work plan has been developed to specifically addresses Output 3.1.a of the Mid-term Strategy (Assessment of the quantity, magnitude and characteristics of IUU fishing) thus proposing a framework towards bridging the gap between MCS and the quantification of IUU in support of scientific advice using standard methodologies as endorsed by the GFCM in its previous sessions. It was has also been designed considering other targets in the Mid-term Strategy, e.g. the move towards increased spatial management to address impacts of fishing

[2] Rec. MCS-GFCM/40/2016/1; Mid-term strategy (2017-2020) Resolution GFCM/40/2016/2; Recommendation CM-GFCM/39/2015/3; Resolution GFCM/38/2014/1; Recommendation GFCM/35/2011/1; Recommendation Dir-GFCM/33/2009/5; Recommendation MCS-GFCM/33/2009/6; Recommendation MCS-GFCM/33/2009/7); Recommendation MCS-GFCM/33/2009/8); Two roadmaps which have been adopted by the GFCM for the purpose of fighting IUU fishing in the Black Sea (GFCM 37th annual session, May 2013 Croatia), and in the Mediterranean Sea (GFCM 38th annual session, FAO Headquarters, May 2014).

on marine ecosystems (Mid-term Strategy, Output 4.2) as well as capacity building in a number of areas identified by the Committee on Compliance (Outputs 5.1.b.ii, 5.1.b.iv and Output 5.1.b.v).

Finally, the work plan was thought in synergy with the RPOA-IUU, taking into account the advances towards a methodology to assess IUU done by FAO in the meantime.

2. Key Challenges

With respect to the quantification and assessment of IUU, the GFCM area of application presents a number of important challenges which are taken into due consideration in the proposed work plan:

i. Addressing the variation generated by differing levels of MCS across the littoral countries in the region: the approach developed will necessarily have to be able to function at the regional scale (independent of country level capacity)
ii. Addressing the variation related to the differing levels of attention devoted to IUU in the data collection by each country: the methodology will have to be adaptable to both data-rich and data-poor contexts
iii. Addressing the variation in the range of possible behaviours that contravene regulations, stemming from the differences in fisheries regulations across countries and fisheries (e.g. closed areas, gear restrictions etc). This will require the development of a dataset and potentially a geodatabase on legal requirements imposed on operators by each littoral state.
iv. Addressing the variation stemming from the fact that relative importance of IUU related issues will likely vary in space and time, indicating that context will be very important for establishing estimates and developing priorities.
v. Understanding the distribution of effort, compliance behaviour, and other factors driving IUU levels in the small-scale sector (~80% of fisheries in the region)

3. A Proposed work plan

The proposed draft work plan seeks to balance short-term and readily achievable activities that will provide some information on IUU, with more in-depth and resource intensive approaches, which are likely to provide better estimates but require more time, focus and resources. The six activities suggested lend themselves to a staged approach (Figure 1), with activities 1 and 2 possible in the near term, supporting the development of activity 3. Activities 4 and 5 can then proceed to some extent independently, building on the information gained in the first three. Activity 6 can be integrated throughout the process, beginning with the development of the quantitative survey in Activity 3 and carrying forward through building spatial models and developing an independent estimate of effort. Finally, as important case studies are identified, Activity 6 can continue, potentially addressing economic values of IUU landings or possibly creating automated risk assessment models based on integration of VMS, logbook, and observer data.

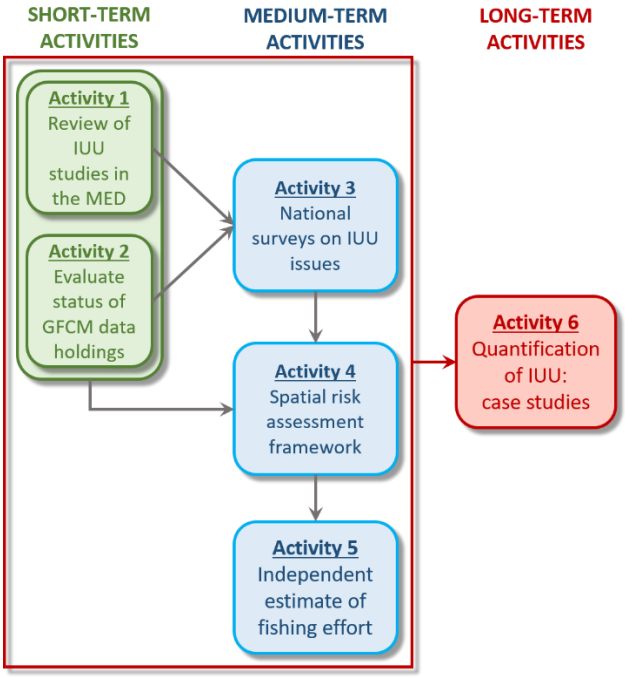


Figure 1. Schematic representation of the proposed activities towards the quantification of IUU

Activity 1 - Compile and review existing published and un-published studies and reports on IUU related issues in the Mediterranean and Black seas.
A number of the littoral countries have research efforts ongoing on IUU related issues. Countries such as Morocco were identified in a survey implemented in 2013 by the GFCM (see Appendix C of the GFCM Workshop on IUU Fishing in the Mediterranean Sea, Tunis, Tunisia, 3-4 October, 2013) as having ongoing research on IUU activities. In combination with reports to the GFCM Committee on Compliance (CoC) Working Group on IUU (WGIUU), these records form a useful picture of the current state of knowledge on IUU issues in the region. This information will provide a picture of regional progress in addressing IUU and could be used to evaluate overall trends as well as to adress specific questions, such as shifts in IUU effort in the region in response to increased interdictions in some countries.

***Activity 2 - Evaluate the current status of data holdings by GFCM on IUU related issues*, including vessel lists (see GFCM/33/2009/8) and other reports**
The GFCM holds a variety of records that could be of use in making qualitative or quantitative assessments of IUU:

- IUU vessel lists
- National fleet sizes and composition,
- National catch levels, enforcement activities and outcomes,
- Logbook and observer records,
- Landings

A complete assessment of available information, including its coverage and quality, would be a key piece of information in designing subsequent analyses.

Activity 3 - Development and administration of a quantitative survey covering IUU related issues at the national level
Quantitative surveys covering IUU related issues across littoral countries in the Mediterranean and Black seas could provide information on both key targets for estimation by country, and useful data for making those estimates. This survey should aim to update the information collected in the survey delivered in 2013.

One key outcome of the survey would be a clear picture, by country, of the *relative priorities in tackling the various components of IUU fishing*: strictly illegal behaviours, those related to issues with reporting, and those related to a lack of regulation on particular activities. Three components are envisaged:

i. Targeting higher-level fisheries officials, familiar with national policy directions and priorities, in a workshop setting
ii. Focussing on IUU related issues in the field, targeting responses from fisheries officers within each of the littoral countries, attempting to get a representative sample across each of the fisheries agencies
iii. Understanding organizational and institutional aspects of IUU activity in the countries

The survey would be structured using quantitative and semi-quantitative methods, allowing an estimation of the *relative importance of IUU issues by target species, gear, and vessel size*. These types of surveys, when combined with robust statistical methods to control for respondent bias and estimate IUU metrics and uncertainty, could provide a useful tool for establishing broad *baselines on IUU levels by country, gear, target species, and vessel characteristics* using a uniform method across all countries.

Activity 4 - Create an IUU spatial risk assessment framework applicable to the Mediterranean and Black Seas

There are a number of characteristics that could be used to estimate the likelihood of vessels fishing in a given location and thus predict IUU risk, even in the absence of information from GFCM member states:

- target species ranges
- relative species abundance
- locations of ports, coastal populations, vessel services, fish processors, and a variety of other spatial information
- governance quality, corruption levels, and other similar variables
- information contained in inspection databases

This spatial information can then be combined with information provided by littoral states on attempted and successful interdictions, vessel behavioural patterns inferred from VMS, spatial and temporal restrictions on fishing activities, and other relevant information for identifying high and low risk contexts for IUU. These data on behaviours can then be used to estimate statistical relationships between observed IUU events and the spatial variables available for all countries. In turn, thoe statistical relationships can be used to predict IUU events at times and locations where there is currently no data available (e.g. transshipment of fish between vessels; see Appendices C & D). This spatial analysis and the resulting risk assessment could be used to (i) evaluate regional progress in addressing IUU activities, based on integration country level reports on detections, (ii) answer questions about shifts in IUU effort as interdiction improves in some jurisdictions in the GFCM region.

Information from the surveys developed in activity 3, along with background data from activities 1 and 2 could also readily inform the risk assessment models developed in the framework.

Activity 5 – Obtaining an independent estimate of fishing vessel activity

Compilation of an independent estimate of fishing vessel activity at the regional scale using electronic monitoring (VMS and AIS) and remote sensing. VMS and AIS can be used to directly construct the at sea distribution of vessel fishing locations, transit routes, and ports utilized. A key issue in the Mediterranean and Black Seas however is the absence of either VMS or AIS in some countries, and the lack of coverage for smaller vessels, in particular those under 12 meters. These shortcomings in coverage could be addressed via a remote sensing approach, using medium resolution satellite imagery. Satellite remote sensing is costly, but it would be possible to use the spatial database developed in activity 4 to design a stratified random sampling approach to target vessels operating on fishing grounds and in ports. Key variables to consider in stratification include target species distributions, distance from ports, intensity of MCS, proximity to borders, proximity to reserves and other areas with high catch rates. The challenge would be to be able to

identify vessels and estimate their movement. Alternatively, for an easier solution, using paired sites inside and outside fishing grounds would allow estimation of fishing vessel densities. Similarly, temporal variation in vessels in ports and at landing sites can be used to estimate trip frequency and vessel latency. It would be possible to supplement the data using ground-based observations of vessel activities in ports and coastal regions, where available from port authorities or other sources, as has already been done in Chile. The output of the analysis would be a map of vessel density (and hence fishing effort) across the GFCM region, potentially with information on relative importance of ports and transit routes, which would include small-scale operators in a uniform manner across all countries.

Activity 6 – Case studies

Based on the survey method outlined in activity 3 and the risk model in activity 4, a number of key issues will likely be identified. These could form the basis for case studies, in which more detailed methods are applied to estimate IUU metrics such as expected catch, areas of high non-compliance, profiles for likely non-compliant operators, lost value to national governments, or other issues of interest. These case studies could be targeted to cover the diverse range of data quality and issue complexity in the GFCM fisheries, ranging from fully quantitative assessments using electronic monitoring data to semi-quantitative analyses based on projection from similar cases and/or elicitation techniques with industry or managers. This activity could provide two key outputs, 1) the development of analytic frameworks and supporting methods which can be transferred to other cases by GFCM parties, and 2) a vehicle for capacity building with the parties through participatory research with technical support from the GFCM as envisioned in Output 5 of the Mid-term Strategy.

Survey towards facilitating the estimation of IUU fishing

Intro

The General Fisheries Commission for the Mediterranean (GFCM) is assessing the quantity and magnitude of IUU fishing in its Area of Application according to Target 3 of its mid-term strategy. Given your experience as a representative of the national administration of a riparian country in the Area of Application, your input is very valuable to reach this target. This survey aims to synthesize your knowledge and perceptions about the problems of illegal fishing at the regional level. We hope to take no longer than 15 minutes of your time completing this online survey.

All respondents will remain anonymous, and your answers will be kept completely confidential. Only collective responses will be used by the GFCM Secretariat to help steer the implementation of a roadmap for the assessment of illegal fishing. Our results will be disseminated back to all riparian countries.

The term “IUU Fishing” refers to illegal, unregulated and unreported fishing. This is hereby considered a fishing activity carried out in national jurisdiction waters by any national or international vessel that is in violation of the national laws, is devoid of a fishing license and/or undertakes activities that involve unreported or misreported captures to the authorities.

If you agree to take this survey, please click on the following link.

End of Block

Geographical Rankings

1. You will be answering questions relevant to the area in which you work. Please choose the appropriate sub-region:

    - ○ Black Sea

2. For the following 15 seafood species, please advise your level of experience with each, and rate the amount of IUU fishing you believe has occurred in your country in the past twelve months.

