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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES – 57TH PLENARY MEETING REPORT (PLEN-18-01)

Edited by Clara Ulrich & Hendrik Doerner

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Abstract

Commission Decision of 25 February 2016 setting up a Scientific, Technical and Economic Committee for Fisheries, C(2016) 1084, OJ C 74, 26.2.2016, p. 4–10. The Commission may consult the group on any matter relating to marine and fisheries biology, fishing gear technology, fisheries economics, fisheries governance, ecosystem effects of fisheries, aquaculture or similar disciplines. The Scientific, Technical and Economic Committee for Fisheries hold its 57th plenary on 9-13 April 2018 in Brussels.

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56th PLENARY MEETING REPORT OF THE SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (PLEN-17-02)

PLENARY MEETING

10-14 July 2017, Brussels

1. INTRODUCTION

The STECF plenary took place at the Centre Borschette, Brussels, from 9 to 13 April 2018. The chair of the STECF, Clara Ulrich, opened the plenary session at 11:00h. The terms of reference for the meeting were reviewed and discussed and consequently the meeting agenda agreed. The session was managed through alternation of plenary and working group meetings. Rapporteurs for each item on the agenda were appointed and are identified in the list of participants. The meeting closed at 16:00h on 13 April 2018.

2. LIST OF PARTICIPANTS

The meeting was attended by 30 members of the STECF, two invited experts and three JRC personnel. 10 DG MARE attended parts of the meeting. Section eight of this report provides a detailed participant list with contact details.

The following STCF members were unable to attend the meeting:

1. Massimiliano Cardinale
2. Jenny Nord

3. INFORMATION TO THE COMMITTEE

STECF work program 2018

The STECF was informed on the current state of planning for meetings and requests for advice by written procedures in 2018.

Meetings 2018 updates:

- EWG 18-08 Elasmobranch, 11-15 June, Brussels – EWG has been cancelled
- Working Group for the preparation of EWG 18-11: New FDI – date tbd, JRC
- EWG 18-11: New FDI, 10-14 September, Ispra / Varese / JRC – co-chaired by Arina Motova & Willy Vanhee
- Working group for the preparation for STECF EWG 18-14: Balance / Capacity – 2 days in week 23 July
- EWG 18-15: CFP monitoring: expansion of indicators – date set to 1-5 October, venue Brussels
- EWG 18-13: Stock assessments in the Black Sea 2018 - date moved to 24-28 September, venue Ispra, Chair: M. Cardinale, review procedure: OWP by end Ocotber

https://stecf.jrc.ec.europa.eu/meetings

Forthcoming written procedures:

No written procedures are currently foreseen prior to the July 2018 plenary meeting.

Election of new vice chair

Following the resignation of Massimiliano Cardinale from the vice chair position, the election for a new vice-chair for the remaining Committee term until April 2019 was held. Two nominations for the vice-chair position were received by the secretariat. Before the election, the candidates presented themselves to the plenary on 11 April. STECF members present elected Antonello Sala vice chair. The election took place on the morning of 11 April and was chaired by the secretariat.

4. ASSESSMENT OF STECF EWG REPORTS

4.1 EWG 17-15 Stock assessments in the Mediterranean Sea - part II

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meetings, evaluate the findings and make any appropriate comments and recommendations.

STECF observations

The working group was held in Rome, Italy, from 27rd November to 3rd December 2017. The meeting was attended by 22 experts in total, including 2 STECF members and 2 JRC experts with two observers.

The objective of the EWG 17-15 was to carry out demersal stock assessments defined in the ToRs. STECF acknowledges that like the previous Mediterranean assessment meeting (STECF-17-09) EWG17-15 had two additional days to answer the ToRs. STECF notes that this additional time was of considerable help, allowing a completion of the assessments and a full review of the work and agreement on conclusions during the meeting.

STECF comments

STECF considers that the EWG addressed thoroughly all ToRs. STECF notes that the EWG carefully reviewed the quality of the assessments produced. Some analyses were considered to be suitable for short term forecasts, others were only considered sufficiently reliable to estimate F-status, and no forecast was produced.

For several assessments in GSAs 20, 22 and 23 it was not possible to conclude stock status or provide advice. This is considered to be partly because of the absence of Greek demersal survey indices for several years. This situation is only likely to improve if the surveys are carried out every year in the future.

A total of 19 area/species combinations were evaluated (Tables 4.1.1 and 4.1.2). The EWG has carried out short term forecasts out of seven age-based or surplus production analytical assessments. Catch advice for two stocks was based on biomass index methods. For ten stocks no catch advice has been provided, however, of these five have an indication of stock status in terms of fishing mortality relative to MSY. The main results are summarised in bullets below. Statements on catch changes are in relation to reaching Fmsy in 2019:

- Hake in GSA 17-18 is declining and is being overfished. Catches should be reduced by a half as a minimum to reach F_{MSY} in 2019..
- Red mullet in GSA 17-18 has increased rapidly over the last few years. Fishing mortality is uncertain but probably below MSY in the last two years. Catches should be increased by no more than 25% in 2019.
- Norway lobster in GSA 17-18 is at a low level with biomass close to B_{lim}, F is at 2.3 time MSY. Catches should be reduced by around 60%
- Common Pandora in GSA 17-18 has been increasing over the last five years, fishing mortality is uncertain. Catches should be decreased by 4%
- Deep-water rose shrimp in GSA 17-18-19 is increasing and is being exploited at 2 times MSY. Catches should be reduced by around 10%

- Thornback ray in GSA 17 is depleted, fishing mortality is uncertain but high catches should be reduced.
- Common cuttlefish in GSA 17-18 is likely to be exploited above MSY, but catches are uncertain and no catch advice can be provided.
- Sole in GSA 17 is increasing but is overfished. Catches should be reduced by at a half as a minimum to reach F_{MSY} in 2019
- Spottail mantis shrimp in GSA 17-18 has been increasing over recent years, F is at 2 times MSY. Catches should be reduced by around 10%.
- Hake in GSA 19 is declining and fishing mortality is estimated several times above Fmsy. Catches should be reduced by around 80%
- Hake in GSA 20 data is sparse due to missing DCF data and uncertain, assessments give conflicting results, no catch advice is provided.
- Red mullet in GSA 19 has been increasing over recent years, F has been decreasing and is at 1.6 times MSY. There is considerable uncertainty in reported catches from different sources, but survey data indicate a required reduction of these of around 10%.
- Red mullet in GSA 20 data is sparse, due to missing DCF data, and uncertain, assessments give conflicting results, no catch advice is provided.
- Hake in GSA 22 data is sparse, due to missing DCF data and uncertain; the stock is considered to be increasing and exploited close to MSY. No catch advice is provided.
- Red mullet in GSA 22 data is sparse, due to missing DCF data, and uncertain; the stock is considered to be increasing and under exploited. No catch advice is provided.
- Deep-water rose shrimp in GSA 22 data is sparse, due to missing DCF data, and uncertain; the stock status is unknown. No catch advice is provided.
- Hake in GSA 23 data is sparse, due to missing DCF data, and uncertain, the stock is considered to be declining and over exploited. No catch advice can be given.
- Red mullet GSA 23 data is sparse, due to missing DCF data, and uncertain; assessments give conflicting results. No catch advice is provided.
- Deep-water rose shrimp in GSA 22 data is sparse due to missing DCF data and uncertain, assessments give conflicting results, no advice is provided.

STECF noted the difficulties encountered by the EWG in selecting a single assessment for both hake in GSA 17&18 and sole in GSA17 due marked differences particularly in biomass resulting from different modelling approaches (SS3 vs a4a) and from shape of the selection curve (dome-shaped vs. logistic). STECF agrees with the conclusion that both stocks were being overfished, however, accepts that it is not possible select a single assessment based on the information provided in the EWG report (Section 5.1 and Section 5.8). STECF considers that more work is required to identify and confirm a single agreed assessment for each of these stocks. Tables 4.1.2 and 4.1.3 contain the conclusions, in terms of F in 2016 and changes in catch for 2018, that STECF draws from the analyses completed for both these stocks.

