



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



GFCM Working Group on the Black Sea (WGBS)

Report of the Workshop to test the feasibility of implementing multiannual management plans in the Black Sea

Trabzon, Turkey, 24-25 February 2014

DRAFT BEFORE PARTICIPANTS' COMMENTS

EXECUTIVE SUMMARY

The Workshop to test the feasibility of implementing multiannual management plans in the Black Sea was held in Trabzon, Turkey, on 24–25 February 2014. The main objectives were to: i) test the technical feasibility of the GFCM guidelines for the development of multiannual management plans for turbot and small pelagics in the Black Sea (GSA 29), ii) identify the emerging issues and needs for the management of these fisheries, and iii) advance in the preparation of technical documents in support of management plans and strategies for the selected case studies. Representatives from Bulgaria, Georgia, Romania, Turkey and Ukraine attended the workshop. The minimal structure for multiannual management plans for turbot fisheries was elaborated, containing specific objectives, criteria and suggested minimum management measures to be adopted in national or regional management plans.

OPENING, ARRANGEMENT OF THE MEETING AND ADOPTION OF AGENDA

1. The Workshop to test the feasibility of implementing multiannual management plans in the Black Sea was held in Trabzon, Turkey, on 24–25 February 2014. The meeting was attended by experts from Black Sea riparian countries (Bulgaria, Georgia, Romania, Turkey and Ukraine), as well as by representatives of the European Union (EU) and the GFCM Secretariat. The list of participants is provided in Appendix B of this report.
2. Mr Ilhan Aydin, Director of the Central Fisheries Research Institute, Trabzon, opened the meeting on behalf of the hosting country. After the opening he presented a summary of the activities carried out by the institute of relevance to fisheries and aquaculture in the Black Sea.
3. Mr Simion Nicolaev, Coordinator of the WGBS and chair of the meeting, greeted participants and thanked Mr Aydin and the local organizers for the warm welcome and for providing all the necessary facilities, and expressed gratitude to all participants for their collaboration in the preparation of the meeting material. He also expressed his condolences on the passing away of Prof Victor Zaika, a prominent researcher in the Black Sea scientific community.
4. The agenda was adopted with some changes as provided in Appendix A.

5. Mr Miguel Bernal, from the GFCM Secretariat, provided an overview of the GFCM Framework Programme activities aimed at testing the feasibility of GFCM management guidelines. He noted that the feasibility of the guidelines had been tested in case studies of selected fisheries in the Mediterranean: small pelagics in the Adriatic Sea, small pelagics in the Alboran Sea, deep water pink shrimp and associated species in the Strait of Sicily, and deep water red shrimps in the eastern Mediterranean basin. For the Black Sea, two case studies had been selected: turbot and small pelagic fisheries. The objectives of the workshop were presented as follows:

- to test the technical feasibility of the GFCM guidelines (on management plans, capacity control and precautionary conservation measures) for the development of multiannual management plans for turbot and small pelagic fisheries in the Black Sea;
- to identify emerging issues and needs for the management of these fisheries; and
- to advance in the preparation of technical documents in support of management plans and strategies for the selected case studies.

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

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

7. In the ensuing discussions it was noted that: i) the development of management plans should be preceded by the evaluation of the effects (biological and socioeconomic) of the proposed management measures, using quantitative methods whenever possible, ii) the development of a subregional management plan did not preclude the possibility for countries to develop their national plans, as long as the national plans were consistent with and not less restrictive than the subregional plan, and iii) the monitoring of the plan, including the status of stocks, should be based on the best available information, from analytical assessments to empirical data and proxies. A management plan could also provide for necessary improvements in the monitoring systems, should that be identified as an issue for the management of the fisheries. Referring to the issue of data limitation, participants were reminded of the need to apply the precautionary approach, where the lack of data should not be an excuse to postpone the development of fisheries management plans. Similarities between the GFCM management guidelines and the EU Marine Strategy Directive were noted, since both aimed at improving the status of resources using a system of indicators and reference points.