		How much experience do you have regarding fishing for this species					**In your opinion, how much of the landings of this species do you believe involved IUU fishing practices in the past 12 months**					
		None	Less than 1 year	1-5 years	5-10 years	More than 10 years	None (1)	Some (2)	Less than half (3)	More than half (4)	Almost all (5)	All (6)
1	Black sea anchovy *(Engraulis encrasicolus ponticus)*	O	O	O	O	O	O	O	O	O	O	O
2	European whiting (*Merlangius merlangus)*	O	O	O	O	O	O	O	O	O	O	O
3	Red mullet (*Mullus barbatus)*	O	O	O	O	O	O	O	O	O	O	O
4	Striped red mullet (*Mullus surmuletus)*	O	O	O	O	O	O	O	O	O	O	O
5	Turbot (*Scophthalmus maximus)*	O	O	O	O	O	O	O	O	O	O	O
6	European sprat (*Sprattus sprattus*)	O	O	O	O	O	O	O	O	O	O	O
7	Horse mackerel, Scad (*Trachurus spp.)*	O	O	O	O	O	O	O	O	O	O	O
8	Piked dogfish (*Squalus acanthias*)	O	O	O	O	O	O	O	O	O	O	O
9	European pilchard (*Sardina pilchardus)*	O	O	O	O	O	O	O	O	O	O	O
10	Common sole (*Solea solea)*	O	O	O	O	O	O	O	O	O	O	O
11	Gilt-head sea bream (*Sparus aurata)*	O	O	O	O	O	O	O	O	O	O	O
12	Venus clams (*Chamelea gallina)*	O	O	O	O	O	O	O	O	O	O	O

13	Rapa whelk (*Rapana spp.)*	O	O	O	O	O	O	O	O	O	O	O
14	Altantic bonito (*Sarda sarda*)	O	O	O	O	O	O	O	O	O	O	O
15	Blue fish *(Pomatomus saltarix)*	O	O	O	O	O	O	O	O	O	O	O

From this section onwards, the questionnaire will focus only on priority species.

3. Turbot (*Scophthalmus maximus*), Black sea anchovy (*Engraulis encrasicolus ponticus*), European sprat (*Sprattus sprattus*), Piked dogfish (*Squalus acanthias*) and Rapa whelk (*Rapana venosa*), are considered relevant by the Regional Fisheries Management Organisation to IUU fishing in the GFCM Area of Application.

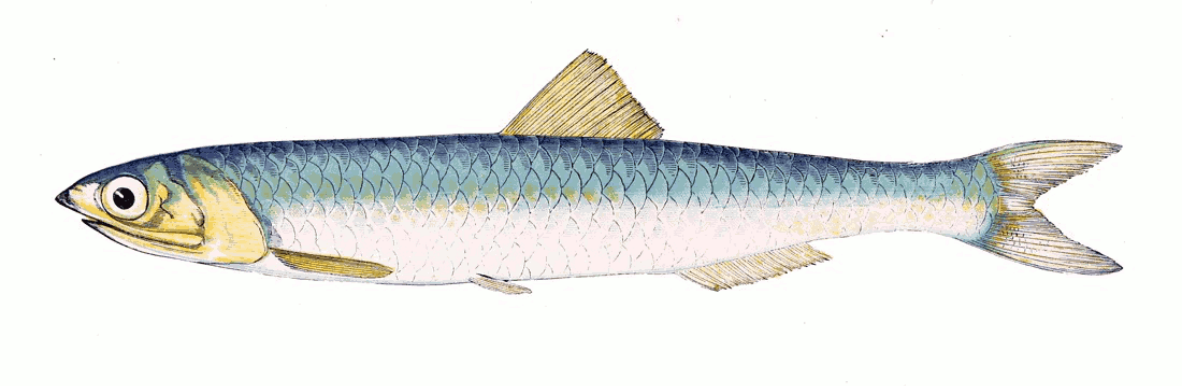
Which other species do you believe contributes the most to IUU fishing? Choose only one.

Species

- ○ Black sea anchovy *(Engraulis encrasicolus ponticus)*
- ○ European whiting (*Merlangius merlangus)*
- ○ Red mullet (*Mullus barbatus)*
- ○ Striped red mullet (*Mullus surmuletus)*
- ○ Turbot (*Scophthalmus maximus)*
- ○ European sprat (*Sprattus sprattus*)
- ○ Horse mackerel, Scad (*Trachurus spp.)*
- ○ Piked dogfish (*Squalus acanthias*)
- ○ European pilchard (*Sardina pilchardus)*
- ○ Common sole (*Solea solea)*
- ○ Gilt-head sea bream (*Sparus aurata)*
- ○ Venus clams (*Chamelea gallina)*
- ○ Rapa whelk (*Rapana spp.)*
- ○ Altantic bonito (*Sarda sarda*)
- ○ Blue fish *(Pomatomus saltarix)*

Species X
[Questions 4 – 12 need to be completed for priority species and for the species selected in question 3]

Example: European anchovy (*Engraulis encrasicolus*)



4. Which of the options below best describes your experience with [selected species] fishing and related IUU activity?
   - Little or no experience
   - Second-hand indirect experience (e.g., somebody told you something that he heard)
   - Second-hand direct experience (e.g., somebody you know observed something)
   - Personal indirect experience (e.g., you saw reliable reports and other information)
   - Personal direct experience (e.g., you saw something or talked to someone)

5. In your opinion, illegal catches of [selected species] make up what percentage of annual landings in your country? Please slide the bar to indicate your best guess.

	0% 100%
Illegal catches as a percentage of annual landings	

6. In your opinion, what is the percentage of annual landings of the [selected species] that are harvested illegally by small-scale vs commercial fishing? For the purposes of this survey, we define *small scale fishing* as being boats no greater than 12m length, which are not using bottom trawl fishing techniques.

	50% 50%	
Small-scale fishing (1)		Commercial fishing (2)

7. In your opinion, please rank the frequency of the type of illegal activities below for the [selected species] both for small-scale and commercial fishing.

	Small-scale fishing				Commercial fishing			
	Never (1)	Sometimes (2)	Mostly (3)	Always (4)	Never (1)	Sometimes (2)	Mostly (3)	Always (4)
Illegal season	-	-	-	-	-	-	-	-
Prohibited fishing gear	-	-	-	-	-	-	-	-
Illegal landing size	-	-	-	-	-	-	-	-
Unauthorized landing port or location	-	-	-	-	-	-	-	-
Illegal transshipping	-	-	-	-	-	-	-	-
Illegal fishing location	-	-	-	-	-	-	-	-
Illegally discarding fish; or other selection	-	-	-	-	-	-	-	-

8. Which regulations do you believe are being breached? Select all that apply.

- ○ GFCM regulations
- ○ National regulations
- ○ Other (inc EU regulations) – please specify

9. In your opinion, which participants below are consciously participating in IUU fishing for the [selected species] (you may choose more than one answer).

- ○ Individual-fishermen
- ○ Organized-fishermen
- ○ Organized-fishermen through intermediaries
- ○ Fishermen-intermediary-exporter
- ○ I don't know

10. In your opinion, please indicate the point(s) in the supply chain at which illegal fishing activities occur for [selected species]. Examples of such activities might include mislabeling products, using illegal transport routes, dealing with unauthorized processors, or directly illegal fishing activities.

	Never (1)	Sometimes (2)	Mostly (3)	Always (4)	I don't know (5)
Fishers	-	-	-	-	-
Purchaser	-	-	-	-	-
Processor	-	-	-	-	-
Wholesaler	-	-	-	-	-
Exporter	-	-	-	-	-
Restaurateur	-	-	-	-	-

11. In your opinion, please rank the infrastructures below according to the likelihood they are involved in IUU fishing activities for the [selected species]. Rank all from 1 to 7, with 1 being the most likely and 7 being the least likely.

Rank 1 to 7

- ○ Fishing boats
- ○ Refrigerated trucks
- ○ Processing plants
- ○ Markets
- ○ Restaurants
- ○ Transshipping boats
- ○ Exporters

12. Where do you believe the majority of illegally caught fish end up? Please rank in order, with 1 being most likely, 4 being least likely.

- ○ Local markets
- ○ National markets
- ○ International markets in neighbouring countries
- ○ International markets further afield
- ○ I don't know

End of Block

Thank you.

We are very grateful for your time to answer this online survey. Please add any additional information that was not considered in this survey about the IUU fishing, any species of interest or general comments.

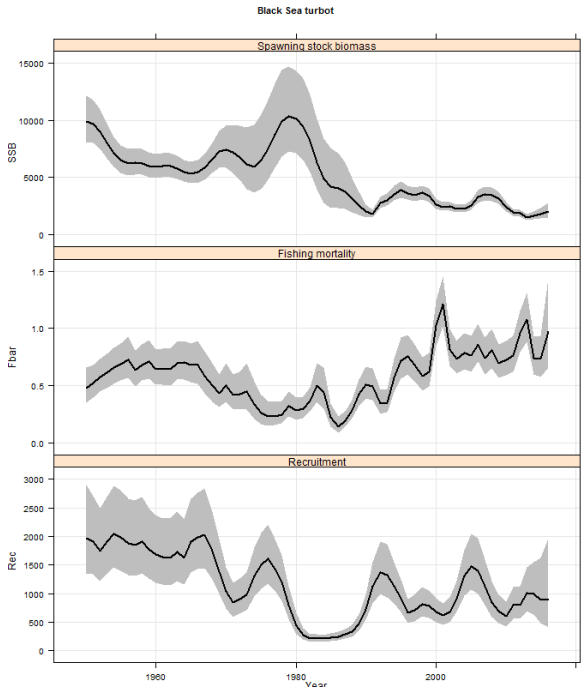
All respondents will remain anonymous and all responses will remain confidential.

Appendix 9

Template for the reporting of advice on priority species

Turbot (*Scophthalmus maximus*) GSA 29

Stock trends:



Latest advice:

The stock continues to be considered **overexploited and in overexploitation** with a fishing mortality more than 3 times higher than FMSY and biomass being below BMSY. Catches of turbot are decreasing and some signs of improvement for this stock were shown in the direct surveys in Bulgaria and Romania as well as in an indirect estimate of the status of turbot in the northern part of the basin made in 2016. Model results highlighted positive trends in SSB and recruitment, as well as stable (over the last three years) trends in fishing mortality.

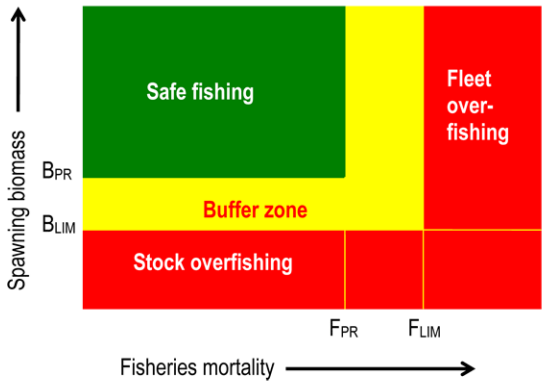
Catches by country for reference year:

Country	Fleet (#)	Catch (t)	Value (Eur)
Bulgaria		42.43	
Georgia		0.73	
Romania		29.49	
Russian Federation		227	
Turkey	580	221.1	
Ukraine		147	
Total		**668**	

Trend in advice

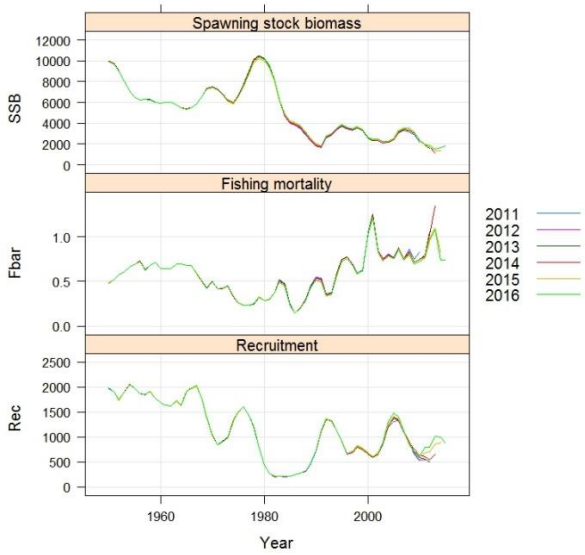
	2015	2016	2017	Trend
Fishing mortality	5.38	4.40	3.10	↓
Biomass	2.35	2.00	1.95	↓

For species with both F and biomass reference points, provide a Kobe plot:



Stock assessment uncertainties:

Including data deficiencies, current assessment model and potential problems



Fisheries considerations:

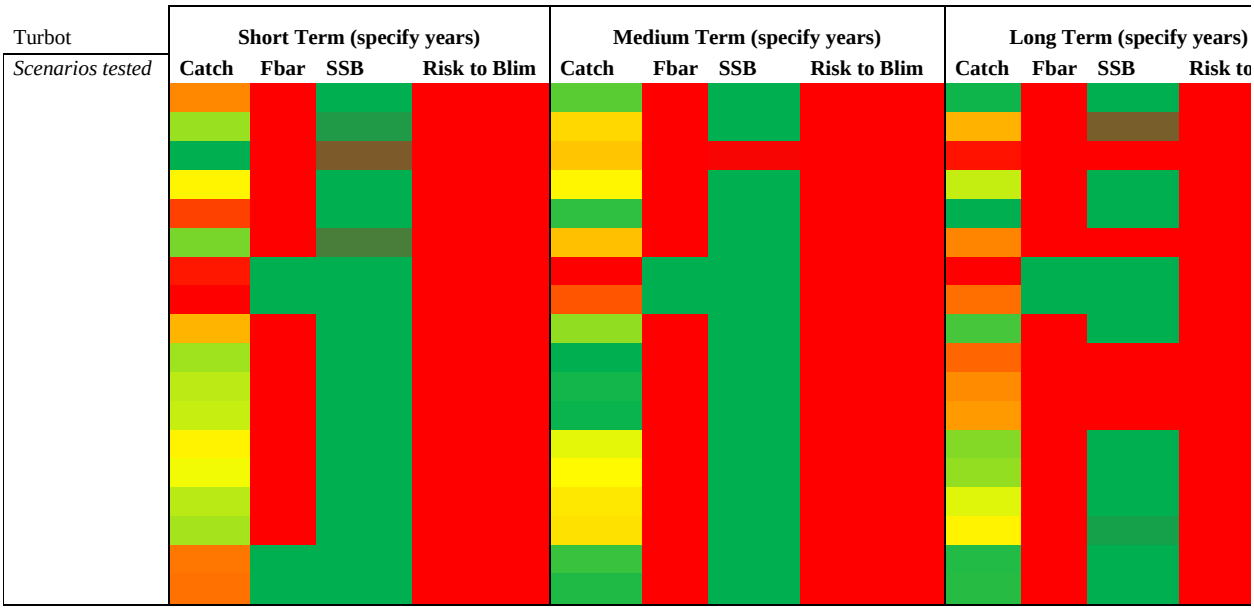
Stock boundaries and dynamics are still unclear. Potential interaction between rapa whelk fishery and turbot juveniles. IUU fishing considered a large threat, with IUU estimates believed to be up to 5 times official landings.