Regarding hake in GSA 17&18, STECF is concerned that the growth rates and selection that fit best in the SS3 model gives SSB constituted almost exclusively of old animals, with around 90% of SSB at ages greater than those that contribute to the fishery. Further exploration of both growth and selection is required to establish what is driving these aspects which are not seen to the same extent in the combined fleet model (a4a). However, based on results of both models STECF is able to conclude that F is high, greater than F_{MSY} and that catches need to be reduced by a half as a minimum to achieve F_{MSY} in 2019. STECF is not able to advise on the current state of biomass for this stock.

For sole in GSA 17 similar issues exist, though differences are less extreme in terms of SSB, and there is less uncertainty on growth parameters. An extensive further evaluation was carried out after the EWG, concluding that results depend strongly on the choice of selection for the fishery, and even more on the choice of selection curve for the beam trawl survey. When strong dome shaped selectivity is used substantial biomass, coming from ages and areas outside the survey and fishery is estimated by the model, similar to the case of hake. Further exploration is required to determine why strongly domed selection is better fitted by the SS3 model, whereas evaluation of mortality signals in the survey does not support selection in this form. At present STECF is able to conclude that for sole in GSA 17, F is greater than F_{MSY}, and catches need to be reduced by a half as a minimum to achieve F_{MSY} in 2019.. STECF also advises that SSB has been increasing over the last three years, although the historical levels of biomass remain uncertain. STECF has discussed the various hypotheses and evidences underpinning the various models, and notes that this might be further analysed by STECF 18-16. Although no unanimous conclusion could be reached by the committee, it is suggested that unless new conclusions are reached by EWG 18-16, the intermediate SS3 model (SS3 Run7 section 6.8.3) with intermediate levels of cryptic biomass (around 15% of adult biomass not accessible to the fishery) is used as the main basis for MAP analyses in STECF 18-17. This run is more conservative than the run with dome-shaped selection.

STECF notes that the EWG has estimated and provided values of F_{MSY} and MSY ranges for five stocks (Table 4.1.3). The values of F_{low} and F_{MSY} are regarded as reasonable estimates that can be expected to be precautionary and thus may be used directly. The values for F_{upper} are indicative only; they have not been evaluated as precautionary and should not be used as such without further evaluation.

STECF notes that data quality deficiencies and recommendations for further research studies and data collection have been comprehensively addressed by the EWG for each stock in section 7 of the report, as well as summarized in stock summaries.

In response to ToR 10, STECF notes that the EWG has provided maps of persistence of several species and life stages, based on MEDITS trawl survey data: Hake (juveniles and adults); Red Mullet (adults and spawners); Deep-water rose shrimp (juveniles and adults). Juveniles as here defined by maturation state not fish size. The distribution of adults relates to the distribution at the time of the year when the MEDITS survey is carried out. For red mullet this may also be suitable as a spawning area as it is possible to identify spawners at the time of the survey. Data is unsuitable to draw distribution of persistence of juvenile red mullet.

The maps can be used to inform selection of suitable areas to protect juveniles or adults. The information produced by the EWG provides the underlying information to allow the selection of areas with high persistence of adults or juveniles. If it is intended to define areas for use as a part of spatial management, such as closed areas, a further step involving the definition of explicit boundaries is required. This step would apply GIS (Geographical Information System) methodologies on the information supplied here to define adequate areas. As a final step managers will be required to make decisions on the proportion of the area of persistence to be closed for fishing.

STECF conclusions

STECF concludes that the EWG addressed all ToRs appropriately. STECF notes that the EWG applied assessment methodologies that allowed estimation of uncertainty and conditioning of operating models to be used in future fishery management evaluations (MSEs).

STECF endorses the assessments and evaluation of stock status produced by the EWG.

STECF endorses the short term forecasts produced by the EWG. In the cases of hake in GSA 17&18 and sole in GSA 17, where conflicting results were produced by different assessment

methods, STECF concludes that as precautionary measure catches should be reduced by a half as a minimum to achieve F_{MSY} in 2019.

STECF notes that the EWG was not able to assess stock status or provide advice for several assessments in GSAs 20, 22 and 23, partly because of the absence of usable time-series of demersal survey indices. Over the last decade, surveys were performed only in 2008, 2014 and 2016. Improving the quality of the stock assessments require the surveys to be carried out every year in the future.

Table 4.1.1. Summary of work was attempted and basis for advice (given in bold). A4A, XSA, and SS3 are age based assessment methods; SPiCT and CMSY are surplus production models. STF is a standard short term projection with assumptions of status quo F in the intermediate year (2017) and recent historic recruitment for 2017 and 2018. HR (Harvest Rate) is a fraction of biomass in the year of the assessment, and assumes no population growth where STF is not suitable.

Area	Species	Previous Analysis / year	Attempted analyses and basis of advice (in bold)
GSA 17-18	Hake	XSA 2015 SS3 2016	SS3 a4a STF
GSA 17-18	Red mullet	GSA 17 (2016) GSA18 (2016)	SS3 a4a XSA **biomass from a4a**
GSA 17-18	Norway lobster	SPiCT 2016	**SPiCT HR**
GSA 17-18	Common Pandora		XSA, a4a **biomass index**
GSA 17-18-19	Deep-water rose shrimp	XSA 2015	XSA, **a4a STF**
GSA 17	Thornback ray		**Catch curves**
GSA 17-18	Common cuttlefish		CSMY
GSA 17	Sole	SS3 2016	SS3 a4a STF
GSA 17-18	Spottail mantis shrimp	XSA 2015	XSA **a4a STF**
GSA 19	Hake	XSA 2015	XSA **a4A STF**
GSA 20	Hake	VIT, ASPIC, SURBA 2012	CMSY SPICT a4a
GSA 19	Red mullet	XSA 2015	xsa **a4a STF**
GSA 20	Red mullet	ASPIC, SURBA and LCA 2012	**SPiCT CMSY a4a**
GSA 22	Hake	2010(production)	**SPiCT**
GSA 22	Red mullet	2010(production)	**SPiCT a4a**
GSA 22	Deep-water rose shrimp		**SPiCT**
GSA 23	Hake		**SPiCT**
GSA 23	Red mullet		**SPiCT**
GSA 23	Deep-water rose shrimp		**SPiCT**

Table 4.1.2. Summary of advice from EWG 17-15 by area and species. F 2016 is terminal F in the assessment. Change in F is the difference as % change between targeted F in 2018 (Fmsy) and the estimated F in 2016. Change in catch is % change from catch estimated 2016 to projected catch 2018. Biomass status is given relative to B_{MSY} where available, (only in *Nephrops* GSA 17-18) and as an indication of trend over the last 3 years for stocks with time series analytical assessments or biomass indices. (^{L} indicated landing only, not catch).