STATUS OF TURBOT AND SMALL PELAGIC FISHERIES IN THE BLACK SEA

8. Mr Simion Nicolaev presented an overview of the Black Sea fisheries and discussed the main needs for sustainable development. He highlighted the most significant threats for fisheries in the Black Sea: i) high fishing effort and overfishing of important stocks (including turbot) that had possibly contributed to drastic drop of total landings by over 40% during the past 5 years; ii) climate change-driven anomalies in water stratification, circulation and temperature and their effects on fish behavior and distribution, as well as, on the distribution and abundance of jellyfish (it was noted for instance that massive jellyfish agglomerations prevented trawling for sprat in certain areas); iii) illegal, unreported and unregulated (IUU) fishing, which is a general issue in all Black Sea countries; iv) and the need to enhance regional cooperation. With regards to IUU fishing, he highlighted the

relevance of the roadmap to fight IUU fishing in the Black Sea elaborated during the Joint GFCM-BSC Workshop on IUU Fishing in the Black Sea (25–27 February 2013). The presentation concluded pointing at the current opportunities for the regional management of fisheries in the Black Sea, including the Strategic Action Plan of the Black Sea Commission (BSC), the Memorandum of Understanding (MoU) between the Black Sea Commission (BSC) and the GFCM and the recently adopted GFCM Recommendation on the establishment of a set of minimum standards for bottom-set gillnet fisheries for turbot and conservation of cetaceans in the Black Sea. A list of relevant regional projects in support of fisheries management was also provided.

9. Mr Ertug Duzgunes presented views on a fisheries management plan for the Black Sea based on the results of the project “Strengthening the regional capacity to support the sustainable management of the Black Sea Fisheries: Bulgaria, Romania, Turkey, Ukraine” (Joint Operational Programme “Black Sea 2007–2013”). He described the current situation of fisheries management in the countries, discussed necessary actions for the sustainable use of Black Sea fish stocks and basic requirements for the development of a fishery management plan. In terms of overall objectives for Black Sea fisheries management plans, the following were highlighted: i) sustainable management of marine fisheries in the Black Sea marine ecosystem; ii) conservation and protection of nature, iii) maintaining and/or restoring biological diversity; iv) increase employment; and v) continued food supply to citizens through fisheries, aquaculture and ecotourism.

10. Mr Gheorghe Radu presented an outline of the project MareFrame which was aimed at fostering the widespread use of Ecosystem-based Approach to Fisheries Management (EAFM) in EU waters. The project objectives include the development of new data based on new tools and technologies, ecosystem models and assessment methods based on indicators of good environmental status and the development of decision support frameworks to support the implementation of EU marine and fisheries policies. The project, funded by the EU FP7, included 28 partners from 14 countries (Romania is the only participating country from the Black Sea) and should run for four years, from January 2014 to December 2017. The project would include the implementation of a case study in the western Black Sea, where ecosystem models would be used to analyze the restoration of turbot fisheries, considering both the effect of fisheries and ecosystem change occurred in the last decades.

11. Mr Baris Salihoglu presented the results of a coupled ecosystem model of the Black Sea incorporating physical processes and trophic dynamics of lower and higher trophic levels organisms. The model had been used to simulate expected changes in the future ecosystem functioning of the Black Sea under changing climatological and fisheries conditions. The presentation highlighted the need to account for the ecosystem-wide impacts of anthropogenic and climatologic stressors in the analysis of options for the sustainable management of commercially important fish stocks.

12. Mr Miguel Bernal summarized the conclusions and advice from the SAC Subcommittee on Stock Assessment regarding the status of turbot and small pelagic stocks in the Black Sea. For turbot, two assessments had been analyzed. One assessment had considered a single Black Sea stock and concluded that the stock was currently depleted and in overfishing. The other assessment covered a northwestern population in Ukrainian waters and had concluded that the stock was in overfishing, with a slight decreasing trend in spawning stock biomass. The Subcommittee advice was that a recovery plan was needed for the stock and that fishing mortality had to be reduced to allow the stock to recover. The Subcommittee had also recommended reaching an agreement on stock limits for the purpose of stock assessment. The stock of sprat had been considered under moderate exploitation rate with an average biomass sustainably exploited. The SC advice was to avoid increase in fishing mortality. Given the natural fluctuations in stock size, the SC had also recommended considering recruitment estimates in future management advice. The status of anchovy stock in the Black Sea was currently unknown (the stock in the Azov Sea was considered moderately exploited and with a high biomass). Available data on the Black Sea anchovy stock suggested that the current level of fishing mortality might not be precautionary. The SC had recommended that the continuation of surveys and the improvement of survey coverage be ensured to enable the monitoring of the status of the stock. The stock of whiting had been assessed in 2013 and considered in overfishing, with higher exploitation in the southern part. The reduction of fishing mortality and the improvement of the

selection pattern of fisheries had been recommended by the stock assessment working group. The SC had further recommended harmonizing management and data regulations and adopting management measures aimed at minimize discards. Mr Bernal also presented the recently developed framework for describing stock status and providing management advice in relation to reference points (Document GFCM/SAC16/2014/6), submitted for approval by the SAC. The framework was expected to facilitate the elaboration of advice by the Subcommittee on Stock Assessment in the future.