Summary of ecosystem interactions:

Potential interaction between rapa whelk fishery and turbot juveniles

Forecasts and simulations of management options

If forecasts and /or simulations were performed, provide results in the following format– *fill as required and specify years*. *Note: the final table will contain values for each quantity for each scenario and will be classified with a colour coding as shown and described in the example below*



Catch –colour scheme ranges between the largest (green) to the smallest (red) while for Fbar, all above Fmsy are red and all below Fmsy are green. For SSB, values are green when above Bpa and are red below Blim. In between, values are more yellow-orange. For the risk, all values below 10% are green, all values > 10% are red

Other comments:

Appendix 10

OVERVIEW OF THE METHODOLOGY FOR THE ASSESSMENT OF THE VULNERABILITY OF FISHERIES IN THE MEDITERRANEAN AND BLACK SEA TO THE EFFECTS OF CLIMATE CHANGE

This Appendix summarizes the methodology proposed to be used in the assessment of the vulnerability of fisheries in the Mediterranean and Black Sea to the effects of climate change. The methodology was based on literature review and on inputs received during the expert meeting on the implications of climate change to fisheries in the Mediterranean and Black Sea, Rome, 4 – 6 December 2017. Consistent with the Ecosystem Approach to Fisheries, the methodology is based on the application of the precautionary principle through the use of best available knowledge and assumes a broad stakeholder participation throughout the assessment process.

Definitions

The methodology uses the following definitions adopted by the Intergovernmental Panel on Climate Change (IPCC). Although variations to these definitions have been put forward more recently (FAO, 2015), the conceptual model of vulnerability described below is valid and used widely in vulnerability assessments.

- *Vulnerability*: the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is *exposed*, its *sensitivity*, and its *adaptive capacity* (Figure 1).

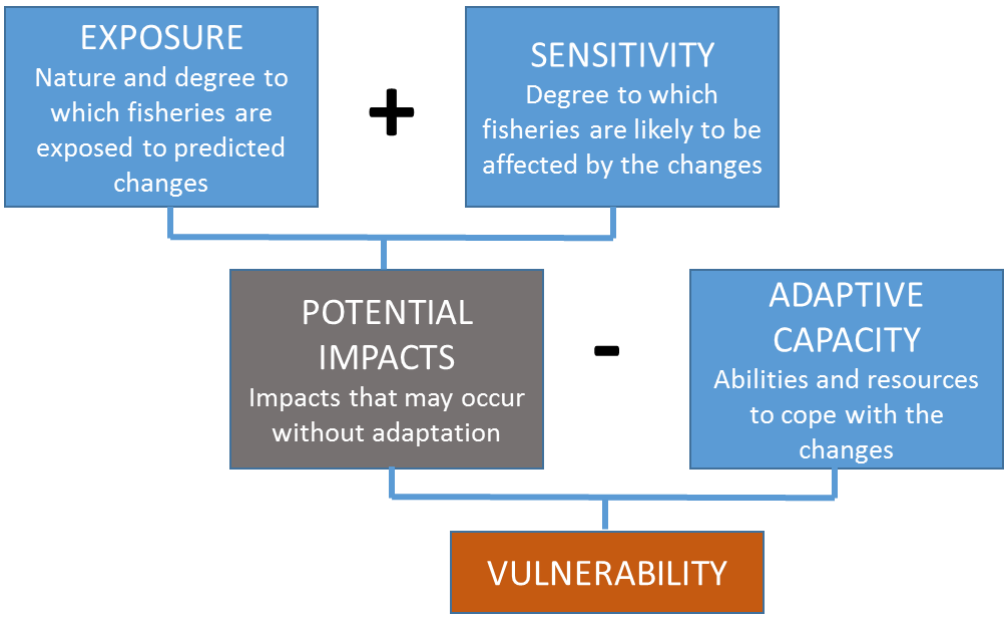


Figure 1. IPCC conceptual model of vulnerability.

- *Exposure*: the degree to which a system is stressed by climate, such as the magnitude, frequency and duration of a climatic event (e.g. temperature anomalies, extreme weather events). In a practical sense,

exposure is the extent to which a region, resource or community experiences change. For fishing communities, exposure would relate, for instance, to how much the resource they depend on will be affected by environmental change.

- *Sensitivity*: the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g. a change in yield in response to a change in the mean, range or variability of temperature) or indirect (e.g. damages caused by an increase in the frequency of coastal flooding due to sea-level rise). The sensitivity of social systems depends on economic, political, cultural and institutional factors that allow for buffering of change.

- *Adaptive capacity*: the ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. For example, systems with low adaptive capacity may have difficulty adapting to change or taking advantage of the opportunities created by changes in the availability of ecosystem goods and services stimulated by climate change or changes in management. Social systems are more likely to be sensitive to climate change if they are highly dependent on a climate vulnerable natural resource. These factors can confound (or ameliorate) the social and economic effects of climate exposure.

Objectives of the Vulnerability Assessment

The assessment of the vulnerability of fisheries in the Mediterranean and Black Sea to the effects of climate change has the following objectives:

- To understand the potential risks to the fisheries sector in the Mediterranean and Black Sea of the ongoing and projected climate-driven environmental changes.
- To identify areas and/or sectors more vulnerable and in need of adaptation options.
- To contribute to a regional (GFCM) adaptation strategy to cope with the potential effects of climate change in the Mediterranean and Black Sea.

Scope of the Vulnerability Assessment

The focus of the vulnerability assessment is the fisheries production systems in the Mediterranean and Black Sea. Fisheries production systems are here understood as the coupled social-ecological systems composed of the resource base (stocks) and supporting ecosystems, the fishers, the fishing technologies and practices used in the capture production and the fisheries value chain.

The fisheries production systems are affected by different types of drivers (Figure 2). On the one hand, there are socioeconomic and institutional drivers that affect how fisheries operate and influence the sustainability and profitability of the activity. They include governance factors such as policies and regulatory frameworks that conditions where, what and how resources are harvested and by whom, cultural/traditional factors that condition the maintenance of fishing livelihoods and practices, and economic factors that define market opportunities and constrains and the dynamics of the value chain. On the other hand, the systems are influenced by anthropogenic drivers such as overfishing, habitat degradation and pollution that affect the productivity and resilience of the stocks and ecosystems. The systems are also affected by climate change drivers, such as changes in sea surface temperature, circulation, weather, etc. that can generate direct and indirect impacts on fisheries. The known direct effects of climate change include changes in the abundance and distribution of exploited species and the impacts of weather events on fishing operations and infrastructure. Indirect effects can include changes in other ecosystem components that interact with the fisheries resources, as well as environmental changes that affect other food production systems and people's health (Cochrane et al., 2009; Heenan et al., 2015). The vulnerability

of the fisheries production systems will depend on how they can cope with the impacts of climate change giving the conditions determined by the other drivers.

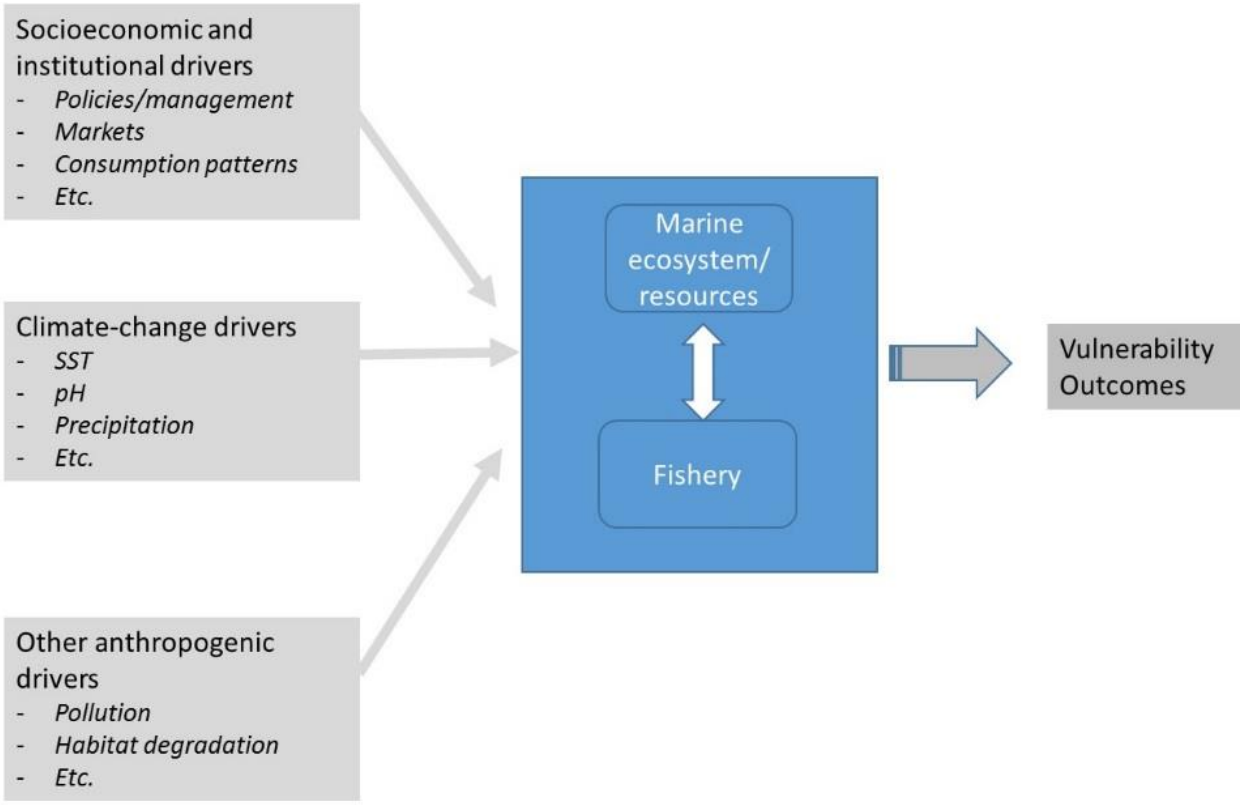


Figure 2. Conceptual model of the fisheries production system and the vulnerability to climate change.

The assessment of the vulnerability of the fisheries production systems could be focused on different spatial scales of analysis, e.g., at the level of the fishing unit (vessel), fleet segment, fishing community, country, sub-regions, etc. Considering the geographic, environmental and socioeconomic differences among sub-regions and fisheries across the Mediterranean and Black Sea, the expert meeting recommended the use of the following minimum level of stratification for a comprehensive view of the impacts and vulnerabilities of fisheries to climate change in the region:

Area	Sub-regions	Fisheries/resources
Mediterranean	Adriatic Sea, Western Mediterranean, Eastern Mediterranean	small-scale fisheries; small-pelagics; large pelagics; demersals; and benthic invertebrates.
Black Sea	Black Sea (as a whole)	anchovy, sprat, turbot, bonito, rapa whelk

Representative fisheries production system will need to be identified within each of the above strata to use as case studies for the vulnerability assessments.