Area	Species	Method/ basis	F 2016	F 2018	Change in F	Catch 2016	Catch 2018	Change in catch	Biomass (status)
GSA 17-18	Hake	SS3/a4a	$>F_{MSY}$	0.19	<-50%	5200	<2600	<50%	Declining
GSA 17-18	Red mullet	A4a biomass index				6188	7706	25%	Increasing
GSA 17-18	Norway lobster	SPiCT STF	0.49	0.21	-57%	1022	441	-57%	0.33 B_{MSY}
GSA 17-18	Common pandora	biomass index				232	222	-4%	Increasing
GSA 17-18-19	Deep-water rose shrimp	a4a STF	1.44	0.70	-51%	3559	3225	-9%	Increasing
GSA 17	Thornback ray	Level advice	Reduce catch						Depleted
GSA 17-18	Common cuttlefish	CMSY	above F_{MSY}	No advice					
GSA 17	Sole	SS3/a4a	$F>F_{MSY}$	0.25	<-37%	2100	<1050	<-50%	Increasing
GSA 17-18	Spottail mantis shrimp	a4a STF	0.65	0.38	-42%	4360	4028	-8%	Increasing
GSA 19	Hake	a4a STF	1.42	0.16	-89%	802	178	-78%	Declining
GSA 20	Hake	SPiCT CMSY a4a	Conflicting results	No advice					

GSA 19	Red mullet	a4a STF	0.56	0.36	-36%	257	253	-2%	Increasing
GSA 20	Red mullet	SPiCT CMSY a4a	Conflicting results	no advice					
GSA 22	Hake	SPiCT	Close to MSY	no advice					Increasing
GSA 22	Red mullet	SPiCT a4a	Under exploited	no advice					Increasing
GSA 22	Deep-water rose shrimp	SPiCT	No conclusion	no advice					
GSA 23	Hake	SPiCT	Over exploited	no advice					Declining
GSA 23	Red mullet	SPiCT	No conclusion	no advice					
GSA 23	Deep-water rose shrimp	Not possible	No conclusion	no advice					

Table 4.1.3. F_{MSY} ranges (Flow and Fupp) for demersal stocks from the Mediterranean. The values for Fupp are indicative only they have not been evaluated as precautionary and should not be used as such without further evaluation.

GSA	Species	F_{curr}	F_{MSY}	F_{low}	F_{upp}	F_{curr}/F_{MSY}
GSA 17-18	Norway lobster	0.49	0.21	0.14	0.29	2.33
GSA 17-18-19	Deep-water rose shrimp	1.44	0.7	0.47	0.95	2.06
GSA 17-18	Spottail mantis shrimp	0.65	0.38	0.25	0.52	1.71
GSA 19	Hake	1.42	0.16	0.11	0.22	8.88
GSA 19	Red mullet	0.56	0.36	0.24	0.49	1.56

4.2 EWG 17-16 (Transition) Economic report fish processing 2017

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meetings, evaluate the findings and make any appropriate comments and recommendations.

STECF observations

The Expert Working Group, STECF EWG 17-16, on the Economic report of the EU fish processing sector 2017, was convened in Ispra, Italy 15-19 January 2018.

STECF reviewed the report and notes that the EWG adequately addressed all the ToRs. In addition the EWG provided a very well developed section on trends and drivers of changes in economic indicators and an outlook of the future of the fish processing industry. STECF observes that EWG 17-16 was able also to answer a specific request arrived from DG-MARE during the meeting about the effects of the structural funds on the fish processing sector. Considering the time limit and the lack of preparation for this request, experts were only able to carry out a limited analysis of data provided.

The report is the sixth report of its kind and provides a comprehensive overview of the latest information available on the structure, social, economic and competitive performance of the fish processing industry at the national and EU levels.

The results of the 2017 EU fish processing sector analysis shows that in 2015 the sector consisted of around 3,600 enterprises (with fish processing as main activity), of which 57% were micro-enterprises with less than 10 employees. The sector employs around 124 thousand persons of which 45% are female. Most of the EU employment is to be found in enterprises with less than 10 employees (55%) and only 14% of it in companies with more than 50 employees. In 2015 the sector produced a total income of €30.3 billion. In general 2015 data show a deterioration of the economic performance if compared to 2014 (e.g. GVA and net profit were respectively 14% and 21% lower than in 2014) even if the sector still remain profitable.

STECF observes that landings of European vessels cover only approximately 40% of the total raw material requirements of the EU fish processing industry (according to external data or expertise for some MS available in the EWG), The EU fish processing industry is therefore still influenced by the developments in the global fish markets. Whether the dependency will be reduced as more stocks in European waters are fished at MSY level remains to be seen. Latest information on the EU aquaculture production seems to indicate that there will be a growing supply from this sector (e.g. see Danish national chapter).

STECF observes that several Member States especially around the Eastern Baltic Sea were and are still negatively affected by the Russian embargo, being affected by a substantial reduction in exports to Russia.

STECF observes that the data coverage and quality continues to improve compared to the previous reports, as all MS who were legally obliged to deliver data have now done so and the EWG was able to produce a national chapter for all those countries. There were though missing

data for some years for some countries, e.g. Greece, delivering only data from 2011 to 2015, Romania, not delivering 2008 data and Netherlands, not delivering data for 2015 because for this year data were not collated, as stated in their National Programme (2017-2019).

STECF observes that the coverage section highlights some missing data in relation to the collection and delivering of data disaggregated by size categories (employment classes). The data collection of disaggregated data is not mandatory but, according to the last data call, in case a MS included a data collection for disaggregated data in the national plan there is an obligation to deliver them. The TORs for the EWG did not include an assessment of the coverage of the data by MS and, therefore, the EWG has not checked the coverage issues arising from the coverage report drafted by JRC and included in the report.

The EWG was requested to produce a "Special Chapter for the Comparison of the data and indicators of the DCF and Eurostat's Structural Business Statistics (SBS)". The aim was to understand whether a future STECF fish processing report could be based on Eurostat data as a main source (complemented by DCF data), considering that under EUMAP data collection for the fish processing sector is no longer mandatory and MS may probably skip the data collection on the fish processing industry under their Work Plans (WP).

The EWG checked the planned data collection at MS level under the new data collection Programme (2017-2019). All the MS WP were downloaded from https://datacollection.jrc.ec.europa.eu/wp-np-ar and a template prepared by experts was used to facilitate this check. STECF observes that the future data collection appears not to change so much: on 27 MS presenting a WP, 21 have included a data collection for the fish processing sector; of these 21 MS only 6 are going to use exclusively Eurostat SBS data. It is also worth noting that there will be a full comparability of future data (collected in 2017-2019) to past data (provided with the last data call) for most MS (16 countries of the 21).

STECF observes that the results of the SECFISH (MARE/2016/22 "Strengthening regional cooperation in the area of fisheries data collection") project as well as the national pilot studies on the possibilities to collect data on raw material will be likely available in advance of the next fish processing report.

STECF conclusions

STECF concludes that the Report on the Economic performance of the fish processing industry can be continued in the present form in the future. The performed analysis highlights that for most MS DCF data will not have Eurostat SBS data as main source and very negligible changes are foreseen under the WP.

STECF notes that one additional analysis was requested during the working group, which could thus not be completely addressed. STECF underlines the importance of the early planning of the ToRs ahead of the meeting, in order to give the chair and experts the time to adequately prepare the analysis.

The EWG was not requested to carry out an extensive check on coverage of data and concludes that this should be again part of the TOR for the next fish processing report. This would assist DG Mare in assessing the non-delivery of data, which may have legal implications (e.g. in case a MS proposed to collect data in the WP and not delivered).

STECF suggests that the main findings of the SECFISH project as well as of the national pilot project on the collection of raw material are considered in the next reporting period.

4.3 EWG 18-01 Data gaps and Biomass Escapement Strategy for Adriatic anchovy and sardine

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meeting, evaluate the findings and make any appropriate comments and recommendations.

STECF comments

EWG 18-01 was asked to develop and assess a biomass escapement harvest control rule (HCR) for anchovy and sardine in the Adriatic Sea (GSA 17-18) that would ensure a low probability of SSB to fall below B_{lim}. STECF reviewed the report of EWG 18-01 and notes that the EWG adequately addressed the ToRs. STECF acknowledges the extensive work undertaken by the working group.

