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Evaluation of Plans for Protection of Marine Living Resources in Sardinia

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This report does not necessarily reflect the view of the European Commission and in no way anticipates the Commission's future policy in this area.

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STECF-SGBRE final considerations and recommendations

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SGBRE report on Sardinian plan for the protection of the resources

4.1 Members of the STECF

4.2 Invited experts

4.3 JRC secretariate

4.4 DG Fisheries and Maritime Affairs

1 BACKGROUND

1.1 Aids for the temporary cessation of fishing activities

Sardinia has submitted scientific information in support of a plan for the protection of the resources for the period 2006-2008; by the time of issuing these terms of reference the legislative act implementing the plan for the protection of the aquatic resources has not yet been notified to the Commission. Nevertheless, from the Regional Law n° 3 of 14 April 2006 notified to the Commission and, in particular, from Article 6 therein, several measures to improve sustainable fishing are foreseen such as: temporary fishing bans, catch limitations, limitations of fishing vessels authorized to operate, technical measures (fishing gears characteristics, closed areas, protection of nursery areas). Sardinia is a Region with autonomous Statute and they can rule on fishery matters with the exception of the fleet policy which is regulated at national level. Regional rules cannot be less stringent than Community legislation under the Common Fisheries Policy. The annual temporary fishing ban is one of the management measures quasi-regularly undertaken during the last 15 years although it may have been differently modulated with respect to timing and fisheries. We suppose that a temporary fishing ban, together possible other measures, could be still part of the anticipated plan for the protection of the aquatic resources. According to Community rules as established in Council Regulation (EC) No 2792/1999 of 17 December 1999 and Guidelines for the Examination of State Aid to Fisheries and Aquaculture (2004/C 229/03)², Member States may support the execution of temporary fishing bans within the framework of a plan for the protection of the aquatic resources. A plan for the protection of aquatic resources must include, in addition to the temporary cessation of activities, effective measures designed to reduce fishing mortality, for example by reducing fishing capacity permanently or adopting technical measures. The plan shall contain precise and measurable objectives and a time frame. In conclusion, the plan shall be designed to further reduce the fishing mortality, over and beyond what is already enforced at national or Community level, because the state of the stocks and production of fisheries call for such additional interventions. The Scientific, Technical and Economic Committee (STECF) shall provide its opinion on the plans and, in particular, must evaluate the scientific basis and likely effectiveness of the plan in terms of pursued conservation results. It is responsibility of a Member State to provide adequate scientific justifications to support the execution of temporary fishing bans under the requirements of the FIFG Regulation.

2 OBJECTIVES OF THE MEETING

Scientists shall provide advice on the basis of both their expertise, including previous STECF works, and of scientific information attached to the plans for the protection of the resources and shall, in particular, evaluate the reliability of the plans in terms of:

- diagnosis upon which the plan is based (e.g. status of the resources and evolution of main fishery indexes, evolution of the status of the resources, evolution of fisheries index, etc.);
- prognosis and expected results (benchmarks, appropriateness of the methodology to evaluate the objectives, reduction in fishing capacity, etc.);
- congruence of the plan both with the targets (e.g. timeframe, appropriateness of management measures with conservation objectives, effectiveness of proposed measures, etc.) and with ongoing fishing practices as well as with already enforced management measures (e.g. the likely outcomes of the plan can be voided by current fishing practices? etc.);
- added value to ensure higher conservation of the exploited resources targeted by the plan in order to avoid short term collapse and achieve higher long-term yields and better economic performances of the fleets involved.

Introduction

STECF-SGBRE has already expressed his opinion on a previous Plan for the protection of the resources submitted by Sardinia in 2006. The Plan was evaluated in conjunction with similar plans for marine resources of Italian mainland and Sicily. STECF-SGBRE considered that the scientific information used to establish the guidelines of the plans were limited. STECF-SGBRE recognized also that the information and the analysis presented by Sicily and Sardinia in 2006 contained an extensive amount of information and analysis when compared to the Italian mainland. However, in absolute terms, STECF-SGBRE considered in 2006 that the plans presented by the Italian authorities (Italian mainland, Sardinia and Sicily) have not clear measurable objectives, in terms of targets to achieve (i.e. level of F and SSB, mean size/age of the stock, biodiversity, etc) as well as a time frame for achieving (see guiding principle established by the Commission in EC 2792/1999). STECF-SGBRE also stated in 2006 that conservation measures should follow the general guidelines delineated by STECF in the report of the November 2005 plenary session.