In terms of the temporal scale of analysis, the expert meeting recommended that the assessment consider the projected changes and impacts on the mid-term (until 2050).

Baseline situation

The first step in the scoping analysis is to conduct a baseline assessment to describe the current situation of the fishery production systems. Table 1 list examples of variables that could be used to characterize the fishery production systems in the baseline report.

Table 1. Examples of variables to describe the baseline situation of a fishery production system.

Type	**Variables**
Ecological	- Area of operation - Target and bycatch species - Status of stocks
Technological	- Gears - Vessels - Equipment
Socioeconomic	- Landings - Revenue (and crew sharing system) - Economic dependency - Education - Social protection - Access to credit - Market - Level of organization (e.g. cooperatives, associations, etc)
Institutional	- Enabling policies - Management capacity - Management plans and contingency measures
Main drivers of change (non-climate related)	- Pollution - Habitat degradation - Overfishing, etc.

Climate change drivers and expected impacts

The second step in the scoping analysis is to understand the main pathways that climate change can potentially impact the fishery production systems. There are multiple pathways of potential impacts (Figure 3) and it is important to understand which pathways are likely to be relevant to the systems at stake. During the expert meeting participants elaborated generic matrices of drivers and impacts for each of the sub-regions in the Mediterranean and Black Sea (Appendixes IV and V). These matrices could be used as starting points for discussing and identifying potential pathways of impacts of climate change in specific fishery production systems case studies in each of the sub-regions.

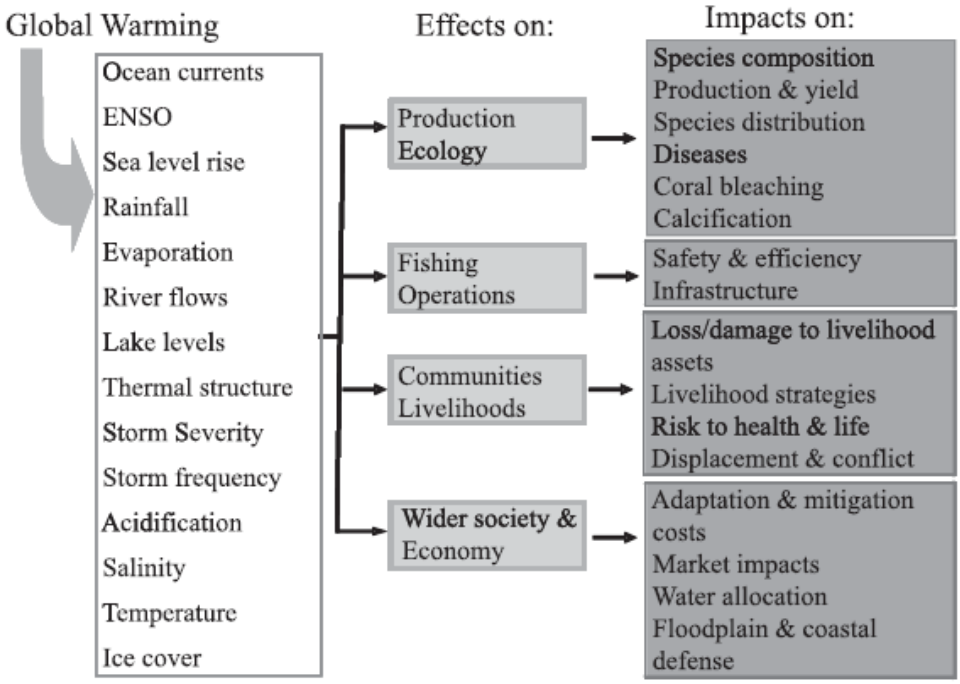


Figure 3. Generic examples of pathways of the impact of global warming on fisheries (Badjeck et al, 2010).

Framework of analysis

The vulnerability assessment is based on the IPCC conceptual model which considers vulnerability a function of the exposure, sensitivity and adaptive capacity of the system (Figure 1). A risk assessment approach is used in the assessment of the vulnerability.

The impacts of climate change can be negative or positive. Negative impacts represent threats – they need to be mitigated. Positive impacts represent opportunities – they need to be explored and benefited from. The importance of the negative or positive impacts can be measured in terms of: 1) the level of expected impact or consequences and 2) the likelihood of the impact occurring. The likelihood of given level of impact occurring is defined as a measure of risk. Therefore, the vulnerability of a system to a given driver/event can be measured in terms of risk levels. While the likelihood of an impact occurring can be interpreted as a measure of exposure of the system to a specific driver/event, the consequences of a driver/event can be linked to its sensitivity and adaptive capacity. FAO (2015) noted that a similar interpretation of the relationships between risk and vulnerability were proposed in the 5th Assessment Report of the IPCC.

For instance, consider two small-scale fisheries in a given sub-region of the Mediterranean, exposed to the same level of changes in the distribution of a target species. Both are exposed to an event that is very likely to occur (based on observed and/or projected changes). Consider further that one of the small-scale fisheries is more dependent on that target species than the other, which has a much more diverse livelihood "portfolio" that includes other species not directly affected by climate change and also activities outside of the fisheries sector. In addition, the system has a social-security mechanism in place to guarantee a minimal level of income during unfavourable situations. The two systems have different levels of sensitivity and adaptive capacity to the climate change driver/event. The consequences of the event to one of the systems will be higher than to the other. Therefore, the two systems will have different levels of risk to the climate driver/event. The system with higher risk is the one more vulnerable to that particular driver. When analyzing positive impacts, the risk level becomes a measure of the expected capacity of the system to benefit from the opportunities associated with a given driver/event.

In lack of availability of fully quantitative methods to assess the risks associated with the different pathways of impacts, a qualitative risk assessment approach is suggested to be used (FAO, 2012). A similar qualitative approach was used in the FAO/WorldFish Workshop on "Adapting to climate change: the Ecosystem Approach to Fisheries and Aquaculture in the Near East and North Africa Region", when a preliminary list of issues and priorities concerning climate impacts on fisheries and aquaculture in the region was identified (Curtis et al., 2011)

An adaptation of the Consequence x Likelihood (C x L) matrix method is used (FAO, 2012). The method combines the scores from the qualitative or semi-quantitative ratings of consequence (levels of impact) and the likelihood (levels of probability) that a specific consequence will occur to generate a risk score and risk rating.

This C x L risk assessment process involves selecting the most appropriate combination of consequence and likelihood levels that fit the situation for a particular objective, based upon the information available and the collective knowledge of the group of stakeholders involved in the assessment process. These scores are multiplied to generate an overall risk score. To allow the assessment of positive impacts, a two-way scale of consequence levels is applied (Garret et al., 2015; Table 2).

Table 2. Generic consequence categories for the assessment of risks of climate-driven impacts on fisheries. Positive consequences are in italics.

Level		Description
1	Minor	Minimal impacts that are highly acceptable. *Few, small-scale impacts providing some minor opportunities across the fishing sector.*
2	Moderate	Maximum acceptable level of impact. *Many, small-scale impacts providing moderate opportunities across the fishing sector.*
3	Major	Above acceptable limit. Wide and long-term negative impacts. *Few, large-scale impacts providing some significant opportunities across the fishing sector.*
4	Extreme	Well above the acceptable limit. Very serious, likely to require long restoration time to undo. *Many, large-scale impacts providing major opportunities across the fishing sector.*

The consequences are assigned considering the expected sensitivity of the fishery system to a given pathway of impact and the adaptive capacity of the system. Different aspects could be considered in the evaluation of the sensitivity and adaptive capacity of a system. Table 3 provide some examples of variables that could be taken into account (Allison et al., 2009; Cinner et al., 2013; FAO, 2015; Whitney et al., 2017). Many of the variables should be part of the baseline assessment described before.

Table 3. Examples of generic social and ecological variables that could be used in the assessment of sensitivity and adaptive capacity of fishery systems.

Characteristics of adaptive capacity		**Characteristics of sensitivity**	
Category	**Indicators**	**Category**	**Indicators**
Diversity and flexibility	Livelihood and income diversity	*Fisheries sensitivity*	Landings (value) of the affected species as % of total landings (value)
	Economic opportunities		Gear sensitivity (which type of gear make fishery more or less sensitive to changes in species abundance)
	Level of dependence on natural resources		Nutritional dependence on the affected species
	Occupational mobility	*Diversity and flexibility*	Species diversity
	Place attachment		Species' life history traits (e.g. growth, fecundity, resilience)
	Migration patterns		Habitat range and tolerance
			Exploitation status
Access to assets	Household material assets (e.g. boats, gears)	*Habitats and interactions*	Habitat availability
	Community infrastructure		Habitat heterogeneity and diversity
	Levels of education		Habitat connectivity
	Financial status and access to sources of credit		Rate and magnitude of habitat disturbance
	Access to markets		Phenology
	Equity, rights and access to resources	*Capacity to adapt within species*	Behavioral changes and learning
	Access to public services (water, health, education)		Phenotypic plasticity
Learning and knowledge	Resource monitoring and feedback mechanisms		Tolerance limits
	Knowledge of disturbances (e.g. climate change)		Reproductive rate and capacity for dissemination
	Perception of risk		Dispersal/Migration capacity
	Spaces and platforms for learning		
	Diversity of knowledge and information sources		

Characteristics of adaptive capacity		**Characteristics of sensitivity**	
Category	**Indicators**	**Category**	**Indicators**
Governance and institutions	Levels of trust, social capital and networks		
	Gender and race relations		
	Levels of participation and quality of decision-making processes		
	Planning capacity		
	Presence of local environmental institutions and strength of social norms		
	Quality of governance and leadership in environmental policies and agencies		
	Accountability of managers and governance bodies		
	Active risk management and adaptive governance process		

The Likelihood Table defines the levels of likelihood of a particular consequence occurring within the time period of analysis (in this particular case until 2050). The assignment of likelihood levels can be informed by the results of oceanographic and biophysical models, which predicts the magnitude of changes in physical drivers according to different climate change scenarios. See Appendix III for specific recommendations concerning climate projections and modelling approaches available for the Mediterranean and Black Sea region. Identifying the time to when consequences are likely to occur (proximity, as defined by Garret et al., 2015) could be also used as an additional information for assigning the likelihood levels (Table 4).

Table 4. Example of likelihood definitions.

Level	Description	Proximity (time to consequence(s) occurring)
1 - remote	Insignificant probability of the particular consequence occurring.	Over 50 years
2 – unlikely	Some evidence that the particular consequence level could occur.	Within next 50 years
3 – possible	The consequence level may occur but this is still not likely.	Within next 20 years
4 – likely	The particular consequence level is expected to occur.	Now

The resulting risk matrix and management response are described in Tables 5 and 6. Impacts with risk scores 6 or above should be further considered for the design of adaptive measures.

Table 5. Risk matrix used in the C x L risk assessment. Numbers in cells indicate risk value, the colors/shades indicate risk rankings (source FAO, 2012).

		Consequence Level			
		Minor	Moderate	Major	Extreme
Likelihood		1	2	3	4
Remote	1	1	2	3	4
Unlikely	2	2	4	6	8
Possible	3	3	6	9	12
Likely	4	4	8	12	16

Table 6. Risk/vulnerability levels and recommended management response (adapted from FAO, 2012)

Risk/Vulnerability Level	Risk Scores (C x L)	Management Response
Negligible	1-2	None
Low	3-4	No specific management response
Medium	6-8	Specific management (adaptation) needed
High	9-16	Increased management (adaptation) activities needed

Integration and analysis of results

By assessing the consequences and likelihoods of each of the identified relevant pathways of impacts of climate change to the specific fisheries, risk scores are assigned and the most important vulnerability factors identified. Table 7 illustrates the outcomes of the assessment on a single pathway for a pretended fishery.

The application of the methodology would allow the identification of specific vulnerability factors of importance to one or more fishery systems as well as the fishery systems more vulnerable to the impacts of climate change.

The next step in the process is the identification of potential adaptation measures for the identified high risk/vulnerability impacts, which should be done in consultation with all relevant stakeholders. Different types of measures could be envisaged, depending on the nature of the impact and the context of the fishery systems. Table 3 provides a list of types of adaptation measures to consider.

Expected outcomes

- Identification of main climate drivers of environmental changes affecting fisheries
- Evaluation of potential impacts (risks) of the drivers
- Identification of the most vulnerable fisheries

- Identification of the areas for adaptation capacity development
- Awareness raising regarding the need to be proactive and adopt measures that will increase the resilience of fisheries to the climate change.

Table 7. Example of risk assessment of a possible pathway of climate impact on a pretended fishery.