13. Each participating country presented a summary of its national fisheries for turbot and small pelagics, highlighting the technical, socioeconomic and institutional characteristics of these fisheries as well as the main issues for the sustainable use of the resources. Mr Gheorghe Radu presented the report for Romania, Mr Violin Raykov for Bulgaria, Ms Irine Lomashvili for Georgia, Mr Vladyslav Shlyyakhov for Ukraine and Mr Ali Gucu for Turkey. The presentations were followed by questions aimed at clarifying doubts regarding the information presented orally or in the questionnaires submitted to the GFCM Secretariat prior to the meeting.

SUMMARY OF EMERGING ISSUES AND NEEDS FOR SUB-REGIONAL MANAGEMENT PLANS

14. In the ensuing discussions, participants agreed on a list of high priority issues that would need to be addressed in a management plan for turbot in the Black Sea. These were:

- Sustainability of the resources, including the need for a precautionary system that maintain the target and associated stocks within safe biological limits. With regards to turbot, the recovery of the stock and the identification of stock boundaries were viewed as priority actions. The main associated species to be covered in the plan were thomback ray, common stingray and picked dogfish
- IUU fishing
- Ecosystem interactions, including:
 - By-catch of turbot in other fisheries (e.g. Rapana beam trawl)
 - Incidental catches of small cetaceans in the main target fishery (bottom gillnet)
 - Potential impacts of environmental changes (alien species introductions, eutrophication, habitats change/damage, climate change, etc.) on the stock and fisheries
- Socioeconomic implications of the plan

15. Due to the limited time available, the remaining part of the meeting concentrated on the elements of a management plan for turbot fisheries. Participants agreed to address the small pelagic fisheries in a future meeting dedicated to this topic.

SUBREGIONAL MANAGEMENT OBJECTIVES

16. Different opinions were expressed with regards to the way forward to the implementation of a management plan for turbot fisheries in the Black Sea. Some participants were in favor of a subregional management plan, with common objectives, indicators and management measures to be followed by all riparian States. Others supported the adoption of regional guidelines, with a common structure for a turbot management plan, to support the development of national management plans. Irrespective of the model to be adopted, participants agreed to elaborate a minimal structure to be followed in the development of multiannual management plans for turbot fisheries in the Black Sea, containing objectives, criteria, measures and recommended priority areas for research. The agreed minimal structure is presented in Appendix C to this report.

PROPOSED FOLLOW-UP ACTIVITIES

17. Participants agreed on the need to pursue the development of management plans for turbot and small pelagic fisheries in the Black Sea. In this regard, the Secretariat informed that the GFCM Framework Programme contained a specific work package on governance, under which further developments for Black Sea management plans could be envisaged, depending on the availability of funds. A follow-up meeting on management plans in the GFCM area was already being planned for the second half of 2014 and could also be used as a venue to continue the work initiated in the Black Sea, particularly for small pelagic fisheries which could not be well covered in the present workshop.

18. Agreement was also reached on the preparation of technical background documents providing a baseline description of the resources, fisheries and management of turbot and small pelagic fisheries in the Black Sea. The documents would be prepared by the GFCM Secretariat, based among others on the information gathered through the questionnaires completed by countries to prepare the workshop. A draft of the technical documents would be sent to participants for revision and comments prior to its finalization and publication.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

19. The following conclusions were adopted by the participants:

To advance towards the development of management rules and management plans for turbot fisheries in the Black Sea, following the proposed minimum structure, criteria and measures agreed by the workshop (included as Appendix C) and according to the following roadmap:

- a. Preparation by the GFCM Secretariat of a technical background document describing the current state of stocks, fisheries and existing legal frameworks
- b. Consultations with involved stakeholders at the national level, if and when appropriate
- c. Review by the GFCM Working Group of the Black Sea of the proposed minimum structure criteria and measures for each case study
- d. Other possible activities within the GFCM Framework Programme to further elaborate on these management plans.

ADOPTION OF THE REPORT

20. The meeting formally adopted the minimum structure for the management of turbot as included in Appendix C on Tuesday 25 February 2014. The full report was adopted by e-mail on XX.

Agenda

- 1. Opening and arrangement of the meeting**
- 2. Introduction of the GFCM guidelines on management plans, fishing capacity and precautionary measures**
- 3. Status of Turbot and Small pelagic Fisheries in the Black Sea**
- 4. Summary of emerging issues and needs for sub-regional management plans**
- 5. Sub - regional management objectives**
- 7. Proposed follow up activities**
- 8. Adoption of conclusions and recommendations**
- 9. Closure of the meeting**

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Minimal structure, criteria and measures for multiannual management plans for turbot fisheries in the Black Sea

1. Scope of the plan

A definition of the area covered by the plan (the *Black Sea, GSA 29*) as well as the fisheries and species concerned (target and associated species) is needed.