STECF notes that information for the Adriatic eco-surveys on sampling design, sampling errors and abundance estimates uncertainty, was not available to the EWG. Consequently, only limited quantitative analysis could be carried out during the working group to assess the potential use of the current acoustic survey as a basis for a biomass escapement strategy HCR and to propose alternative settings. STECF notes that the conclusions on that term of reference (ToR 1.2) are thus mainly based on expert knowledge. STECF agrees with those conclusions but notes however that it would have been useful to quantify the impact of alternative survey settings (number of surveys, seasons) on the catch advice based on a biomass escapement strategy, and that such analysis could be further developed once the information needed is made available.

To address ToR 1.3, EWG 18-01 opted for a stepwise approach by first selecting from a grid of potential HCR parameters (biomass escapement, Besc; fishing mortality cap, Fcap), those which were delivering the objectives of low risk of falling below Blim ($P[SSB< B_{lim}] < 0.05$ across all operational models and secondly running management scenarios and robustness test using those selected parameters. STECF agrees with this stepwise approach which allows focusing the analysis on the "area of interest" and limit as much as possible the number of simulations to be conducted and interpreted.

STECF notes that the stock dynamics modelled in the simulations are somewhat optimistic due to the use of stock-recruitment models based on average recruitment, segmented regressions and geometric means. These models don't capture the linear relationship between SSB and recruitment observed in the data, which shows a decreasing trend in recruitment in the recent years. To mitigate this effect the EWG chose the most conservative combinations of Besc and Fcap parameters as candidates to parametrize the HCR.

With relation to the analysis of long term effects, carried out without considering stock assessment uncertainty, STECF notes that large biomass escapement levels lead to more frequent closures of the fishery or provide very small catches. Conversely, small biomass escapement levels need to be complemented with low fishing mortality caps to avoid large inter-annual fluctuations in catches and exploitation levels.

STECF notes however that assessment uncertainty leads to a strong degradation of the performance of the harvest control rules for both stocks, with an increasing risk of SSB falling below B_{lim}. In the case of anchovy this risk becomes about 20% to 30%, while for sardine 5% to 10%.

To evaluate short term effects, the EWG tested the requested set of catch options during the intermediate period of 2017-2020. Using real reported catches for 2017, assuming status quo catches in 2018 and catch reductions of 5-10-20% per year in 2019 and 2020. STECF notes that the proposed levels of catch reductions led to the collapse of the stock of anchovy. STECF notes that these results are associated with the very poor status of the anchovy stock in the Adriatic (STECF EWG 17-09), and considers that additional measures are needed in the short-term to reduce catches and increase biomass above Blim.

For ToR 2 (economic analyses), STECF notes that, because of the limited time available, EWG 18-01 used an approach based on short-term projections. This approach was used for the AER short-term projections (STECF 2017b) through BEMEF (extension of the EIAA models). EWG 18-01 explored alternative functions to compute variable costs to the inverse of the Cobb-Douglas function (in order to link the estimated catches and biomass resulting from the HCR with corresponding fishing activity) as well as an alternative approach based on the existence of a correlation between fuel consumption per kilo of landings and the ratio between total catches and fishing mortality. The low number of observations for Croatian purse-seiners (only 4 years) did not allow the EWG to conclude with the parameters' estimation for that fleet.

STECF suggests that further work should be done on the socio-economic sustainability of the fishery, exploring e.g. the use of the minimum break-even revenue to set the minimum catches required from the HCRs and/or the maximum level of risk required to make these fisheries profitable. STECF also suggests that such analysis would also need to take into account the effects of a change in the level of catches on the canning industry and tuna farms, since a significant part of the catches are allocated to these industries.

Finally, STECF recalls the comments made by PLEN 17-01 (in ToR 4.2) that, "a common database with stock assessment results and DCF data will be a relevant development on bio-economic modelling, given the time require to collate all the data coming from different sources. Development of calibration methods based on an integrated database gathering main data needed for bio-economic parametrisation would improve the ability to perform impact assessments in a short interval". The development of such calibration methods would improve the ability of experts to perform impact assessments more quickly, such that they could be done effectively within a short EWG.

STECF conclusions

STECF endorses the general conclusions and recommendations from the EWG:

- STECF considers that the current acoustic survey settings could potentially be used to set fishing opportunities based on a biomass escapement strategy. Furthermore, providing the survey index to the assessment EWG, in the same year the survey is carried out, would allow a more precise application of the escapement strategy by removing the need to project the intermediate year. Having several surveys would also provide better estimates of recruitment for each stock (in the beginning of the year for anchovy and second half of the year for sardine), and better indications of spawning stock biomass, (in the summer for anchovy and winter for sardine).

- Under the condition of perfect knowledge of the stock dynamics (no error in the stock assessment results), the selected combinations of values of biomass escapement and fishing mortality caps generally fulfil the condition of a low probability of SSB to fall below B_{lim}. However, the inclusion of stock assessment uncertainty leads to a very strong increase in the risk. STECF thus consider that the framework developed during the EWG and the results of the simulations can serve as a basis for further discussion. However, the implementation of an HCR would need to be more conservative than the results presented here in order to account for assessment uncertainty.

- In the long term, large biomass escapements lead to more closure of the fishery or provide very small catches, while small biomass escapements need to be complemented with low fishing mortality caps to avoid large fluctuations in catches and exploitation levels.

- The short-term simulations led to stock collapse for anchovy for any level of catch reductions. This result is the consequence of the current very poor status of the anchovy and STECF considers that for that stock, additional measures are needed in the short-term to reduce catches and increase biomass above B_{lim}.

- The analysis carried out by EWG 18-01 showed that there is a high percentage of monospecies catches in the fishing operations analysed for the fisheries for anchovy and sardine in the Adriatic Sea (GSA 17-18), suggesting that potential choke species effects should be limited.

- Economic analysis of the different scenarios and HCRs was attempted but the short time series of available economic data for some fleets did not allow a full analysis of management options. STECF suggests exploring alternative options of e.g. aggregating national fleets segments into broader regional groups, which may allow performing further bio-economic impacts assessments of the management measures in the short- and medium-term.

4.4 EWG 18-02 Technical Measures – Improving selectivity to reduce the risk of choke species

Background provided by the Commission

The North Western Waters Advisory Council (NWWAC) has developed a Choke Mitigation tool (CMT) which provides a means for the identification of choke situations for key stocks. It is designed to help assess what tools – improvements in selectivity; avoidance; quota flexibilities; and exemptions included in Article 15 of the CFP - are appropriate for individual stocks/fisheries to mitigate choke situations. It also provides a qualitative assessment of how and to what extent the available tools can reduce the deficit between catch and fishing opportunities.

Two expert workshops have been convened by the NWWAC and the NWW Regional group to work through the different stocks in the Celtic Sea, West of Scotland, the Irish Sea and Channel using the CMT. The threat of choking fisheries has been assessed for each of these stocks/fisheries and sea basins. The aim was to use this analysis to identify residual choke issues that can only be addressed at Union level with alternative measures over and above the existing tools available.

Each of the stocks assessed was classified depending on the extent of the problem as follows:

- "**High risk**" – catches are well in excess of current fishing opportunities and even with all the available mitigation tools applied there is a high risk of choke for multiple Member States.
- "**Moderate risk**" – catches are in excess of fishing opportunities for one or more Member States and the risk of choke is significant for these Member States but mitigation tools potentially can solve the problem.
- **"Low or no apparent risk"** – catches are in line with fishing opportunities and the risk of choke is low or there is no apparent risk with the mitigation tools available.