3 ANSWER TO THE TERMS OF REFERENCES

3.1 Applicability of plan

to evaluate whether the plan for the protection of the resources is based on information and sound scientific analysis that allow to establish measurable objectives as well as to determine a diagnosis of the state of the stocks and of the fisheries object of the plan;

STECF-SGBRE considers that the scientific information used to establish the guidelines of the 2006-2008 Sardinian Plan are inadequate or lacking. According to provided legislative acts, the Plan for the protection of aquatic resources, as mentioned in the Regional Law 14 April 2006 no. 3, art. 6, is constituted only by the fishing ban included in the Decree 14 September 2006 no. 25/v and the following modification decrees (see also TOR 7). Moreover, the fishing ban is not supported by any species-specific temporal and spatial analysis of recruitment, spawning activity, commercial CPUE and dynamic of fishing fleets in the scientific document (Sardinians plan for the protection of aquatic resources (SPAR 2006)) attached to the Plan. Those analyses are among those fundamental to establish the measurable objectives for the plan.

Time series used to estimate trends in biomass, abundance, fishing mortality (F) and Y/R of the most important commercial species exploited in the area were limited to GRUND and MEDITS data from 1994 while GRUND data exists since 1984. Long term changes in fish abundance together with its associated population structure are crucial elements for estimating reference points to be used in the restoration and management of exploited fish populations. Thus, data of fish abundance and stock structure that extend current data series back in time are of crucial importance for establishing recovery plans of overexploited species in the area. This was already expressed in the previous STECF-SGBRE report (2006) (SEC 2006 (XXXX)). Any effort should be devoted to include, in a standardized way, available data prior to 1994 in the analysis of the stock trends. Also, there are no data of CPUE from commercial fleets as well as time series of landings in the SPAR (2006). Those data have been collected, including those in DCR, and should be used.

There are inconsistencies between the conclusions contained in the scientific document attached to the Plan and the measures foreseen in the plan itself. Stability in abundance, biomass and F not necessarily imply that the resources are in a general good condition,

especially when considering the shortness of the time series used and the level of F estimated. Also, interpretation of F trends is inconsistent with the data shown in the SPAR (2006). For two of the three species analysed, F in the last years is larger than F_{\max} . Nevertheless, the use of the YPR analysis might be appropriate here but there is a misuse of F_{\max} as it is clearly inadequate for short living species and in the case of flat-topped YPR curves (as for those species analysed). F_{01} should constitute the appropriate reference limit here. There are also concerns about how F was estimated. STECF-SGBRE notes that there is no mention of the sample size used for estimation of the F . Thus, STECF-SGBRE is not able to evaluate if the observed large variability in F is a result of the low sample size or a real phenomenon of the stock and the fisheries. Moreover, in fast growing species, seasonality of the appearance of recruitment and sampling period may introduce bias in the F estimation. In this context, the analysis should be carried out for macro-areas to allow for a sample size large-enough.

In a previous scientific report (2004) submitted by Sardinian authorities, several species as hake, red shrimp, horned octopus were considered overexploited while the same analysis was not presented in the 2006 and the species are now depicted as having a stable trend and being in good conditions. This is a serious inconsistency that needs to be sorted out. Data from the artisanal fisheries are presented by group of different species and this makes difficult any interpretation of the observed trends.

STECF-SGBRE considers that as for 2006, the plan has not any measurable objectives, in terms of targets to achieve (i.e. level of F and SSB, mean size/age of the stock, biodiversity, etc) as well as a time frame for achieving and a set of complementary measures if the objectives are not met (see guiding principle established by the Commission in EC 2792/1999). The objectives of the plan should be clearly defined and a monitoring programme be put in place to assess the affect of the closure against agreed performance measures. STECF-SGBRE also reiterates that protection plans should follow the general guidelines delineated by STECF in the report of the November 2005 plenary session and in SGBRE (2006).

3.2 Effectiveness of plan

to evaluate whether the scientific analysis allows to conclude that the exploited resources targeted by the plan have been fishing at sustainable or unsustainable levels and if the

changes in fishing mortality, prior and after the execution of the plan, will allow higher yields in the long term as well as a reduced biological risk to the fish stocks;

Given that the status of the stocks did not show any signal of recovery during the years of the implementation of the plans (from 1988), STECF-SGBRE considers that the temporary fishing ban alone is not sufficient and not appropriately designed in order to ensure the long term sustainability of exploited stocks.

STECF-SGBRE considers also that for most of the stocks the fishing mortality has remained stable or increased during the period of the execution of the plans. There are however some problems concerning the methods used for the estimation of F, especially because most of the stock analysed are short lived-fast growing species and the samples are concentrated in a short period of the year. These difficulties may drive to imprecise and some times biased results that should consider with care, although the Y/R analysis is valid to assess the current exploitation status of the stocks. In relation to trends in biomass, without the knowledge of a reference value of the pristine situation or in the earlier 1980's, it is difficult to know if the observed current situation is sustainable or not.