Fisheries

Target fisheries

- Bottom set gillnet

Other fisheries affecting turbot

- Bottom trawl
- Rapana beam trawl and dredges
- Hydraulic dredges (venus)
- Midwater trawls
- Longlines for dogfish

Species

Target species

Turbot (*Psetta maxima*). The structure of the turbot population in the Black Sea is uncertain (limit between populations, degree of mixing/independency). However, ecology, biology and fishing gears are similar throughout all the Black Sea and similar issues exist in the different areas, including high fishing pressure (high fishing effort, overfishing and indirect mortality e.g. bycatch) and high IUU fishing pressure due to its economic value. A main research priority should be to improve knowledge on the population structure, but this should not prevent the set-up of a common management framework.

Associated species (bottom set gillnet fishery)

- Cetaceans
- Picked dogfish
- Thomback ray
- Common stingray

2. Objectives

Two options could be considered: a common subregional management plan or a common management plan structure to be implemented through national management plans. Any discrepancies with national legislations should be evaluated.

Following the GFCM guidelines on management plans (GFCM/36/2012), and in accordance with the established roadmap to fight IUU fishing, the regional plan should consider in particular the following options:

- To counteract and/or to prevent overfishing (both direct and indirect e.g. by-catch) with a view to ensuring the sustainable economic viability of fisheries

- To restore, to the extent possible, the size of Black Sea turbot stocks at least at levels that can produce the maximum sustainable yield
- To guarantee a low risk for stocks of the associated species to fall outside safe biological limits
- To reduce the extent of IUU fishing on turbot
- To ensure the protection of biodiversity in order to avoid undermining ecosystems structure and functioning

Operational objectives

The plan should define, for each agreed objective, specific operational objectives that can have a practical interpretation, clearly describe the expected outcomes and be measured with indicators. For example:

Objective

To restore, to the extent possible, the size of Black Sea turbot stocks at least at levels that can produce the maximum sustainable yield

Operational objective

- To restore the biomass of turbot above agreed precautionary biological reference points (e.g. $B > B_{\text{target}}$).

In the case that SAC has accepted different assessments for different areas, all accepted assessments should comply with this operational objective.

Objective

To counteract and/or to prevent overfishing (both direct and indirect e.g. by-catch) with a view to ensuring the sustainable economic viability of fisheries

Operational objective

- To maintain fishing mortality within agreed precautionary fishing mortality reference points (e.g. $F < F_{\text{target}}$)

In the case that SAC has accepted different assessments for different areas, all accepted assessments should comply with this operational objective. In the absence of an accepted assessment or fishing mortality reference point, a precautionary limit should be established.

Objective

To guarantee a low risk of stocks for associated species to fall outside safe biological limits

Operational objective

- To keep fishing mortality of associated species at levels that allow them to be within safe biological limits

Objective

To reduce the extent of IUU fishing on turbot

Operational objective

- To implement as a priority the actions set in the Roadmap to fight IUU fishing in the Black Sea¹ (reference) which are of relevance for turbot fisheries
- To develop specific cooperation (including in the exchange of information, training, port State measures) at Black Sea scale regarding the control of the turbot fishery

Objective

To ensure the protection of biodiversity in order to avoid the undermining of ecosystems structure and functioning

Operational objective

- To decrease discards of commercial and non-commercial species by (x)% in (y) years
- To decrease the incidental catch of protected and endangered species
- To reduce the amount of lost fishing gear and cage nets\

3. Indicators and reference points

The indicators and reference points accepted by the SAC should be used in the management plan.

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

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

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

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

Spawning stock biomass: ratio between the spawning stock biomass and the total biomass.

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

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

¹ Roadmap elaborated in the “Joint GFCM-BSC Workshop on IUU Fishing in the Black Sea”, Istanbul, Turkey, 25-27 February 2013.

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

Indicator	Reference point
Discard rate of undersized turbot and associated species (%)	<ul style="list-style-type: none"> - Historical - Trend (% over time)
Bycatch of protected/endangered species	<ul style="list-style-type: none"> - Historical - Trend (% over time)
Lost and abandoned	<ul style="list-style-type: none"> - Recovery of a number of lost/abandoned gears - Trend (% over time)

Indicators for environmental and other anthropogenic effects on the fishery

Considering the relevance of external impacts on the performance of fisheries management, the plan should indicate a set of indicators to be monitored in connection to known environmental and other anthropogenic effects on the stocks. For turbot, the following indicators of environmental status are considered as important:

- Water temperature in the spawning period
- Water temperature stratification
- Spatial extent of hypoxia

4. Fisheries management measures

In order to reach the objectives of the management plan, and without prejudice to stricter measures adopted nationally, countries should consider the adoption of the following minimum conservation measures for the turbot fisheries covered by this plan.