The choke mitigation tool has proven to be an extremely useful tool for carrying out this evaluation, but the analysis carried out was meant as illustrative and to identify stocks where chokes may be an issue and to identify what tools maybe applicable to mitigate choke situations. The analysis has identified 12 stocks where there is a high risk of residual choke issues. For 6 of these stocks – **whiting VIIb-k; sole and plaice VIIf,g; whiting VI, cod VIIa; plaice VIId,e** - the available measures and tools will significantly reduce the choke risk provide they are used appropriately. For the other 6 stocks – **haddock VIIb-k, skates and rays VI and VII, cod VIa, saithe VI, whiting VIIa and skates and rays VIId,e** - additional measures or a different management approach is likely to be required to prevent multiple fisheries from being choked. The analysis has identified a further 13 stocks where there is a moderate risk of residual choke issues for one or more Member States. The available tools and measures can significantly reduce this risk for these species.

In the case of the 12 high risk stocks, improving selectivity has been identified in 9 of these stocks as one of the main mitigation actions to reduce the risk of fisheries being choked. In addition improving selectivity was seen as an important mitigation action for a further 5 stocks of the 13 identified as having a moderate risk. However, as the CMT is largely qualitative rather than quantitative analysis the extent to which selectivity and in which fisheries was not fully identified.

Request for EWG-18-02

In order to address this and in particular confirm that the high risk stocks identified have residual choke issues that will require additional measures to solve, a further analysis is required. This analysis should identify the fisheries in which the high risk stocks are caught and in which of these fisheries improving selectivity is appropriate on the basis that discard rates are high. The analysis should also identify the selectivity tools available to improve selectivity and assess the knock-on effects of utilising these tools in the fisheries identified. Therefore for the stocks listed. STECF is requested to*:*

1. Describe the main fisheries in which the high risk stocks identified are caught and identify whether catches are from a targeted fishery or as a bycatch. For these fisheries identify the catches of the relevant stock and the main gear types used.
2. Assess in which of these fisheries improving selectivity may be possible.
3. Identify in these fisheries what selectivity devices and gear modifications are available that could improve selectivity.
4. Assess the likely reductions in unwanted catches of the relevant stock that might reasonably be achieved based on the results of past trials carried out with these selectivity devices and gear modifications,
5. Assess the likely economic impacts resulting from such changes in selectivity on the basis of losses of marketable catches of the stock or reductions in the marketable catches of other species contrasted with the economic impacts of a choke situation.

The High risk stocks are:

- Haddock VIIb-k
- Whiting VIIb-k
- Sole VIIf,g
- Plaice VIIf,g
- Cod VIa
- Whiting VIa
- Cod VIIa
- Whiting VIIa
- Plaice VIId,e

The moderate risk stocks are:

- Hake VI and VII
- Cod VIIb-k
- Haddock VIa
- Haddock VIb
- Haddock VIIa

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meeting, evaluate the findings and make any appropriate comments and recommendations.

STECF Observations

STECF acknowledges the work undertaken by the EWG chair and experts to produce the report of EWG 18-02, Technical Measures. EWG-18-02 identified fisheries (gear, target species and

area combination) in which there is a high risk of choke problems that will persist unless additional tools or measures, over and above what is contained in the CFP and supporting legislation, are applied. As detailed below, STECF notes that there are a large number of cases of high risk stocks,, and a fully detailed assessment of each ToR for each stock and fishery could not be performed within one week. The EWG provides therefore a very good overview about the issues, sources of information, data and models available and represents a very useful preliminary assessment of the likely impacts of the alternative scenarios on fishing businesses. STECF notes however that a more detailed case-by-case assessment may be further required in order to inform decisions about policy or regulatory steps that could be taken to avoid choke situations.

STECF observes that high risk stocks (high risk of causing a choke situation) identified are caught either as target species or as a bycatch. For fisheries involving high risk stocks, the catches of the relevant stock and the main gear types used are provided. **TOR 1, Description of the main fisheries,** is fully addressed in section 3 of the EWG 18-02 report.

STECF observes that **TOR 2**, **Assessing Fisheries for which Selectivity may be Improved**, is addressed in section 4 of the EWG 18-02 report, where these fisheries (stock groups) are listed in a table at page 42. The fisheries were identified as having high discards quantity and also high discard rates thus vessels involved would benefit most from selectivity improvements. The majority of these fisheries involve vessels using TR2 or BT2 gear, with codend mesh sizes of less than 100 mm. There are also several TR1 fisheries with high level of discards and high discard rates.

The EWG identified available selectivity devices and gear modifications (**TOR 3,** section 5) that could be used when fishing for or trying to select out these high risk stock groups. STECF observes that, given the wide range of selective gear options that have been tested for different fisheries, and the time available to the EWG, it was not possible for EWG 18-02 to fully assess the effect of all the potential gear modifications on unwanted catches of the relevant stocks. STECF notes that, as ICES and STECF do not routinely report catches-at-length for the relevant stocks, the evaluation of the relative impact of different selectivity changes on catches-at-length is limited. Therefore, in **TOR 4**, **Likely reductions in unwanted catches** (section 6), EWG 18-02 explored the potential effect on catch profile using different selectivity improvements only for a limited range of roundfish species and sea areas where these are considered as high risk of causing choke situations.

STECF observes that EWG 18-02 was not able to assess all the economic impacts (**TOR 5, Likely Economic Impacts**, section 7), namely loss of marketable catch, for all the fisheries, due to the complexity of the issue and time constraints. The report provides two case studies applying a Landing Obligation Impact Assessment Model, a fairly simple and limited Excel model developed during the EWG meeting and applied to several sea areas, and the SEAFISH model (Mardle et al., 2017), a more comprehensive, bio-economic model developed for the UK fleet. Both models were developed to provide information on possible choke stocks and effects on fleets.

STECF observes that the simple Excel model created during the meeting was applied to fisheries in areas VIIbk, VIIfg, VIIde, VIIa and VI and includes a limited number of stocks. Analysis shows that MS fleets would be affected differently. In some cases, vessels would reach a choke situation even if they had implemented mitigation measures and subsequently would forego a substantial amount of catch of other stocks. In other cases, after adopting mitigation measures, and given the assumptions made, vessels would be able to avoid choke situations and land a higher quantity of fish after applying the mitigation measures. The impacts are analysed for stocks listed in the EWG ToRs and for which data were made specifically available for the meeting, and a large number of species are missing.

STECF notes that the SEAFISH model was used to provide information on choke effects and possible impacts of new technical measures for three UK fleets. The EWG report provides results for UK Northern Irish *Nephrops* fleet fishing in area 7 and Scottish *Nephrops* trawl and

Demersal trawl fleets fishing in West of Scotland (ICES Area 6a). The SEAFISH model estimates at which point stocks might choke the fleet under different modelled scenarios with and without additional selectivity measures. It was also possible to show how changes in quota allocations to the fleets may reduce the choke effects. The UK analysis shows that changes of selectivity in combination with the quota management can help UK fleets to delay the choke point or reduce the level of foregone catch before choke occurs. However the selectivity improvements tested do not fully eliminate the problem of choke and its economic implications. The extent to which gear selectivity can help to mitigate against the risk of choke varies according to the fleet and the stocks.

Fleet	**Model outputs**
Northern Irish *Nephrops* trawl fleet in area 7	Fleet chokes on whiting 7a in 2019. Selectivity adjustment can improve situation for all scenarios (compared to initial scenario), effect is limited, choke risk remains without extra quota for the fleet.
Scottish *Nephrops* trawl fleet in area 6	Zero TAC stocks (cod and whiting) are choke stocks area 6. Use of 80mm + 160mm square mesh panel, in combination with quota movement, allows fleet to increase effort until choke point from 9% of 2016 days at sea in B4 to 50% of 2016 days at sea in both quota trade scenarios.
Scottish demersal trawl fleet in area 6	Effort of the fleet was mostly in North Sea, but 23% annual effort was in area 6, using TR1 and TR2. Selectivity improvements and quota management delays choke point until 54% of 2016 actual days at sea.