The traditional Beverton & Holt Y/R method applied for three species analysed in the SPAR (2006) considers only the trawlers exploitation pattern. However, when relevant, amounts of catches and exploitation patterns for all the fisheries targeting these species should be necessary for the assessment. This could have been done using data collected under DCR from 2001 and other data collected prior 2001. Moreover, the method used is notoriously deterministic and there is no any risk analysis, considering the high levels of uncertainty regarding parameters estimation, dynamic processes, etc. Also, the document includes some reference on former VPA analysis that could be very useful in similar cases, but the results are not shown in the scientific documents (Evaluation of the stock in relation to the results obtained with temporary fishing ban from 1999-2004 (SPAR 2005), Effects of the fishing ban in the Sardinian Seas (EFBSS 2004) and SPAR 2006).

3.3 Long-term profitability of fishery

To evaluate whether the plan is able to adjust fishing on the target stocks and main associated species in order to achieve greater catches, larger and more stable stocks of fish and more profitable fisheries;

The Mediterranean multi-species fishery targets a large number of species using different types of gears in a diversified marine environment and Sardinia is a good example of such

diversity. In such environment, some of the available tools for the management and the recovery of the exploited biological resources are the control of the fishing effort, improvement in selectivity of the existing gears, the establishment of protected areas and the seasonal fishing ban in significant areas and periods. These measures aim to limit the fishing mortality on the stocks and improve the conditions of the populations through the protection of the most vulnerable part of their life cycle as recruits and spawners. Considering the diversification and overlap of biological cycles between the existing species and the interdependency of associate species, it is obvious that the combination of several management actions will achieve more satisfactory results in a synergistic manner.

According to provided legislative acts, the Sardinian Plan for the protection of aquatic resources, as mentioned in the Regional Law 14 April 2006 no. 3, art. 6, is constituted only by the fishing ban included in the Decree 14 September 2006 no. 25/v and the following modification decrees (see also TOR 7). Moreover, this ban is foreseen only for 2006.

The aim of a temporary fishing ban, as designed by the Sardinian authorities, seems to be the reduction of the fishing mortality on a fraction of the population, usually recruits, allowing the increase of the spawning biomass. Depending on the period and the target species involved, the seasonal closure is supposed to reduce the massive mortality of the recruits. Nevertheless, the temporal fishing ban should be combined also with the establishment of permanently closed areas that are located either in correspondence of extensive nurseries and adult concentration of important species (see STECF-SGBRE 2006) and/or of essential fish habitats that have been defined and identified for Sardinia by STECF-SGMED in 2006 (SEC 2006 (XXXX)). Such areas should be in addition to those already enforced for the trawl fishery in three gulfs since 1990 (Regional Law 7 August 1990 no.25). These actions, jointly with measures aiming to improve the selectivity of the gears and to reduce the overall fishing effort could be the tools for a successful plan aiming to improve the status of the exploited marine living resources.

However, STECF-SGBRE considers that, nonetheless the implementations of different management measures (i.e. permanently closed areas), including the temporary fishing ban, in the last 20 years in Sardinia, most of the exploited stocks still show clear signs of overexploitation. Considering that the current implemented plan (2006) foreseen only a temporary fishing ban, STECF-SGBRE concludes that the plan for the protection of the aquatic resources in Sardinia will not be able to achieve larger catches in the near future and the sustainability of the stocks in the long term.

According to the submitted scientific reports, the management measures suggested for Sardinia include a temporal and spatial fishing ban, the conversion of coastal trawling in less harmful fishing activities, the introduction of marine protected areas for spawners and nurseries, the adoption of more restrictive technical measures and the definition of a minimum landing size for the common Octopus. For many of these measures there is a lack of scientific evidence, at least in the submitted report that could support their design.

The fishing ban was applied in Sardinia from 1988. However, despite the implementation of this measure for such a long period of time and the application of additional measures (i.e. permanently closed areas), the stock indexes available in the report does not show a decrease in F for the stocks exploited in the area and included in the present report and in

those previously submitted by Sardinian authorities (see STECF-SGBRE 2006 (SEC 2006 (XXXX)). On the opposite, the three species more deeply analysed in the last report (SPAR 2006) show increasing trends in F, with highest F values in the last years for *Mullus surmuletus* and *Aristaomorpha foliacea*. The mismatch between applied measures and observed trends in F and stock biomass presented in the report could be due to several factors: the limited extension or inappropriate location of the permanently closed areas, the biological inadequacy of the closed season, the lack of reduction in the fishing capacity, the ongoing technological creeping, together with a low enforcement of the existing rules (as mentioned several times in the report) could negatively affect the results of the management measures included in the plan.

STECF notices that the status of stocks exploited by the small scale artisanal fisheries, which are included in the temporary fishing ban, is not included in the document presented by the Sardinian authorities.