Driver	Threat/ Impact	Sensitivity	Adaptive capacity	Consequence	Exposure	Likelihood	Risk Level (Vulnerability score)
Increase in SST	Change in distribution of the target species	High dependency of the segment on the target species	Weak monitoring and control system; difficult access to credit to upgrade vessels	**Major (3)**	According to ongoing observations and model projections, the most valuable species will move to areas not accessible to the fleet. Changes are already being observed.	**Likely (4)**	**High (12)**
…	…	…	…	…	…	…	…

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Appendix 11

PROPOSED STOCK ASSESSMENT WORK PLAN BY PRIORITY SPECIES, FOR 2018–2020, IN SUPPORT OF THE PROVISION OF ADVICE

SGSABS activities

	Species	2018	2019	2020
Small pelagic stocks	Black Sea anchovy (*Engraulis encrasicolus ponticus*)	Updated assessment	Data preparation Benchmark	Updated assessment
	Azov anchovy (*Engraulis encrasicolus maeoticus*)	Updated assessment	Updated assessment	Updated assessment
	European sprat (*Sprattus sprattus*)	Data preparation Benchmark	Updated assessment	Updated assessment
	Horse mackerel (*Trachurus mediterraneus*)	Updated assessment	Data preparation Benchmark	Updated assessment
Demersal stocks	Turbot (*Scophthalmus maximus*)	Data preparation Updated assessment	Benchmark (early 2019)	Updated assessment
	Whiting (*Merlangius merlangus*)	Updated assessment	Updated assessment	Data preparation Benchmark
	Red mullet (*Mullus barbatus*)	Updated assessment	Updated assessment	Data preparation Benchmark
	Rapa whelk (*Rapana venosa*)	Updated assessment	Updated assessment	Data preparation Benchmark
	Piked dogfish (*Squalus acanthias*)	Updated assessment	Data preparation Benchmark	Updated assessment

Other activities in support of stock assessment (BlackSea4Fish)

	Species	2018	2019	2020
Small pelagic stocks	Black Sea anchovy (*Engraulis encrasicolus ponticus*)	Age reading workshop (Appendix 12) New assessment with SAM	General activity on MSE General activity on Ecopath	General activity on multispecies assessments
	Atlantic Bonito (*Sarda sarda*)	Data preparation, new assessment		
	Bluefish (*Pomatomus saltatrix*)	Data preparation, new assessment		
Demersal stocks	Red mullet (*Mullus barbatus*)	Age reading		

Appendix 12

Terms of reference for selected meetings

Terms of reference for a workshop on otolith reading of Black Sea anchovy

1: Problems associated with interpretation of the annuli (check rings, sub-species, habitat differences)

- To review the current ageing procedures, taking into account of "Handbook on fish age determination: a Mediterranean experience" and the results of the specific workshops held in the framework ICES (WKARA);
- To evaluate and elaborate the results of the otolith exchange exercise held among Black Sea institutes providing data to the SGSABS
- To review the sample processing techniques for age reading of the different laboratories and initiate the standardization process to improve the quality (i.e. accuracy and precision) of otolith readings;
- To test the accuracy of age estimates through complementary validation methods (marginal increment reading, length frequency distributions, etc.);

2: Problems associated with stock assessment (birthday, Incompatibility between the calendar year and fishing seasons)

- To determine the theoretical birthday that could best represent the stock, taking into consideration the different exploitation periods in different countries and biology of the anchovy.
- To agree on a standardized ageing scheme for Black Sea anchovy
- To further discuss how to preparation of stock files based on agreed standardized otolith reading protocol.

Terms of reference for Workshop on management strategy evaluation (WGMSE)

WGMSE main objective will be to address the requests of the SAC and Commission in relation to the biological and socio-economic implications of the implementation of alternative management scenarios, and report its technical advice to the relevant SAC subsidiary bodies (e.g. Subregional Committees) and the SAC itself. In order to do that, WGMSE should meet regularly to

- Develop a Management Strategy Evaluation (MSE) framework for each of the fisheries addressed, including:
    - Identify the adequate Operational Model, including the stock assessment model, stock-recruitment relationship and related input parameters.
    - Identify and list the management scenarios to be tested, taking into account scenarios previously proposed by the Commission or agreed with relevant stakeholders
    - Identify the performance statistics to be used for the analysis of simulation results
- Run the MSE simulations and discuss the outcomes.
- Prepare a draft advice on the biological and socioeconomic implications of alternative management scenarios, to be submitted to the SAC.

WGMSE should ideally be composed of experts in both stock assessment and socio-economics, and should meet for a sufficient amount of time in order to address the ToRs proposed. Scenarios to be tested should be discussed with all stakeholders of the subregion involved in the management process.

Workplan for the recovery and evaluation of raw input data in support of improved advice on Black Sea turbot fisheries

On the basis of previous suggestions from the SGSABS as well as on the work done for the preparation of a Management Strategy Evaluation framework for Black Sea turbot, a number of shortcomings of the input data used for the provision of advice for Black Sea turbot were highlighted, namely:

- Lack of consistency of catch at age and survey at age data (i.e. lack of clear cohort signals in the data)
- Conflicting signals between different observations (catch at age, survey data) used in the statistical catch at age SAM model
- Issues related to the abundance indexes used in the current assessment model (timing, spatial coverage, lack of harmonization, use of different age-length keys, etc.)

In order to analyse these issues in detail, and also address the suggestions of SGSABS, within the context of the BlackSea4Fish project, the following workplan is proposed to compile and analyse all information required for the provision of advice (as much as possible raw disaggregated data), including biological data, fisheries related information and socioeconomic data:

- Revise the list of information available by country useful for advice on turbot fisheries (metadata tables included in Annex I)
- Compile, through the different BlackSea4Fish focal points, all information by country as identified in the metadata tables (Annex 1), using standardized formats, and send to the GFCM Secretariat by September 2018.
- The GFCM Secretariat will analyse these data in coordination with the national experts with the aim of having datasets by country ready for the benchmark assessment to be carried out in the first quarter of 2019. The data preparation meeting foreseen for October 2018 and the SGSABS (November 2018) will serve to advance on the task.

Terms of reference for the meeting on data preparation in the Black Sea

A data preparation meeting will be held in October 2018, prior to the SGSABS in 2018. It is foreseen to last five-six days, focusing on three main elements:

- In-depth analysis of biological data available for all priority commercial species. This will foresee two main tasks:
    - Collation of all information, prior to the meeting, available in the literature and from ongoing monitoring projects for:
        i. growth parameters,
        ii. maturity,
        iii. spawning and recruitment periods and areas,
        iv. natural mortality estimates and methods for the estimation of vectors by age (e.g. Prodbiom, Gislason, Chen & Watanabe, Pauly etc.)
        v. length-weight relationships,
        vi. age information

        Stock coordinators for each species should be assigned to coordinate the work by species
    - Analysis of collated information by species and choice of best parameters for use in subsequent analyses
- An in-depth analysis of tuning fleets:
    - Fishery dependent indices: the use of nominal CPUE should be analyzed in depth for small pelagic species (Black Sea anchovy, European sprat and horse mackerel), as well as for turbot and whiting, addressing three issues in particular:

i. the standardization of nominal CPUE using auxiliary data available on the fishery in order account for changes in catchability owing to external sources. The use of environmental variables in the standardization should be investigated. Outcomes will also include a plan for future data collection towards improving the data available for standardization;

ii. the use of catch at age from the fishery to slice the CPUE index into ages

- Fishery independent (e.g. trawl surveys):

i. In-depth analysis of the seasonality of survey indices for turbot, piked dogfish and red mullet. This will involve a scrutiny of disaggregated data by season, including length frequency distributions;

ii. Based on the results achieved in point (i), the use of standardization methods to allow for the combination of seasons should be investigated taking into account both the biology of the species in question and environmental variables

- The analysis of basic catch data, including an analysis of all available biological data e.g. length-frequency distributions and the parameters used to slice lengths into ages for commercial catch. This will also imply that all countries provide data, at least, on landings.

Terms of reference for the benchmark assessments of turbot and sprat

General provisions

The benchmarking process is built on the expertise of stock and ecosystem knowledge, involving the best available scientific competence and relying on the integration of such knowledge for the different aspects. During this process all available information e.g. ecosystem and fisheries data, stock distribution, assessment models, forecast methods and reference points, is reviewed, compared, tested and finally agreed upon by the experts.

A benchmark assessment can be viewed as a full analysis and review of the data, methods and assumptions used to provide advice on the status of a given stock, focusing on the consideration of old and new data sources as well as newer or improved assessment models and assumptions. In particular, the benchmark process should include:

- the identification of all problems associated to the assessment of a resource (including stock boundaries, data, assumptions and methodologies);
- the identification and provision of extra data required to address the above problems (besides the typical data and parameters also those based, for example, on different spatial aggregations and/or environmental variables);
- the revision and agreement of data, assumptions (including all biological parameters and related estimation methods), standardization of fishery-independent data and assessment methods proposed for the assessment;
- the test of the candidate methods with a sensitivity analysis on different assumptions;
- the performance of the assessment.

The benchmark will be attended by stock experts as well as by methodological experts from the sub-region, as well as by external experts, thus providing a framework for broadening the ideas in play, ensuring a high level of scientific expertise and thus the quality of the advice. Following a benchmark assessment, all historical data, assumptions and models will be fixed for the successive 3 – 4 years and assessments presented in this time period will simply provide updates.

In order to ensure a successful benchmark exercise, intensive preparatory work should be done at CPC level (compiling all information requested) and by the experts (reviewing potential models and listing existing assumptions, while making available common tools for data checks and aggregation of data, and/or parameters in case of combination of different sub-areas).

Black Sea turbot

The benchmark of Black Sea turbot should take place once all input data are available in the appropriate format (ideally in first quarter 2019) and should focus, in particular, on the following aspects:

1. Investigation of the population structure towards defining the most appropriate assessment unit(s) scrutinizing all evidence available for the existence of one or multiple stocks. This will entail the compilation and analysis of available life-history, genetic and tag-recapture data.
2. Scrutinizing the stock assessment methodologies and assumptions used to date taking into account available data and the results of the evaluation carried out in point 1 above. Different stock assessment models/assumptions will be discussed and agreement will be reached on a methodology/set of assumptions to be used until the following benchmark (i.e. for 3 – 4 years). This should include the investigation of:
    - the use of models accommodating the fragmented nature of available data;
    - the possibility of assessing stock(s) by region/fleets/countries within the same assessment model or having separate models for different stocks
3. Once the assessment is consolidated, revised reference points should be estimated

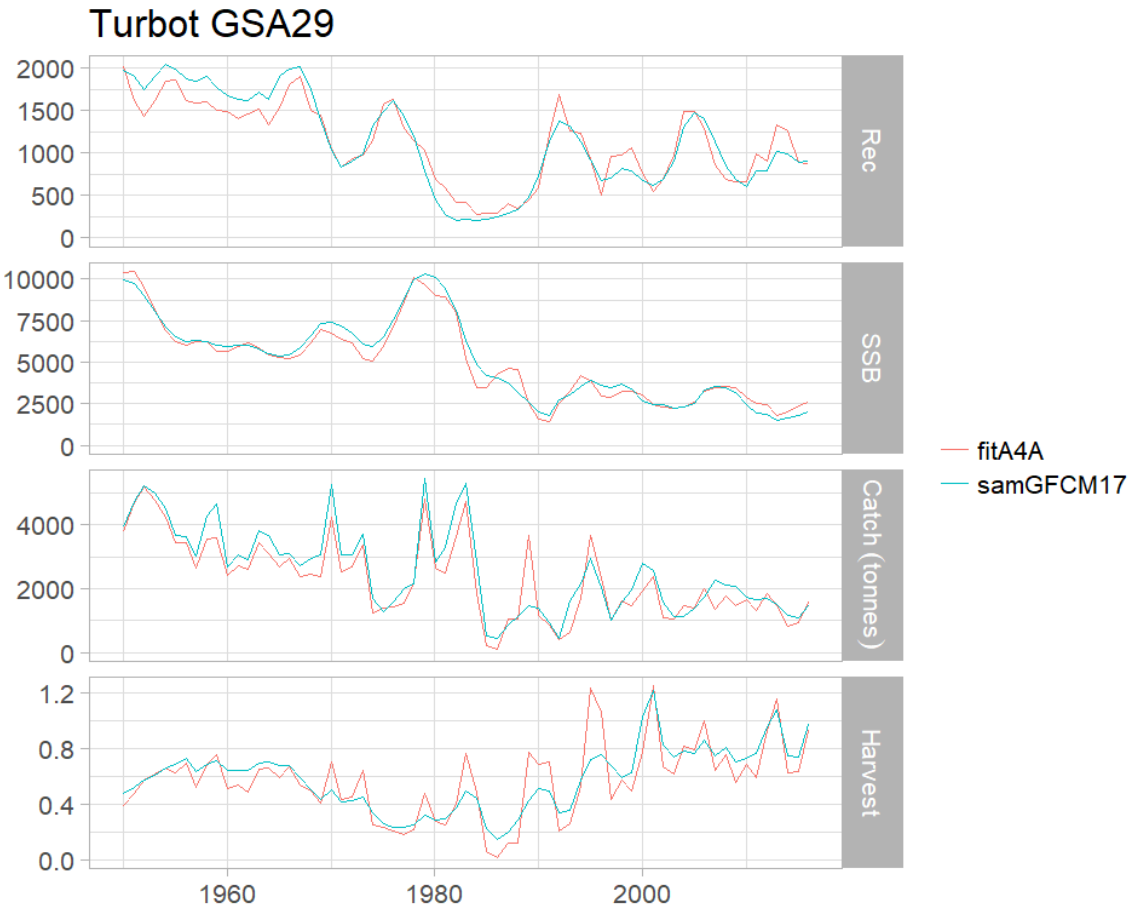
European sprat

The benchmark of Black Sea sprat should take place in parallel with the 2018 SGSABS and should focus, in particular, on the following aspects:

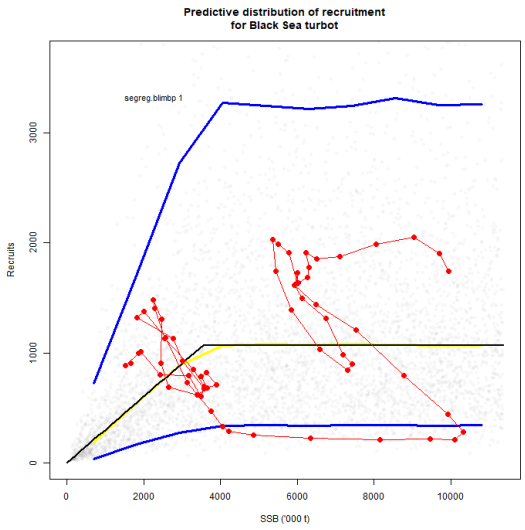
- Investigate alternative stock assessment models, in particular the possibility to use SAM to assess the stock and the observed differences with the current ICA model
- Investigate the effect of the Turkish CPUE which covers an area greater than that covered by the fishery
- Investigate the possibility of using information from the Turkish acoustic survey for tuning the assessment
- Investigate the use of different mortality estimates, including Gislason
- Estimation of reference points, including if possible MSY

Appendix 13

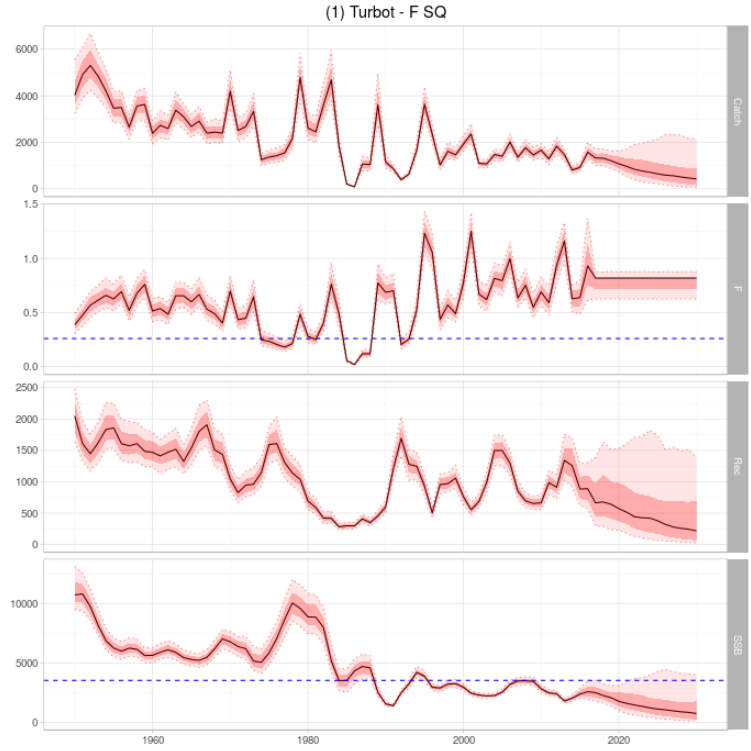
Outcomes of the workshop on alternative management scenarios for turbot fisheries: simulations carried out with the a4a FLMSE



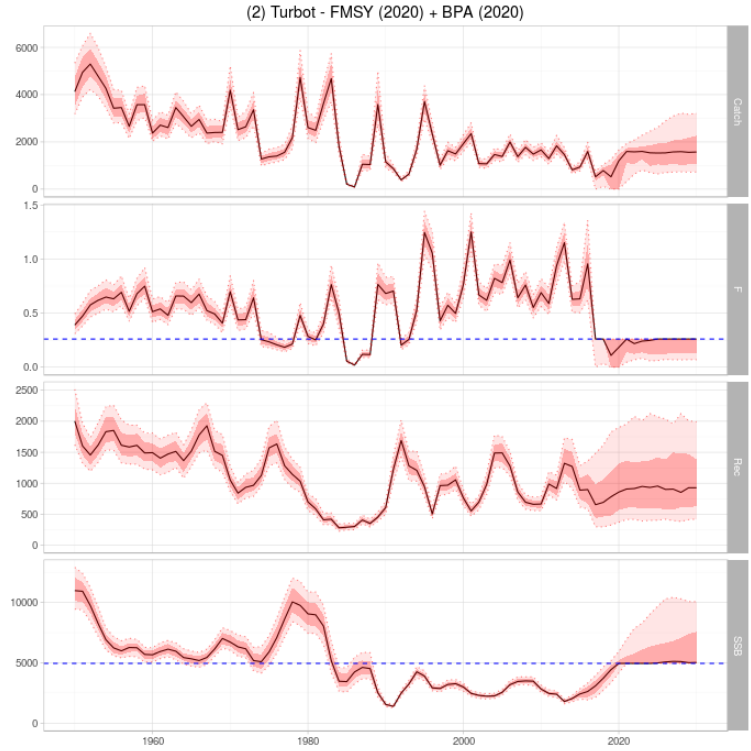
Dynamics of the turbot stock as estimated by the GFCM (2017) SAM stock assessment (blue) compared to those mimicked by the FLa4a model (red).



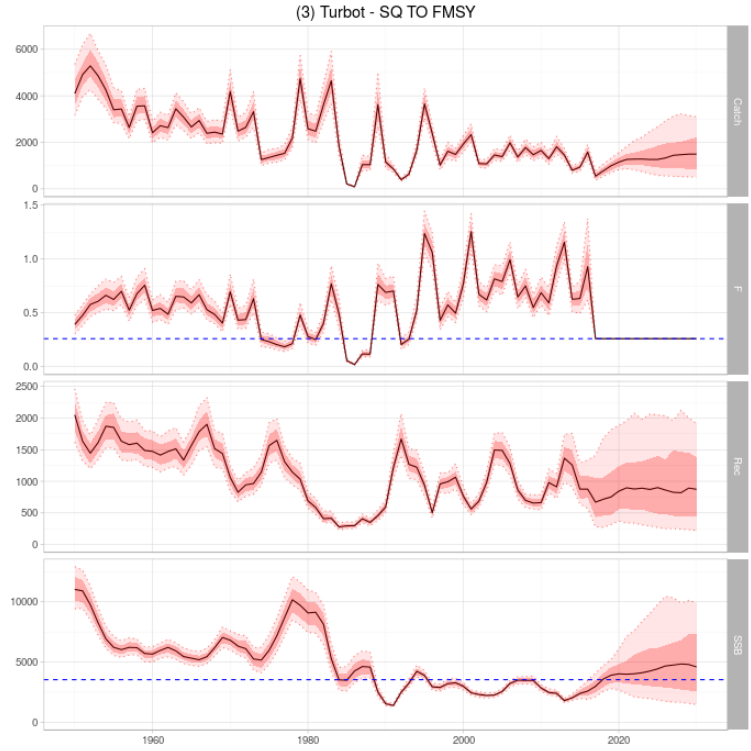
Stock-recruitment relationship for turbot with confidence intervals



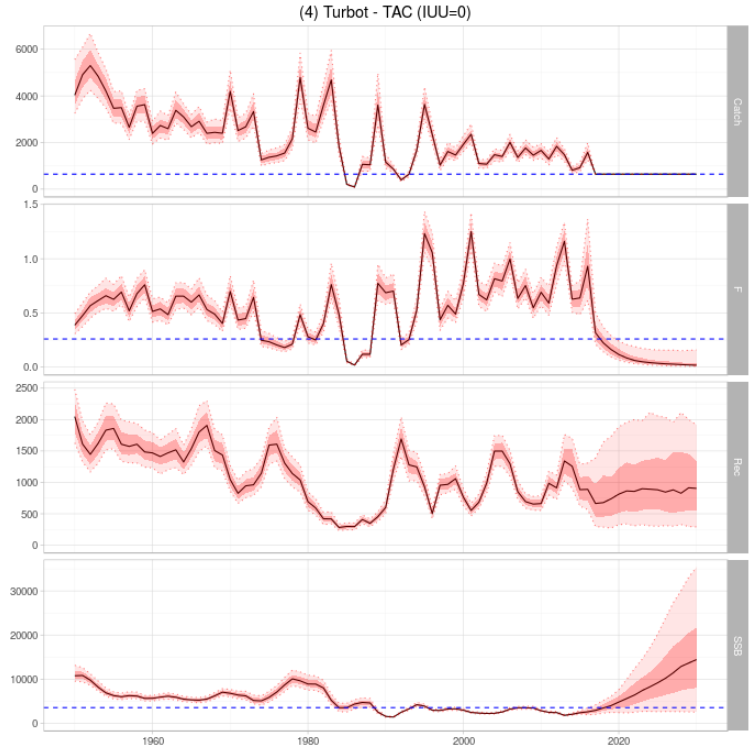
Scenario 1 – F_{SQ} = 0.81. Dashed lines represent F_{MSY} and B_{LIM}, respectively.



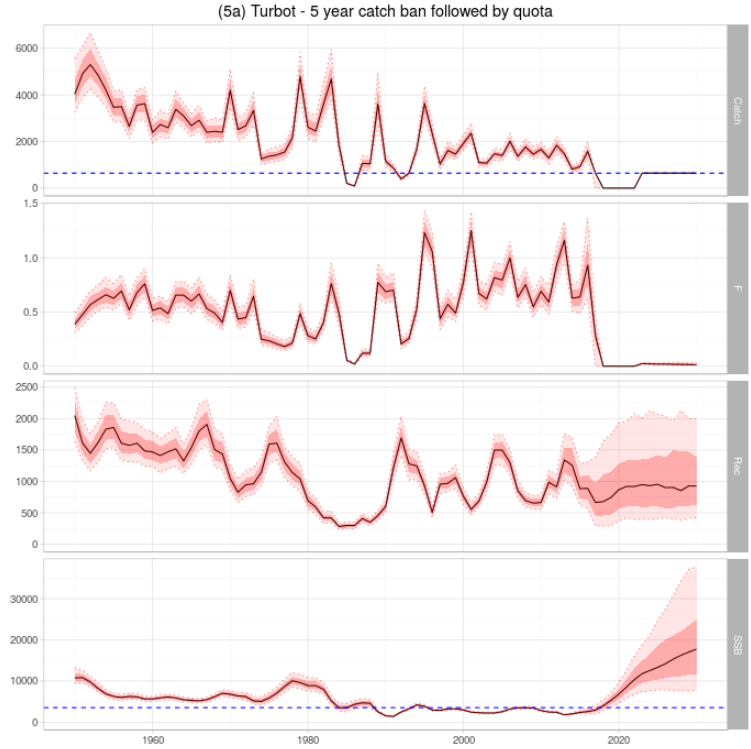
Scenario 2, F_{MSY} and B_{PA} by 2020. Dashed lines represent F_{MSY} and B_{PA}, respectively.