STECF conclusions

STECF concludes that the EWG 18-02 report identifies some key stocks with high risk of causing choke situations and some gear selectivity improvements that could reduce the risk of choke situations occurring at all, or could potentially delay choke situations to a point later in year, in the Celtic Sea, West of Scotland, the Irish Sea and Channel. Delaying a choke situation until later in the year could allow enough revenues and operating profit to enable a vessel business to continue to operate as solutions are found to avoid choke situations altogether.

STECF concludes that the limited review of gear trials did identify some modifications that might improve selectivity, with a view to avoiding choke situations. STECF concludes that there are also likely to be other trials, not included in the review, which have identified gear modifications that could improve selectivity. STECF concludes that some of the gear modifications listed in one sea area might also be relevant to other sea areas.

STECF concludes that further investigation is needed to assess the potential for gear modifications to prevent or delay choke situations in the identified stocks/fisheries. In recent years there have been several trials to test the effects of modifying gear. While many of these trials are limited in time and space, many have demonstrated the potential to change selectivity. Nevertheless, the trials have also highlighted how difficult it is to improve selectivity without reducing marketable catch to the extent that fishing operations are not profitable. This difficulty exists particularly for trials testing larger codend mesh sizes, owing

to the discrepancy in the marketable size of different species caught simultaneously. STECF concludes nevertheless that large-mesh and/or square-mesh panels in the trawl body may offer effective alternative or complementary solutions to avoid or delay choke situations under the landing obligation (see **Error! Reference source not found.** below).

STECF recognises that most trials consist of a relatively low number of hauls, and modified trawl designs are tested only to a limited extent. STECF concludes that, until economic incentives motivate vessel operators to improve selectivity, the full potential to improve selectivity cannot be determined. The intended consequence of the landing obligation is to motivate vessel operators to avoid unwanted catches, but the incentive will not arise unless the regulation is adequately enforced. The ability to avoid choke by illegally discarding unwanted catches, could remove the need and the potential for gear-based selectivity improvement. With effective enforcement of the landing obligation, vessel operators would begin to base decisions on their choice of gear on trade-offs between risk of choke, risk of infringement and risk of less profitable or unprofitable fishing due to loss marketable catches. There are examples of proactive vessel operators who are making positive progress to reducing unwanted catches through gear selectivity (and through other changes to fishing practices) but the overall discard rates for fleets indicate that these individuals are in the minority.

STECF notes that the dissemination of gear trial results to fishermen is important and recent initiatives, including the gear trial factsheets of the H2020 Project DISCARDLESS (www.discardless.eu/selectivity_manual) and the Gearing Up initiative (https://gearingup.eu), are increasing access to trial information for fishermen.

STECF concludes that the results from the simple excel model are of some interest but the usefulness of some results is limited because the model does not use data on all fish stocks, is based on unrealistic assumptions and presents only partial economic impact assessment. Some of the scenarios presented simply rely on the assumption that somehow the first choke stock has been resolved, and then go to show which stock would be the next to cause choke. E.g. for demersal fish species in Area 6a, a scenario is presented that assumes that somehow, the choke on cod 6a has been resolved for all fleets. For most fleets tested, the mitigation of choke situations resulting from selectivity improvements was relatively small.

STECF concludes that the SEAFISH model is a useful tool for assessing the likely choke stocks and choke points based on assumptions of either status quo catch rates or improved selectivity catch rates, combined with quota management measures. For the UK fleets shown, STECF concludes that gear selectivity improvements tested may delay but are unlikely to enable fleets to avoid choke situations.

STECF concludes that, to assess economic effects of selective gear on choke mitigation, it is not sufficient to just explore possible losses of marketable catch as a change in fishing practice would most likely mean change in costs and/or changes in other economic variables, e.g. fish price. The application of more advanced analyses and bio-economic models, such as the SEAFISH model, but also including the long term effects of increased selectivity, would be useful but would demand a lot more time and preparatory work.

STECF concludes that although improvements to gear selectivity can help delay choke points, gear adaptation is only one of several changes that fishing businesses may need to make in order to fish legally and profitably under the landing obligation.

References

Mardle, S., Russell, J., Motova, A., 2017. Seafish Bio-economic Modelling: Methodology Report, 34 pp.

Table 4.4.1. Summary table based on the analysis of the relevant fisheries described in Section 3, and identified by EWG 18-02 where improvements in selectivity may be made. These fisheries were identified as having high discards and also high discard rates. For each fishery, STECF reported the relevant Primary choke stocks, the past experiments, and the EWG 18-02 suitable main findings to improve gear selectivity. Note: affix numbers added in parenthesis after the acronym (see list below) represent when present the mesh sizes.

Region	Gear Type	Fishery	Choke stocks	Experiments	STECF summary of EWG 18-02 most promising of the measures reviewed
Celtic Sea	TR1 DMC100+SMP120	Mixed Gadoid	Haddock	LDC, T90	Square mesh panels (SMP various mesh sizes); T90 cod-end and extension piece
	TR2	*Nephrops*	Haddock, whiting	LDC+SMP, SMC(45,55,65) LDC+SELTRA, CLH, DCA	Increasing cod-end mesh size (LDC), with larger mesh, square-mesh panels (SMP). Dual cod-end (separator trawl). Potential for BRDs(*)
	TR2	Directed whiting/hake (trawl and seine)	Haddock	LDC+SMP, T90	Cod-end mesh increase (DMC) with SMP
	TR2	Mixed demersal (angler, megrim, hake)	Hake	LDC+SMP	Cod-end mesh increase (DMC) with SMP
	BT2	Mixed demersal (angler, megrim, sole, plaice)	Haddock, whiting, plaice	LDC+SMP (conducted in Channel)	Cod-end mesh increase (DMC) with SMP (consider also T90). Potential for SMC(*)
Irish Sea	TR2	*Nephrops*	Whiting	LDC(80,90,100), CLH, SMC, SELTRA, SMP(120,200,300), BRD	Increasing cod-end mesh size (LDC), with larger mesh square-mesh panels (SMP). Potential for BRD(*)
	TR2	Queen Scallop	Whiting	-	Low unwanted catches, solution through internal UK quota swap

Region	Gear Type	Fishery	Choke stocks	Experiments	STECF summary of EWG 18-02 most promising of the measures reviewed
West of Scotland	TR1 DMC(120)+SMP(120)	Mixed Gadoid	Cod	LDB, LDC, LSP	Nothing identified as promising
	TR1	Mixed demersal	Cod		
	TR2	*Nephrops*	Cod	LDC(80,90,100)+SMP120, SMP, LDP in front the trawl, BRD	Cod-end mesh increase (DMC) with SMP
Channel	TR2	Mixed demersal/Non quota	Haddock	SMP(80,90,100,115), SMY in extension, LDP in front the trawl, T90 codend or extension, BRD	Cod-end mesh increase (DMC) with SMP; T90; SMY; LDP in front of trawl
	BT2	Sole	Plaice	LDM in extension, T90, SMC, LSP in front the trawl, HSP	Nothing identified as promising
	BT2	Mixed demersal/Non quota	Plaice		

*** Added by STECF as an additional potential suggestion List of acronyms used in the table.**

1. BRD: bycatch reduction devices (e.g. grids)
2. CLH: coverless and low headline trawls
3. DMC: diamond-mesh codend
4. DCA: dual codend arrangement/separator trawl
5. HSP: horizontal separator panel
6. LDM: large diamond-mesh
7. LDB: large-mesh belly sections
8. LDC: large diamond-mesh codend
9. LDP: large diamond-mesh panel
10. LSP: large square-mesh panel
11. SELTRA: SELTRA trawl
12. SMC: square-mesh codend
13. SMY: square-mesh cylinder
14. SMP: square-mesh panel
15. T90: diamond-mesh rotated of 90°

5. ADDITIONAL REQUESTS SUBMITTED TO THE STECF PLENARY BY THE COMMISSION

5.1 CFP monitoring

Background provided by the Commission

Article 50 of the Common Fisheries Policy (CFP; Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013) stipulates: "The Commission shall report annually to the European Parliament and to the Council on the progress on achieving maximum sustainable yield and on the situation of fish stocks, as early as possible following the adoption of the yearly Council Regulation fixing the fishing opportunities available in Union waters and, in certain non-Union waters, to Union vessels."