The plan planned for 2007 foresees a shifting of the effort from the coastal artisanal fishery towards small and large pelagic species. For some large pelagic species, ICCAT considers those as being currently overexploited. Moreover, no data were presented about the status of the small pelagic stocks.

The total lack of analysis on commercial fishery data (either landings or CPUE) does not allow any economical evaluation of the plan and its future expected effects. The scientific document does not include any projection on the possible trends of the main target species in the short and medium term, under different management scenarios. This does not allow any evaluation about the possible development of the fisheries after the adoption of the measures envisaged in the plan.

3.4 Alternative analyses

to evaluate whether and why other type of analysis could/should have been taken into consideration to set up the basis and to evaluate the appropriateness of the plan;

As it was stated in the report of STECF-SGBRE in 2006, a protection plan should identify the status of the fisheries resources in a particular area and followed by, through the definition of the problems, it should propose measures to be adopted by the local authorities aiming to improve the status of these resources. The plan submitted for 2007, is based only on data obtained from experimental surveys as GRUND and MEDITS carried out during the period 1994-2005 for some selected species. As already expressed in the previous STECF-SGBRE report (2006), any effort should be devoted to include, in a standardized way, available data prior to 1994 in the analysis of the stock trends. Those data have been collected (e.g. GRUND) and should be used to extend back in time the current used time series and allows for a full evaluation of the resources status.

Landings are not considered except for artisanal fishery (pp 64-67 in SPAR 2006). Those

data are limited in the sample size and inadequate in their presentation since presented per group of different species. Landings from other fleet segments and data from landings collected though the DCR enforced from 2001, are not taken into account.

As it was stated in the STECF-SGBRE report of 2006, data from landings and effort could be used to assess by age and gear fishing mortality, CPUE and mean size in the catch, and, to make an analysis of the Y/R. The integration of both sources (i.e. fishery dependent and independent data) is the appropriate way for designing a protection plan of fishery resources. On the other hand, calculations of biomass indexes by taxa, as those presented this year for artisanal fisheries, are without any value for stock assessment purposes as well as the length distributions of the species caught in the survey in 2005.

STECF-SGBRE recommends that an analysis of trends in CPUE, F and Y/R based on data from experimental surveys extended as back in time as possible (from 1985), and, landings available through DCR (from 2001) would improve the possibilities to assess more efficiently the Sardinian resources and propose adequate measures for their protection, recovery and long term sustainability.

3.5 Use of data

to evaluate whether the scientific bases of the plan has taken stock of and has fully exploited the monitoring data gathered through the community data collection programme (Council Regulation (EC) 1543/2000);

STECF considers that according to the documents available at the meeting, the scientific background is constituted by the document prepared by the University of Cagliari (i.e. Sardinian's plan for the protection of aquatic resources (SPAR 2006)). This document contains data and analysis on demersal resources, concerning *Merluccius merluccius*, *Micromesistius potassou*, *Mullus barbatus*, *Mullus surmuletus*, *Spicara flexuosa*, *Spicara smaris*, *Phycis blennoides*, *Aristaeomorpha foliacea*, *Aristeus antennatus*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone cirrhosa* and *Octopus vulgaris*. However, more detailed analysis have been conducted only on *Merluccius merluccius*, *Micromesistius potassou*, *Mullus barbatus*, *Phycis blennoides*, *Aristaeomorpha foliacea*, *Aristeus antennatus*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone cirrhosa* and *Octopus vulgaris*. Stock assessment data have been produced exclusively on *Mullus barbatus*, *Mullus surmuletus* and *Aristaeomorpha foliacea*. These species and stocks are included in Annex 12 of the DCR, but the list presented in the scientific document is not comprehensive and several

species are missing.

Although no specific references have been made to the DCR within the document, it is clearly stated that fishery independent data used in the analysis have been collected within the DCR framework (GRUND and MEDITS surveys), as these surveys are included in the DCR since 2001. However, no data have been included for species caught mainly in the small scale fisheries (artisanal fishery as it is defined in the document) or for the pelagic fisheries (either small or large pelagic species), species that are also listed in Annex 12 of the DCR.

The document includes also generic and aggregated fishery dependent data on species caught in the artisanal fishery (e.g. lobsters and spiny lobsters, horned octopus and common octopus). Data aggregated by different species have no biological sense and cannot be used as such in stock assessment. No reference has been made on data gathered within the Italian national data collection programme CAMPBIOL that is also included in the DCR framework. No data or reference has been included about the CPUE data collected within the DCR framework. Those data should be used to estimate the fraction of the stock that is taken by a specific fishery and to establish management regulations on a specific part of the fleet.