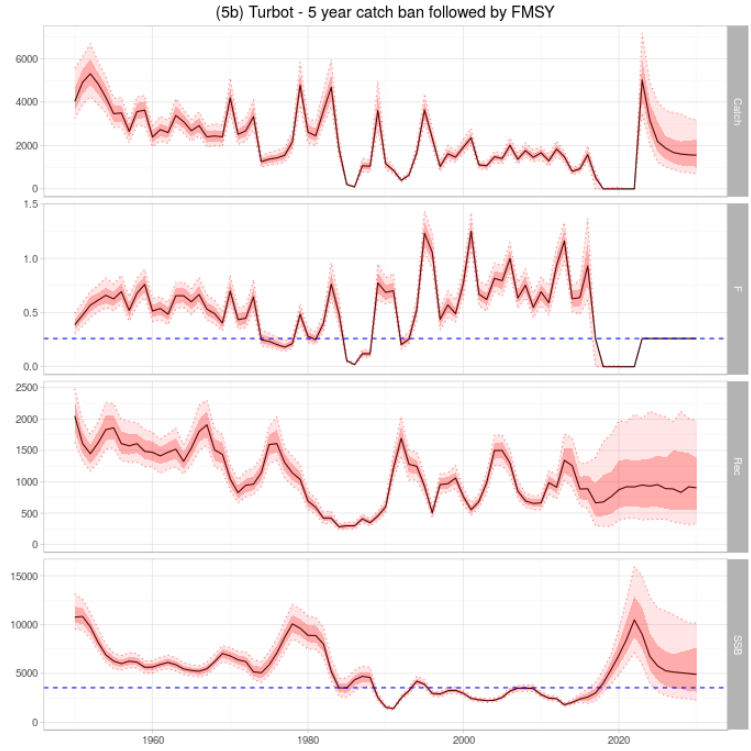
Scenario 3 – F_{SQ} to F_{MSY}. Dashed lines represent F_{MSY} and B_{LIM}, respectively.



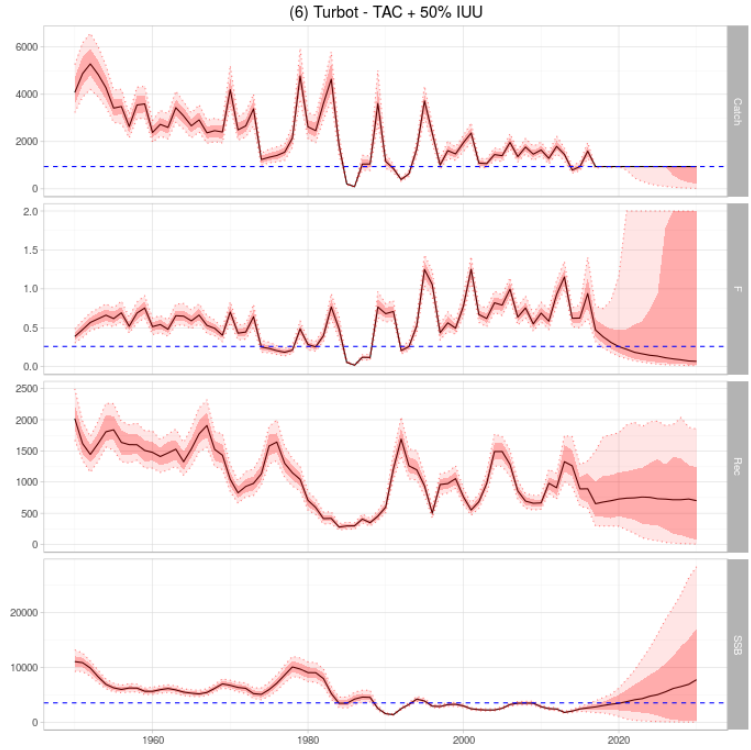
Scenario 4 – TAC = 644 t (no IUU). Dashed lines represent TAC, F_{MSY} and B_{LIM}, respectively.



Scenario 5a – 5 year catch ban followed by TAC. Dashed lines represent TAC and B_{LIM}, respectively.



Scenario 5b – 5 year catch ban followed by FMSY. Dashed lines represent F_{MSY} and B_{LIM}, respectively.



Scenario 6 – TAC = 945 t (including 50% IUU). Dashed lines represent TAC+50%IUU, F_{MSY} and B_{LIM}, respectively.

Appendix 14

National reports to the WGBS

BULGARIA

Section 1 - Description of fisheries

A. Fishing grounds (GSAs): 29 - Black Sea

B. Total landings: 8512 tonnes (2017); 8561 tonnes (2016); 8735 tonnes (2015); 8547 tonnes (2014); 9507 tonnes (2013)

Main 10 species landed

C. Fleet: 1880 vessels (2017); 1910 vessels (2016); 1970 vessels (2015)

Total GT: 6081 (2017); 6367 (2016)

AVG LOA: 7.1 m (2017)

Min LOA: 2.9 m

Max LOA: 27.2 m

AVG LOA previous year: 6.9 m

Section 2 - Status of stocks of priority species

Species/Stock	Ref. year	Stock status	GSA	Presented to GFCM WGs?	Presented to any other forum?
Sprattus sprattus	2016	In sustainable exploitation	29	Y	Y
Psetta maxima	2016	Overexploited	29	Y	Y
Engraulis encrasicolus	2016	Overexploited	29	Y	Y
Trachurus mediterraneus	2016	Overexploited	29	Y	Y
Mullus barbatus	2016	Overexploited	29	Y	Y
Merlangius merlangius	2016	Overexploited	29	Y	Y
Squalus acanthias	2016	Depleted	29	Y	
Rapana venosa	2016	Sustainably exploited	29	Y	Y

Section 3 - Status of statistics and information system

A. Description of the national system of fishery statistics and/or any improvement/change occurred

Executive Agency for Fisheries and Aquaculture, Bulgaria developed and implemented two informational systems to serve the needs of different management and operative levels – Information Statistical System (ISS) and Vessels Monitoring System (VMS). The information-statistics system (ISS) of EAFA Bulgaria has been created in relation with the engagements of Bulgaria, based on the EU legislation, which after the country`s accession to the EU (01.01.2007) became compulsory. This system contains information about catches, landings, sales, aquaculture production, take-over declarations etc. With ISS creation centralized collection and storage of the information have been initiated. The data are in a numerical format which is base for:

- Check of confidentiality of the input data;
- Analysis of data and possibility to detect the unconformities;
- Control on the activities;
- Data summarize aiming the presentation to the EU and other international and national organizations.

EAFA supports trough ISS the following registers:

- Register of the fishing licenses and authorizations issued;
- Register of the issued tickets for recreational fishery;
- Register of the persons, dealing with aquaculture;
- Fishing fleet register;
- First sales centers register;
- registered buyers register;
- Producers register;
- Register of fish producers and other aquatic products branch organizations;
- Fishery permissions for scientific purposes register;

Through VMS the proper monitoring of fishing vessels is ensured. All vessels over 12 m flying under Bulgarian flag are equipped with VMS device. Moreover, vessels less than 12 m, targeting turbot are also equipped with device, allowing their tracking and connected with our FMC. At the end of 2016, as part of ISS of EAFA, was developed a module for data collection and storage for fishing activity variables, social and economic variables for the fleet. In the module exist the opportunity for processing, providing automated exchange and providing electronic reports. The electronic reports generated by the module have been built in accordance with the requirements of the DCF and the variables described in EU MAP.

B. National entities or authorities in charge for the collection of data pertaining the GFCM DCRF Tasks

Task I - Global Figures of	Task II - Catch	Task III - Bycatch	Task IV - Fleet	Task V - Effort	Task VI – Socio-Economic Data	Task VII - Biological Information

National Fisheries						
Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture	Executive Agency for Fisheries and Aquaculture

Section 4 - Status of research in progress (or recently concluded)

Research or Project title	Subject	From	To
Pelagic trawl survey and demersal trawl survey	Stock assessment	2015	2019
The pilot project for the assessment of discard in Rapa Whelk fisheries with beam trawls in the Black sea in order to evaluate the impact of this activity to the juvenile turbot and piked dogfish	Marine environment and conservation	2017	2019

Section 5 - Involvement in activities of FAO regional projects

Activity	FAO regional project	Year	Type
	BlackSea4Fish	2017	Stock assessment, Data collection and statistics, Socio-economics, Marine environment and conservation

Section 6 - Management measures taken in direct response to GFCM decisions

Title III, Section IV: "Aquaculture" of the Fisheries and Aquaculture Act; Art. 16 of Fisheries and Aquaculture Act.	REC.DIR-GFCM/41/2017/1
The Fisheries and Aquaculture Act creates a national framework for licenses and authorizations.	REC.CM-GFCM/41/2017/4
No national legislation in place. We apply directly the EU legislation in that field.	REC.DIR-GFCM/41/2017/6
The Fisheries and Aquaculture Act.	REC.MCS-GFCM/41/2017/7
No national legislation in place. We apply directly the EU legislation in that field.	REC.MCS-GFCM/40/2016/1
No national legislation in place. We apply directly the EU legislation in that field.	REC.DIR-GFCM/40/2016/2
No national legislation in place. We apply directly the EU legislation in that field.	REC.CM-GFCM/40/2016/6
No national legislation in place. We apply directly the EU legislation in that field.	REC.CM-GFCM/39/2015/3
No national legislation in place. We apply directly the EU legislation in that field.	REC-CM-GFCM/39/2015/4

Section 7 - Environment protection measures

Section 8 - Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area

Section 9 - Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area

Section 10 - Recommendation GFCM/35/2011/4 on the incidental catch of sea turtles in fisheries in the GFCM competence area

Section 11 - Recommendation GFCM/35/2011/3 on reducing incidental catch of seabirds in fisheries in the GFCM Competence Area

Section 12 - Recommendation GFCM/35/2011/5 on fisheries measures for the conservation of the Mediterranean monk seal (*Monachus monachus*) in the GFCM Competence Area

Section 13 - Proposals for future research programmes

Survey at sea for evaluation of biomass of piked dogfish
Survey at sea for evaluation of biomass of Rapa Whelk
Survey at sea for evaluation of biomass of white sand clams as *Chamelea galina*

GEORGIA

Section 1 - Description of fisheries

A. Fishing grounds (GSAs): 29 - Black Sea

B. Total landings: 49342 tonnes (2017); 58342 tonnes (2016)

Main 10 species landed

Species	*Tons*
Engraulis encrasicolus	48972
Trachurus trachurus	310
Merlangius merlangus	80
Mullus barbatus	36

C. Fleet: 26 vessels (2017)
Total kW: 43912 (2017)
Total GT: 11150 (2017)
AVG LOA: 38.5 m (2017)
Min LOA: 25.6 m
Max LOA: 46.7 m
AVG LOA previous year:

Section 2 - Status of stocks of priority species

Species/Stock	Ref. year	Stock status	GSA	Presented to GFCM WGs?	Presented to any other forum?
Engraulis encrasicolus	2017	In sustainable exploitation	29	N	N
Merlangius merlangus	2017	In sustainable exploitation	29	N	N
Trachurus trachurus	2017	In sustainable exploitation	29	N	N
Mullus barbatus	2017	In sustainable exploitation	29	N	N

Section 3 - Status of statistics and information system

A. Description of the national system of fishery statistics and/or any improvement/change occurred

B. National entities or authorities in charge for the collection of data pertaining the GFCM DCRF Tasks

Task I - Global Figures of National Fisheries	Task II - Catch	Task III - Bycatch	Task IV - Fleet	Task V - Effort	Task VI – Socio-Economic Data	Task VII - Biological Information
National Environmental Agency; Ministry of Environment Protection and Agriculture of Georgia	National Environmental Agency; Black Sea Conventional Service; Ministry of Environmental Protection and Agriculture of Georgia	Black Sea Conventional Service, National Environmental Agency, Ministry of Environmental Protection and Agriculture	Marine Transport Agency, Black Sea Conventional Service	National Environmental Agency	Ministry of Economy	National Environmental Agency, Ministry of Environmental Protection and Agriculture

Section 4 - Status of research in progress (or recently concluded)

Research or Project title	Subject	From	To
Governmental Program on Stock Assessment	Stock Assessment	2015	2018

Section 5 - Involvement in activities of FAO regional projects

Section 6 - Management measures taken in direct response to GFCM decisions

Section 7 - Environment protection measures

Section 8 - Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area

Section 9 - Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area

ROMANIA

Section 1 - Description of fisheries

A. Fishing grounds (GSAs): 29 – Black Sea

B. Total landings: 9553 tonnes (2017); 6839 tonnes (2016); 4825 tonnes (2015); 2231 tonnes (2014); 1712 tonnes (2013)

Main 10 species landed

Species	***Tons***
Rapana venosa	9242
Mytilus galloprovincialis	142
Psetta maxima	43
Trachurus mediterraneus	35
Sprattus sprattus	29
Engraulis encrasicolus	27
Gobiidae	13
Alosa pontica	7.7
Dasyatis pastinaca	2.5
Mullus barbatus	2.5

C. Fleet: 135 vessels (2017); 121 vessels (2016); 127 vessels (2015)
Total kW: 6104 (2017); 5366 (2016)
Total GT: 1377.39 (2017); 1009.79 (2016)
AVG LOA: 13.6 m (2017)
Min LOA: 5.3 m
Max LOA: 25.8 m
AVG LOA previous year: 8.2 m

Section 2 - Status of stocks of priority species

Species/Stock	Ref. year	Stock status	GSA	Presented to GFCM WGs?	Presented to any other forum?
Sprattus sprattus	2017	In sustainable exploitation	29	Y	Y
Psetta maxima	2017	In sustainable exploitation	29	Y	Y

Section 3 - Status of statistics and information system

A. Description of the national system of fishery statistics and/or any improvement/change occurred

Fisheries data obtained in the different projects by NIMRD are incorporated in database of institute. Reports and data are transmitted to Romanian NAFA in the frame of National Data Collection Program. In the same Program, fisheries data are uploaded in JRC data base. In parallel way, National Fisheries Report prepared in agreed format is prepared and transmitted annually to the Black Sea Commission. Full information on capacity indicators is available through the FFR. Therefore only this information source has been used. So, the data have been collected in an exhaustive way by NAFA inspectors from the logbooks, for vessels and coastal logbooks, for small boats. This method ensures 100 % coverage of the population and maximum level of quality. With the help of the NAFA statistics/collecting data system are performed crosscheck verifications between the logbooks, declarations of origin and (first) sales notes of fish and other aquatic organisms and reports. As described above mentioned, the exhaustive method used ensure the maximum quality level of collected data.