Request to the STECF

The STECF is requested to report on progress in achieving MSY objectives in line with the Common Fisheries Policy.

STECF observations

STECF notes that to address the above Terms of Reference a JRC Expert Group (EG) was convened to compile available assessment outputs and conduct the extensive analysis. The EG output was presented in a comprehensive report accompanied by several detailed annexes providing: 1) CFP monitoring protocols as agreed by STECF (STECF, 2017); 2a) R code for computing NE Atlantic indicators; 2b) R code for computing Mediterranean indicators and 3) ICES data quality issues corrected prior to the analysis. The report and Annexes are available at https://stecf.jrc.ec.europa.eu/plen18_01

STECF notes that the report is clear and well laid out, transparently describing the analysis undertaken, cataloguing changes made in approach since the previous report (2017) and including URL links to the various reports and stock advice sheets underpinning the analysis. STECF commends the effort employed in updating nomenclature following various changes to the ICES database and the careful attention paid to ensuring the correct figures were used.

The most significant changes in the 2018 approach were:

i) A revision of the Mediterranean sampling frame used for the analysis
ii) Where data were unavailable for the most recent year, the data from the previous year was rolled forward
iii) $MSY_{Btrigger}$ was used as a proxy for lower bound of B_{MSY}

Details of these changes and other points to note can be found in section 2 of the EG report.

The EG report then sets out results of the analysis for the ICES area of the NE Atlantic and Mediterranean & Black Sea separately in Sections 3 and 4 (respectively). Based on these results STECF provides an overview of what is currently known regarding the

achievement of the MSY objectives, drawing together the results from the different sea areas to provide a comparative picture. The overview focuses on a limited number of 'core' indicators earlier agreed by STECF (2017). The EG report contains results for a number of 'experimental' indicators which STECF notes are still at the development stage. It is expected that these will be further developed as part of another STECF EWG (EWG 18-15) to be held later in 2018 (see conclusions). In this report, "ICES Area" refers to all stocks in the FAO Area 27 in the Northeast Atlantic assessed by ICES, while the denomination "NE Atlantic stocks" refers more specifically to the stocks distributed widely, including outside EU Waters

Trends towards the MSY objectives in the ICES area and Mediterranean& Black Seas

The overview below describes the trends observed in the ICES area and the Mediterranean for the periods 2003 to 2016 and 2003 to 2015 respectively and applies to the stocks included in the reference list of stocks for these areas. The stocks are primarily those with a full analytical assessment (ICES Category 1).

Stock status in the ICES area

The indicators provided by the JRC EG show that stocks status has significantly improved (Figure 5.1.1) but also that many stocks are still overexploited in the ICES area, and that the rate of progress has slowed in the last few years. In the ICES area, among the 65 to 71 stocks which are fully assessed, the proportion of overexploited stocks (i.e. $F>F_{MSY}$, blue line) decreased from more than 70% to close to 40%, over the last ten years and seems to have stabilised in the last three years. The proportion of stocks outside the safe biological limits ($F>Fpa$ or $B<B_{pa}$, orange line), computed for the 46 stocks for which both reference points are available, follows the same decreasing trend, from 65% in 2003 to around 30% in 2016.

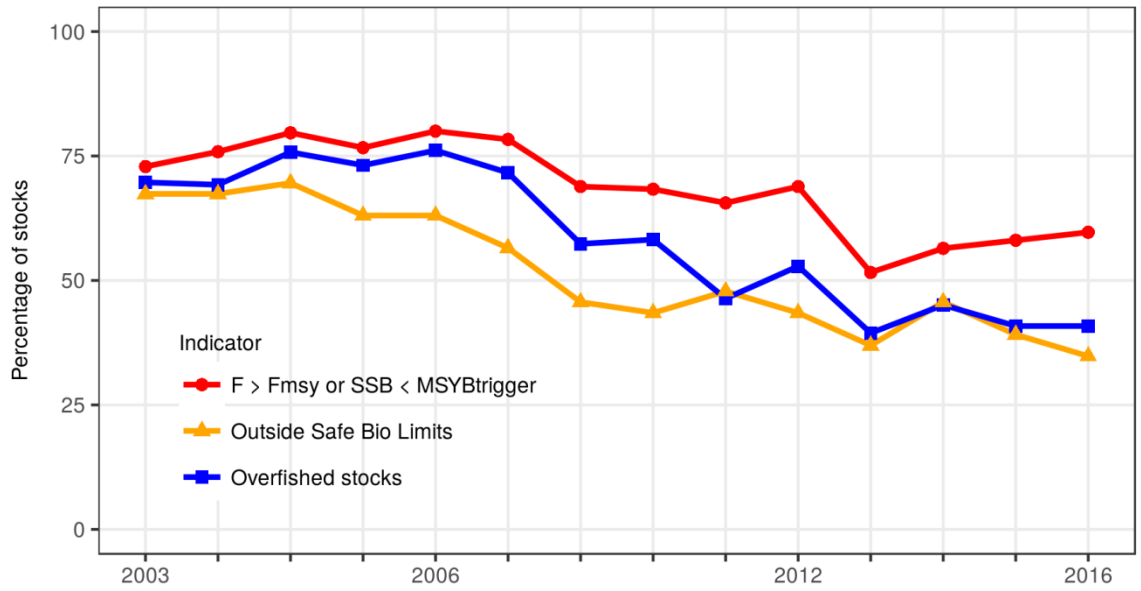


Figure 5.1.1. Trends in stocks status, 2003-2016. Three indicators are presented: Blue line: the proportion of overexploited stocks ($F>F_{MSY}$) within the sampling frame (65 to 71

stocks fully assessed in the ICES area, depending on year); Orange line: the proportion of stocks outside safe biological limits ($F>F_{pa}$ or $B< B_{pa}$) (46 stocks); Red line: $F>F_{MSY}$ or SSB $<MSY_{Btrigger}$

It is important to note, however, that some stocks now managed according to F_{MSY} may still be outside safe biological limits, or conversely some stocks inside safe biological limits may still be overfished.

The red line illustrates changes in the proportion of stocks where $F>F_{MSY}$ or SSB $<MSY_{Btrigger}$. Here the improvement in status has been slower with the indicator remaining above 75% of stocks until 2007 before declining. The decline then appears to have stopped in 2013 and began to slowly increase again to about 60% of stocks in 2016 where $F>F_{MSY}$ or SSB $<MSY_{Btrigger}$.

STECF notes that the number or proportion of stocks above/below B_{MSY} is still unknown, because an estimate of B_{MSY} is only provided by ICES for very few stocks.

STECF observes that the recent slope of the indicators suggests that progress until 2016 has been too slow to allow all stocks to be maintained or restored to at least the precautionary B_{pa}, and managed according to F_{MSY} by 2020.

Stock Status in the Mediterranean & Black Sea

In the Mediterranean & Black Sea, the variable number of stocks contributing information in the early part of the time series renders the calculation of a robust indicator difficult and potentially misleading. STECF suggests the possibility of investigating this in the future for a shorter time period (e.g. from 2008 to 2015 when the stock numbers appear to be more stable). For the present STECF has utilised the summary Table 5.1 in the EG report to compute the F status for 2015 (last year in Mediterranean stock assessments). Out of 47 stocks, only around 13% (6 stocks) are not overfished, the majority are overfished.