3.6 Geographical range and stock coverage

to evaluate whether the scientific analysis ensures a full coverage of stocks and fisheries involved in the plan for the protection of the resources and which areas, fisheries and stocks are not covered;

According to provided legislative acts, the Plan for the protection of aquatic resources, as mentioned in the Regional Law 14 April 2006 no. 3, art. 6, is constituted only by the fishing ban included in the Decree 14 September 2006 no. 25/v and the following modification decrees. This is only one of the several management actions presented in the Sardinian plan for the protection of aquatic resources (SPAR 2006). Moreover, the management actions proposed in the scientific document are not supported by any temporal and spatial

analysis (for details see TOR 1 and 2). Neither the recent legislative acts nor the scientific document provided take into account the essential fish habitats, which have been previously identified for the Sardinian seas (STECF-SGMED, SEC 2006 (XXXX)), in order to establish the appropriate closed areas.

According to the scientific documents available and the legislative acts in place, it is quite evident that the fishing ban is trying to manage some fleet segments without a specific reference to single stocks. Such ban could be regarded as an indirect way to manage several species harvested together by the same fleet segment. The plan suggested in 2006 by the scientific document for Sardinia includes all the fishing vessels registered in Sardinia. Then, in theory, all the stocks should be included, but this is not the case. In this document, only 3 species are taken into account from a stock assessment point of view (two mullets, *Mullus barbatus* and *M. surmuletus*, and the red shrimp *Aristaeomorpha foliacea*).

The fishing ban established in 2006 (Decree 14 September 2006 no. 25/V, modified by Decree 20 September 2006 no.27/V, Decree 13 October 2006 and Decree 27 October 2006 no. 34/V) was mandatory for vessels with gillnets, small trawlers, bottom trawlers and pelagic trawlers, for a period of 45 days, shifting by 15 days between the eastern and the western coast. As in the previous plans (2003-2004) (SEC 2006 (XXXX)), the fishing ban is facultative for some segments of the fleet: for purse-seiners fishing for small pelagic species, for artisanal vessels using surface long-liners fishing for large pelagics and for the bottom trawlers over 15 GRT having also the long-line licence, which have the possibility to choose to continue the fishing activity with long-lines during the fishing ban for trawlers, but outside the territorial waters. Some fisheries or fishing activities are excluded from the time closure: the professional dive fishery, the coral fishery. The sport and recreational fishery is allowed only from the shore, while the line fishery from the boat is allowed only on Saturday and Sunday during the fishing ban. The game fishery is permitted in official tournaments even during the fishing ban. The use of bottom and pelagic longlines and bottom trolls is forbidden for the sport and recreational fisheries during the fishing ban.

The stocks and species covered by the scientific documents provided for Sardinian waters are listed in TOR 5 of this report. The scientific analysis does not include all the other demersal species not listed in TOR 5, most of the species and all fisheries that are included in the “artisanal fishery category”. For this fishery, gears are not specified in the report as well as catch per gear, while catches are reported for mixed species or group of species. Small and large pelagic fisheries are not covered by the analysis.

3.7 Compliance of measures with plans

to evaluate whether the measures implemented in the legislative acts match with the alternative management measures identified and justified in the scientific report;

According to provided legislative acts, the Plan for the protection of aquatic resources, as mentioned in the Regional Law 14 April 2006 no. 3, art. 6, is constituted only by the fishing ban included in the Decree 14 September 2006 no. 25/v. Previously, on the same line, the Regional Autonomous Government of Sardinia had adopted the Decree 20 February 2003, Decree 24 July 2003, Decree 18 February 2004 and Decree 18 August 2004 and STECF (report SEC 2006 (XXXX)), as these regulations are included in the Italian national Plan, without any specific reference to additional scientific background. The scientific document provided here is the “Sardinian’s plan for the protection of aquatic resources” (SPAR 2006).

STECF-SGBRE considers that the measures (temporary fishing ban and permanently closed areas) implemented in the legislative acts (Sardinia Regional Law 14 April 2006 no.3, Decree 14 September 2006 no. 25/V, Decree 20 September 2006 no.27/V, Decree 13 October 2006 and Decree 27 October 2006 no. 34/V) match only partially with the management measures identified in the SPAR (2006). Nevertheless, those management measures are not scientifically justified in the SPAR (2006). As a matter of fact, the fishing ban, as well as the permanently closed areas, is not supported by any species-specific temporal and spatial analysis of recruitment, spawning activity, commercial CPUE and dynamic of fishing fleets in the SPAR. Those data, together with clear and measurable objective of the plan, are fundamental to establish time frames for temporal fishing ban and permanently closed areas. Moreover, as recommended by STECF (SEC 2002 (1374)) and (SEC 2006 (XXXX)), effective management measures for the protection of the marine resources should not only include compulsory fishing ban and permanently closed areas (assuming that their design is supported by simulation analysis showing a substantial reduction of the yearly fishing mortality exerted on the stock), but also:

1. a progressive reduction of the effective fleet capacity, according to the different fleet segments involved
2. the establishment of permanent closed areas to all fishing activity (including non commercial fisheries) where recruitment, spawning aggregation, concentration of adult individuals and essential fish habitats of the exploited species are located
3. an increase in selectivity of the gears in order to decrease F on the juveniles and reduce discard, where appropriate

Also, the implementation of all those measures must be proven to be effective, using simulation tools, to reduce F , increase SSB , R and mean age and size of the stocks, maintain biodiversity and improve the status of essential fish habitats (as identified in the STECF-SGMED report in 2006), in the medium and long term.

STECF-SGBRE reiterates that the current legislative acts have not clear measurable objectives, in terms of targets to achieve (i.e. level of F and SSB , mean size/age of the stock, biodiversity, etc) as well as a time frame for achieving and they lack of a set of complementary measures if the objectives are not met (see general guidelines established by the Commission in EC 2792/1999).

The actual management measures take into account the entire territorial waters, including the vessels coming from other Mediterranean areas and not only the fishing vessels registered in Sardinia (Decree 14 September 2006 no.25/V art. 4). The scientific report clearly states that the same resources are fished also by other vessels from other Italian regions and Spain, but data about these fleets are not available in the document.

Neither the recent legislative acts nor the scientific document provided take into account the essential fish habitats, which have been previously identified for the Sardinian seas (STECF-SGMED, SEC 2006 (XXXX)), in order to establish the appropriate closed areas.

3.8 Contribution to reduction in mortality and effort

to evaluate whether and how much the temporary fishing bans and complementary measures, if any, have been contributing to reduce the fishing mortality and the fishing effort as well as to improve sustainable exploitation of targeted resources;

According to the available documents (EFBSS 2004; SPAR 2005; SPAR 2006), there is no significant reduction of the fishing mortality for any of the analysed species during the last 10 years. The temporary fishing ban has been in place since 1988, but the data do not show any reduction in F since the start of the time series (1994). Also, the Y/R analysis presented in the 2004, showed a situation of overexploitation with current E larger than E_{msy} for important exploited stocks as hake, red shrimp and horned octopus. F_{sq} is larger than F_{01} for all species except for red mullet (SPAR 2006). Thus, STECF-SGBRE considers that the temporary fishing ban alone is not able to reduce fishing mortality.

However, STECF considers also that it is not possible to establish if the lack of reduction in F is due only to the inefficient design of the temporary fishing ban and/or it is also an effect

of the contemporary increase in fishing capacity of the fleet. STECF-SGBRE reiterates that a temporary fishing is only one management element of a fishing ban and that, if the management plan will continue to include such a ban as one of the measures, then a strictly compulsory, continuous and extended ban should properly cover all fishing areas and fleets in terms of time and space. However, the design in terms of period of closure must be revisited and planned to match as much as possible the period of recruitment and/or aggregation of spawners of the target species included in the plan as it was already indicated in the 2004 study. The appropriateness of those periods must be demonstrated through a temporal analysis of the occurrence of recruitment and and/or aggregation of spawners of the target species included in the plan.

Regarding the fishing effort, (estimated as number of boats per fishing days at sea) and assuming that the ban has been fully enforced, the data shows a decrease since 1998 in the Sardinian waters (STECF-SGBRE 2006). However, this definition of effort does not take into account changes in the structure of the fleet. As shown in the SPAR (2006; Fig. 12), there is an increase around 100% of the fishing capacity for the large vessels and a stable trend for the other components of the fleet. This aspect, together with the technological creeping (Rijnsdorp et al., 2006), suggests a large increase of the fishing power of the fleet during the last decade.

The relationship between fishing effort and estimates of fishing mortality for the same periods and areas is needed for help managers to transform one in the other. Only in this way it will be possible to define for instance how much reduction in effort (operation days, capacity, etc) should be necessary for reaching the desired level of F according to the established reference points (e.g. $F_{0.1}$ and F_{max}) and thus to set up the optimal duration of a temporal fishing bans.

3.9 Relevance of closed areas to stocks

to evaluate whether the implemented closed areas, in terms of location and dimensions, are relevant for the concerned stocks;

There is not information as mapping of stock distribution and/or nurseries areas in the Sardinian's plan for the protection of aquatic resources (SPAR 2006) that justify the selection of areas currently closed to the fisheries. Thus, it is not possible to evaluate if the implemented closed areas are relevant for recruitment and spawning of the concerned stocks or to reduce impact on essential habitats and biodiversity. Those areas should be aimed to protect nurseries, important areas of spawning or essential habitats for alieutic

resources. However, mapping of nurseries areas were presented in the STECF-SGMED (2006) for red mullet and hake. For hake, the nursery areas are located well outside the implemented closed areas while for red mullet implemented closed areas overlap only partially with individuated nursery areas.