Management tools	Potential measures	Rank (effectiveness)
Spatial restrictions	Areas restricted to trawling	High
	Areas restricted to gillnet fisheries	High
	Areas restricted to other fisheries catching turbot as by-catch	High
	No-take areas	Medium (because no-takes are usually small)
Temporal restrictions	Close fishery during spawning season. If similar spawning season occur in different areas, a common closed season should be established.	High
Gear restrictions	Maximum length and height of gillnets	Medium
	Hanging ratios of gillnets	High (cetacean bycatch)
	Minimum mesh size for gillnets	High
	By-catch reduction devices for beam trawl and bottom trawl	Low
	Maximum monofilament or twine diameter in bottom set gillnets of 0.5 mm (not implemented in Ukraine)	High (cetacean by-catch)
Effort restrictions	Limit the overall capacity of the authorized fleet	High
	Number of days/ hours at sea	Medium
Minimum size	Minimum size 45 cm TL (Ukraine 35 cm SL)	High
	Minimum sizes should be established for: <ul style="list-style-type: none"> - Picked dogfish¹ - Thornback ray - Common stingray 	High
Participatory restrictions	Adoption of special authorizations for turbot fishing	High
Others	- Catch restrictions (e.g. TAC or limit)	Medium (high IUU catches)
	- By-catch restrictions (e.g. maximum number or weight of turbot allowed to be caught as by-catch)	Medium
	- Restocking	High

1. Currently minimum sizes for picked dogfish have been defined in Ukraine (85 cm SL), Romania (120 cm TL), Bulgaria (90 cm TL).

5. Decision rules

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

6. Scientific monitoring

The Scientific Advisory Committee (SAC) of the GFCM should be responsible for advice on the status of stocks and economic indicators of fisheries, taking into account the work performed by its subsidiary bodies. The Working Group of the Black Sea should oversee the implementation of the management plan.

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

In line with the roadmap to fight IUU fishing, the management plan should develop and agree on standard methodologies to evaluate illegal, unreported and unregulated catches in support of stock assessments.

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

- Stock identification
- Improving data collection, especially for small-scale fisheries
- Estimation of by-catch, discard and IUU catches
- Improvement of the selectivity of the fishery, including more ecosystem friendly fishing gears
- Cooperation among countries and Black Sea Commission
- Assessment of the socioeconomic importance of the fisheries and of the socioeconomic impacts of the proposed measures in the management plan, both at the national and regional level

8. Fisheries monitoring, control and surveillance

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

- Concerned Parties should make efforts to implement GFCM recommendations related to MCS, including those listed below:
 - Vessel information submitted to the GFCM Regional Fleet Register
 - Record of fishing vessels larger than 15 metres authorized to fish in the GFCM area
 - Satellite-based VMS required for vessels >15 meters authorized to fish in the GFCM area.
 - Required submission of data on vessels engaged in IUU fishing (IUU Vessel List)
 - Required logbook for vessels exceeding 15 meters authorized to fish in GFCM area. The logbook should register the quantities of each species caught and kept on board, above 50 kg in live weight
 - Adoption of Port State measures to prevent, deter and eliminate IUU fishing.

These obligations are already in place for the GFCM Members but the possibility that some of them are used in the management plan for turbot by Members and non-Members of the GFCM should be explored.

Additional actions to combat IUU fishing should be considered. The proposed actions should build on the elements of the roadmap elaborated in the “Joint GFCM-BSC Workshop on IUU Fishing in the Black Sea”, Istanbul, Turkey, 25–27 February 2013. Specific reference to the following action in the roadmap should be made:

- Improve market control and traceability mechanisms and take measures to minimize the trade of IUU products
- Envisage joint adaptive inspection schemes and national observer programmes
- Carry out joint training of fisheries inspectors and other enforcement authorities
- Launch awareness campaigns for the protection of Black Sea fisheries against IUU fishing

9. Review of the management plan

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

To be done by SAC:

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

To be done by concerned Parties:

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

10. Compliance with the plan

Management actions, modifications of the plan and compliance with the plan should be reported to the GFCM in the national reports submitted yearly to the GFCM (the use of the common format decided for the GFCM and Black Sea Commission is recommended). The GFCM Compliance Committee shall review this report and take necessary actions.