B. National entities or authorities in charge for the collection of data pertaining the GFCM DCRF Tasks

Task I - Global Figures of National Fisheries	Task II - Catch	Task III - Bycatch	Task IV - Fleet	Task V - Effort	Task VI – Socio-Economic Data	Task VII - Biological Information
National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)	National Institute for Marine Research and Development "Grigore Antipa" Constanta (www.rmri.ro)

Section 4 - Status of research in progress (or recently concluded)

Research or Project title	Subject	From	To
EC - DG Mare - National Data Collection Program, NAFA / (contract nr. 241 /12.01.2016 cu Act adiţional nr. 2 / 15.12.2016)	Data collection and statistics	2015	2018

Proiect FP7: MareFrame/2014 - Co-creating Ecosystem-based Fisheries Management Solutions MAREFRAME (contract nr. 270/25.06.2014)	Marine environment and conservation	2014	2017
COFASP FP7: IntelliGent oceanographically - based short - term fishery FORecastIng applications (198_GOFORIT)/Case Study Responsible (Black Sea sprat);, NIMRD - partner, coordonator - Technical University of Denmark, ERA NET	Marine environment and conservation	2015	2018
New methodologies for an ecosystem approach to spatial and temporal management of fisheries and aquaculture in coastal areas (ECOAST)	Marine environment and conservation	2016	2019
EC EASME: CHECKPOINTS: Sea Basin CHECKPOINTS, LOT NO: 4 – Black Sea	Marine environment and conservation	2015	2018

Section 5 - Involvement in activities of FAO regional projects

Activity	FAO regional project	Year	Type
	BlackSea4Fish	2016	Stock assessment, Data collection and statistics, Socio-economics, Marine environment and conservation

Section 6 - Management measures taken in direct response to GFCM decisions

Title/Reference to National Law	Related GFCM Decision(s)
Recommendation GFCM/39/2015/3 on the establishment of a set of measures to prevent, deter and eliminate illegal, unreported and unregulated fishing in turbot fisheries in the Black Sea	REC.CM-GFCM/39/2015/3

Section 7 - Environment protection measures

Name of the area	Type of spatial restriction	Year
ROSPA0076 Black Sea	Marine Protected Area (MPA)	2007
ROSCI0066 - Danube Delta - marine zone	Marine Protected Area (MPA)	2009
ROSCI0094 - The Sulphur Seeps in Mangalia	Marine Protected Area (MPA)	2009
ROSCI0197 - Submerged beach from Eforie North - Eforie South	Marine Protected Area (MPA)	2009
ROSCI0269 - Vama Veche - 2 May	Marine Protected Area (MPA)	2009
ROSCI0273 - Marine area from Cape Tuzla	Marine Protected Area (MPA)	2009
ROSCI0281 - Cape Aurora	Marine Protected Area (MPA)	2011
ROSCI0293 - Costinesti - 23 August	Marine Protected Area (MPA)	2011
ROSCI0311 - Viteaz Canyon	Marine Protected Area (MPA)	2016
ROSCI0413 - Lobe of Zernov's Phyllophora Field	Marine Protected Area (MPA)	2016

Section 8 - Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area

Section 9 - Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area

Section 10 - Recommendation GFCM/35/2011/4 on the incidental by-catch of sea turtles in fisheries in the GFCM competence area

Section 11 - Recommendation GFCM/35/2011/3 on reducing incidental by-catch of seabirds in fisheries in the GFCM Competence Area

Section 12 - Recommendation GFCM/35/2011/5 on fisheries measures for the conservation of the Mediterranean monk seal (*Monachus monachus*) in the GFCM Competence Area

Section 13 - Proposals for future research programmes

TURKEY

Section 1 - Description of fisheries

A. Fishing grounds (GSAs): 28 – Marmara Sea; 29 – Black Sea

B. Total landings: 255049 tonnes (2016); 352348 tonnes (2015)

Main 10 species landed

Species	*Tons*
Engraulis encrasicolus	93164
Sprattus sprattus	50222
Sarda sarda	38197
Chamelea gallina	20932
Merlangius merlangus	11330
Rapana venosa	10330
Pomatomus saltatrix	9311
Trachurus mediterraneus	8164
Mullus surmuletus	2590
Sardina pilchardus	4311

C. Fleet: 9672 vessels (2017); 9774 vessels (2016)
Total kW: 880599 (2017); 874031 (2016)
Total GT: 137960 (2017); 135989 (2016)
AVG LOA: 8.9 m (2017)
Min LOA: 2.6 m
Max LOA: 62 m
AVG LOA (previous year): 8.8 m

Section 2 - Status of stocks of priority species

Species/Stock	Ref. year	Stock status	GSA	Presented to GFCM WGs?	Presented to any other forum?
Sprattus sprattus	2016	In sustainable exploitation	29	Y	Y
Psetta maxima	2016	In overexploitation	29	Y	Y
Mullus barbatus	2016	In overexploitation	29	Y	Y
Engraulis encrasicolus	2016	In overexploitation	29	Y	Y
Trachurus trachurus	2016	In overexploitation	29	Y	Y
Squalus acanthias	2016	In overexploitation	29	Y	Y
Merlangius merlangus	2016	In overexploitation	29	Y	Y
Raja clavata	2016	In overexploitation	29	N	Y
Rapana venosa	2016	In sustainable exploitation with biomass above reference points	29	Y	Y

Section 3 - Status of statistics and information system

A. Description of the national system of fishery statistics and/or any improvement/change occurred

Fisheries data have been collected by Turkish Statistics Institute (TurkStat) and Ministry of Food Agriculture and Livestock (MoFAL).

B. National entities or authorities in charge for the collection of data pertaining the GFCM DCRF Tasks

Task I - Global Figures of National Fisheries	Task II - Catch	Task III - Bycatch	Task IV - Fleet	Task V - Effort	Task VI – Socio-Economic Data	Task VII - Biological Information
TurkStat (in collabration with MoFAL)	TurkStat (in collabration with MoFAL)	MoFAL	MoFAL	TurkStat and MoFAL	TurkStat	MoFAL

Section 4 - Status of research in progress (or recently concluded)

Section 5 - Involvement in activities of FAO regional projects

Section 6 - Management measures taken in direct response to GFCM decisions

Title/Reference to National Law	Related GFCM Decision(s)
Notification 4/1 Regulating Commercial Fishing	REC.CM-GFCM/39/2015/2 REC.CM-GFCM/41/2017/4 REC.CM-GFCM/40/2016/6

Section 7 - Environment protection measures

Section 8 - Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area

Section 9 - Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area

Section 10 - Recommendation GFCM/35/2011/4 on the incidental by-catch of sea turtles in fisheries in the GFCM competence area

Section 11 - Recommendation GFCM/35/2011/3 on reducing incidental by-catch of seabirds in fisheries in the GFCM Competence Area

Section 12 - Recommendation GFCM/35/2011/5 on fisheries measures for the conservation of the Mediterranean monk seal (*Monachus monachus*) in the GFCM Competence Area

Section 13 - Proposals for future research programmes

Population structure including age-size composition and spatial distribution in the sea of the most vulnerable fish species - turbot and sturgeons
Stock assessment for main commercial fishes
The impact of alien species (*Mnemiopsis leidyi*, Rapa Whelk, etc.) on the Black Sea environment and fisheries

UKRAINE

Section 1 - Description of fisheries

A. Fishing grounds (GSAs): 29 – Black Sea

B. Total landings: 5253 tonnes (2017); 3700 tonnes (2016); 2794 tonnes (2015)

Main 10 species landed

Species	***Tons***
Sprattus sprattus	2159
Atherina boyeri	190
Psetta maxima	102
Liza aurata	62
Engraulis encrasicolus	31
Trachurus mediterraneus	15
Merlangius merlangus	5
Mullus barbatus	3
Squalus acanthias	2
Palaemon adspersus	0.8

C. Fleet: 247 vessels (2017); 222 vessels (2016); 222 vessels (2015)
Total kW: 2623 (2017); 2623 (2016)
Total GT: 1117 (2017); 1117 (2016)
AVG LOA: 18.5 m (2017)
Min LOA: 12.8 m
Max LOA: 28.6 m
AVG LOA (previous year): 18.5 m

Section 2 - Status of stocks of priority species

Species/Stock	Ref. year	Stock status	GSA	Presented to GFCM WGs?	Presented to any other forum?
Sprattus sprattus	2017	In sustainable exploitation with biomass above reference points			
Psetta maxima	2017	Overexploited			
Engraulis encrasicolus	201	In sustainable exploitation with biomass above reference points			
Squalus acanthias	2017	In overexploitation			
Rapana venosa	2017	In sustainable exploitation with biomass above reference points			

Section 3 - Status of statistics and information system

A. Description of the national system of fishery statistics and/or any improvement/change occurred

The national authority on the field of fisheries is the State Agency of Fisheries of Ukraine (Kiev, Ukraine). State Agency of Fisheries collects and summarizes all statistical information on fisheries.
The State Agency of Fisheries of Ukraine has regional body in the Black Sea region - in Odessa city.

B. National entities or authorities in charge for the collection of data pertaining the GFCM DCRF Tasks

Task I - Global Figures of National Fisheries	Task II - Catch	Task III - Bycatch	Task IV - Fleet	Task V - Effort	Task VI – Socio-Economic Data	Task VII - Biological Information
Each fishing company provides to the State Agency of Fisheries (passes through its body) data on landing (catches) by species for each month.	Catches for each fishing operation are indicated in the paper fishing log on each vessel, or in a team of fishermen with boats.	Nothing registration	The whole fleet including boats must have fishing licenses and documents certifying the right to sail in the sea. Information on the number and parameters of all fishing vessels and boats is in the State Agency of Fisheries	There is no reliable information on fishing efforts for the entire fleet. There are only some scientific observations for some types of fishing.	Nothing data	Collected and summarized by Odessa center YugNIRO

Section 4 - Status of research in progress (or recently concluded)

Research or Project title	Subject	From	To
Stock assessment for the marine biological resources of the Black Sea shelf zone, catch limits determination, forecasts of the allowable catches and development of an optimal regime of stocks exploitation.	Stock assessment for main commercial fishes and invertebrates and determination of TAC, forecasts and management measures.		

Section 5 - Involvement in activities of FAO regional projects

Activity	FAO regional project	Year	Type
	BlackSea4Fish		

Section 6 - Management measures taken in direct response to GFCM decisions

Section 7 - Environment protection measures

Name of the area	Type of spatial restriction	Year
The Black Sea Biosphere Reserve	Marine Protected Area (MPA)	1998
The Danube Biosphere Reserve	Marine Protected Area (MPA)	1998
Zernov's Phyllophora field	Marine Protected Area (MPA)	2008
Beloberezhye Svyatoslava National Park	Marine Protected Area (MPA)	2009
National Nature Park "Dzharylgatskii	Marine Protected Area (MPA)	2009
Small Phyllophora Field	Marine Protected Area (MPA)	2012

Section 8 - Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area

Section 9 - Recommendation GFCM/36/2012/3 on fisheries management measures for conservation of sharks and rays in the GFCM area

Section 10 - Recommendation GFCM/35/2011/4 on the incidental by-catch of sea turtles in fisheries in the GFCM competence area

Section 11 - Recommendation GFCM/35/2011/3 on reducing incidental by-catch of seabirds in fisheries in the GFCM Competence Area

Section 12 - Recommendation GFCM/35/2011/5 on fisheries measures for the conservation of the Mediterranean monk seal (*Monachus monachus*) in the GFCM Competence Area

Section 13 - Proposals for future research programmes