The correct location and extension of protected areas should be given a priority selecting significant areas where essential habitats for the most important marine living resources are persistent in time. No information has been made available for the importance of the areas as essential fish habitats and the distribution of the fishing effort prior the definition of the closed area.

In general the surface of closed areas is too small and there is a risk that they cover only partially essential fish habitats. Therefore, as previously recommended by STECF-SGBRE, the areas should be larger (at least 4 times larger in extension than the actual areas) to be significant for the long term sustainability of the resources. For comparative purposes, the areas approved for protection by the GFCM 2006 in international waters consist of surfaces ranging from 1000 to 10 000 km².

The implemented areas were established in 1990 (Reg. law 7/8/1990, n25). However, there is not analysis on the impact of the implemented closed areas on the status of the exploited stocks. Moreover, although those areas might have a positive effect in terms of F and biomass at the local level, they are likely to be inefficient to significantly decrease F and increase SSB at the stock level.

3.10 Effect on operation of fleets

to evaluate whether the closed areas implemented in conjunction with the plan affect and how the operations of fleets involved in the plans;

The lack on information on the spatial distribution of the fishing effort (i.e. VMS data) does not allow evaluating whether and how the closed areas affect the operations of fleets involved in the plans.

3.11 Capacity reductions

to evaluate whether there has been a permanent reduction of the fishing capacity in the years before the starting of the plan and if a permanent reduction of the fishing capacity is foreseen to be achieved, and how much, in

the period 2006-2008;

STECF (2006) recommended that effective management measures for the protection of the marine resources should not only include a compulsory fishing ban and permanently closed areas, provided that they substantially reduces the total fishing mortality exerted on the stocks, but should be supplemented also with a progressive reduction of the effective fishing capacity of the fleet as well as an increase of gear selectivity. According to the latest scientific information (SPAR 2006; Fig. 12) used to establish the guidelines of the plan there has been a continuous and strong increase of the TSL of the large vessels (> 70 TSL) and almost a stable trend for smaller fishing boats (< 70 TSL). In spite of this, a permanent reduction of the fishing capacity is not foreseen in the plan.

3.12 Impact of no action

to evaluate whether and why the absence of a recurrent temporary fishing ban concerned fleets may further deteriorate the state of exploited resources;

In 2004, several stocks were reported as overfished by Sardinian authorities (see TOR 1 and STECF-SGBRE 2006). In 2006, the status of most of the exploited resources is considered stable by Sardinian authorities, taking into account trends in biomass, density and F. This stability or at least the lack of any significant trend in the time series of available data from experimental surveys is attributed by Sardinian authorities to good stock conditions and possibly to the measures already implemented. However, stability in CPUE and F does not necessarily mean that the resources are in a good condition, especially when considering the shortness of the time series used and the level of F observed (for further details see TOR 1 and TOR 3). Also, for some stocks, there is an increasing F in the latest years, with F_{sq} (F in 2005) that is larger than F_{01} .

The fishing ban has been in place since 1988. However, no analysis has ever been performed on the effectiveness of this measure in terms of reduced yearly fishing mortality and protection of a specific fraction of the exploited stocks or life cycle. If the fishing ban is a part of a future management plan, it is crucial to present the relative documentation allowing their scientific evaluation and justification. For this purposes it is needed the distribution of the fishing effort and CPUE by fleet in the temporary closed areas and in the bordering zones, (i.e. VMS or other available data), the abundance of fished species, the estimated fishing mortality at the stock level with and without closure, and, details on the period of spawning and the recruitment All those elements are not included in the submitted plan.

STECF-SGBRE notes that the current status of overexploitation and no improvement in biomass and F has been observed in the last decade for most of the Sardinian resources. Thus, STECF-SGBRE concludes that, since the temporary fishing ban is neither appropriately designed nor scientifically justified and documented, it is likely that the status of the resources will not further deteriorate (in terms of F exerted at the stock level) in absence of a temporary fishing ban as that implemented by the Sardinian authorities in the last 18 years.

3.13 Participants

3.13.1 STECF members

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Antonio Di Natale

3.13.2 Invited Experts

Argyris Kallianiotis

Henri Farrugio

Alvaro Abella

3.13.3 European Commission

Franco Biagi (DG_FISH)

Iain Shepherd (JRC, secretary)

STECF-SGBRE final considerations and recommendations (all areas)

STECF has revised the report of SGBRE and provided an opinion on the major considerations and recommendations. Detailed answers to each of the TORS are given in the SGBRE report.

STECF-SGBRE recognizes that, in spite of the implementation of different management measures in the last 18 years, several important marine living resources (e.g. hake, red mullet, deepwater rose shrimp) around Sardinian coasts (GSA 11) are currently overexploited (see SPAR 2004, SPAR 2006).

STECF-SGBRE considers that the measures currently included in the Italian plans are matching only partially with those recommended as candidate measures by the scientific community. According to provided legislative acts, the Plan for the protection of aquatic resources, as mentioned in the Regional Law 14 April 2006 no. 3, art. 6, is constituted only by the fishing ban included in the Decree 14 September 2006 no. 25/v and the following modification decrees (see also TOR 7) alongside three historically permanently closed areas. However, the temporary fishing ban is not supported by any species-specific temporal and spatial analysis of recruitment, spawning activity, commercial CPUE and dynamic of fishing fleets in the scientific document (Sardinians plan for the protection of aquatic resources (SPAR 2006)) attached to the Plan. Those analyses are among those fundamental to establish the measurable objectives for the plan.

STECF-SGBRE considers that, nonetheless the implementations of different management measures (i.e. permanently closed areas), including the temporary fishing ban, in the last 18 years in Sardinia, most of the exploited stocks still show clear signs of overexploitation. Considering that the current implemented plan (2006) foreseen only a temporary fishing ban, STECF-SGBRE concludes that the plan for the protection of the aquatic resources in Sardinia will not be able to achieve larger catches in the near future and the sustainability of the stocks in the long term.

STECF-SGBRE concludes that the plans presented by the Sardinian authorities have not clear measurable objectives, in terms of targets to achieve (i.e. level of F and SSB, mean size/age of the stock, biodiversity, etc) as well as a time frame for achieving (see guiding principle established by the Commission in EC 2792/1999). STECF-SGBRE also reiterates that conservation measures should follow the general guidelines delineated by STECF in the report of the November 2005 plenary session and STECF-SGBRE 2006.

STECF-SGBRE recommends that an analysis of trends in CPUE, F and Y/R based on data from experimental surveys extended as far back in time as possible (from 1985), and, landings available through DCR (from 2001) would improve the possibilities to assess more efficiently the Sardinian resources and propose adequate measures for their protection, recovery and long term sustainability.

STECF-SGBRE notes that there is not information as mapping of stock distribution and/or nurseries areas in the Sardinian's plan for the protection of aquatic resources (SPAR 2006) that justify the selection of areas currently closed to the fisheries. Those areas should be aimed to protect nurseries, important areas of spawning or essential habitats for alienic resources. However, mapping of nurseries areas were presented in the STECF-SGMED (2006) for red mullet and hake. For hake, the nursery areas are located well outside the implemented closed areas while for red mullet implemented closed areas overlap only partially with individuated nursery areas.

STECF-SGBRE recommends that the areas should be larger (at least 4 times larger in extension than the actual areas) to be significant for the long term sustainability of the resources. For comparative purposes, the areas approved for protection by the GFCM 2006 in international waters consist of surfaces ranging from 1000 to 10 000 km².

As recommended by STECF (SEC 2002 (1374)) and (SEC 2006 (XXXX)), STECF-SGBRE also recommends that effective management measures for the protection of the marine resources should not only include compulsory fishing ban and permanently closed areas (assuming that their design is supported by simulation analysis showing a substantial reduction of the yearly fishing mortality exerted on the stock), but also:

- ✓ a progressive reduction of the effective fleet capacity, according to the different fleet segments involved
- ✓ the establishment of permanent closed areas to all fishing activity (including non commercial fisheries) where recruitment, spawning aggregation, concentration of adult individuals and essential fish habitats of the exploited species are located
- ✓ an increase in selectivity of the gears in order to decrease F on the juveniles and reduce discard, where appropriate

Also, the implementation of all those measures must be proven to be effective, using simulation tools, to reduce F, increase SSB, R and mean age and size of the stocks, maintain biodiversity and improve the status of essential fish habitats (as identified in the

STECF-SGMED report in 2006), in the medium and long term.

According to the latest scientific information (SPAR 2006; Fig. 12) used to establish the guidelines of the plan there has been a continuous and strong increase of the TSL of the large vessels (> 70 TSL) and almost a stable trend for smaller fishing boats (< 70 TSL). In spite of this, a permanent reduction of the fishing capacity is not foreseen in the plan.

STECF-SGBRE notes that the current status of overexploitation and no improvement in biomass and F has been observed in the last decade for most of the Sardinian resources. Thus, STECF-SGBRE concludes that, since the temporary fishing ban is neither appropriately designed nor scientifically justified and documented, it is likely that the status of the resources will not further deteriorate (in terms of F exerted at the stock level) in absence of a temporary fishing ban as that implemented by the Sardinian authorities in the last 18 years.

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