Trends in the fishing pressure (Ratio of F/F_{MSY})

As agreed by STECF (2017) the Expert Group computed the trends in fishing pressure using a robust statistical model (Generalised Linear Mixed Effects Model, GLMM) accounting for the variability of trends across stocks and including the computation of a confidence interval around the median. A large confidence interval means that different stocks have different trends. Because this is a model-based indicator, and because the number of stocks is slightly different from last year, small differences in the resulting outcomes compared to last year's report should not be over interpreted.

This indicator can be used for regional comparison between the ICES area and Mediterranean & Black Seas. In the ICES area, the model-based indicator of the fishing pressure (F/F_{MSY}) shows an overall downward trend over the period 2003-2015 (Figure 5.1.2). In the early 2000s, the median fishing mortality was more than 1.5 times larger than F_{MSY}, but this has reduced and has now stabilised around 1.0. Reaching F_{MSY} for *most* stocks in the analysis would require the upper bound of the confidence interval in figure 3.1 in the EWG report to be around 1. STECF also notes that this indicator of fishing pressure has not decreased since 2011.

The same model-based indicator was computed by the EG for an additional set of 9 stocks located in the NE Atlantic, but outside EU waters. This indicator seems to confirm the positive overall trend observed in EU waters, with the median value of the F/F_{MSY} indicator closely tracking that produced for EU waters. STECF notes that the indicator for NE Atlantic stocks outside EU waters is based on comparatively few stocks and thus should be considered with care.

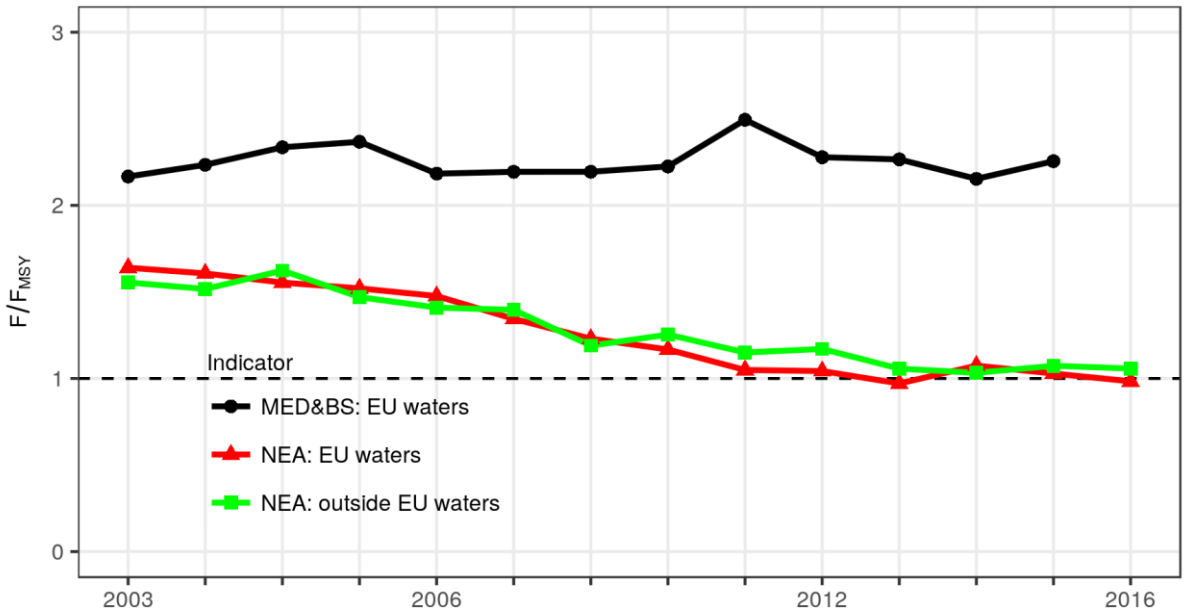


Figure 5.1.2. Trends in the fishing pressure. Three model based indicators F/F_{MSY} are presented (all referring to the median value of the model): one for 48 EU stocks with appropriate information in the ICES area (red line); one for an additional set of 9 stocks also located in the NE Atlantic but outside EU waters (green line), and one for the 47 assessed stocks from the Mediterranean and Black Sea region (black line).

In contrast, the indicator computed for stocks from the Mediterranean Sea and Black Sea has remained at a very high level during the whole 2003-2015 period, with no decreasing trend. The value of F/F_{MSY} varies around 2.3 indicating that the stocks are being exploited on average at rates well above the F_{MSY} CFP objective.

Trends in Biomass

The model-based indicator of the trend in biomass shows improvement in the ICES area, but not in the Mediterranean and Black Sea (Figure 5.1.3). In the ICES area the biomass has been generally increasing since 2006, and was in 2016 on average around 39% higher than in 2003. This represents a slight change from the reporting in 2016 reflecting the fact that the modelled trend incorporates new information. In the Mediterranean & Black Sea the uncertainty associated with this indicator (see Figure 4.4 in the EWG report) makes it difficult to conclude anything about trend and the situation is essentially unchanged since the start of the series in 2003.

An improving trend is also observed for data poor stocks (Figure 3.23 in the EWG report), according to the indicator computed by the EG for 61 ICES Category 3 stocks. However, in view of the fact that this indicator is still regarded as experimental, care in interpretation is required.

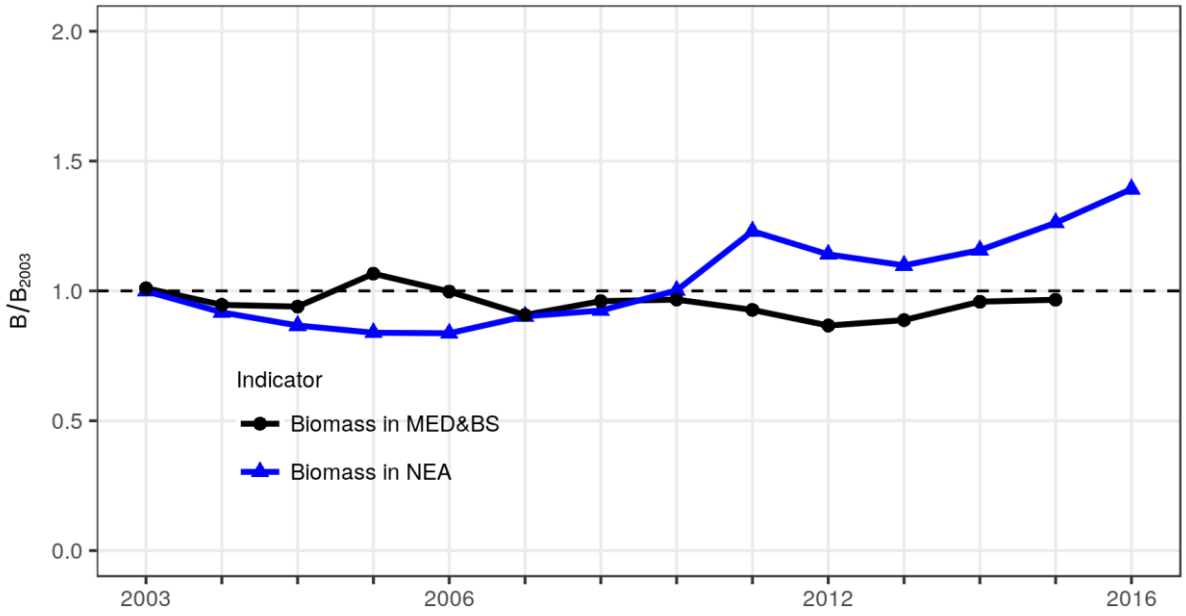


Figure 5.1.3. Trends in the indicators of stock biomass (median values of the model-based estimates relative to 2003). Two indicators are presented: one for the ICES area (54 stocks considered, blue line); one for the Mediterranean region (47 stocks, black line). The EG noticed that a large uncertainty is associated to these estimates, coming from the fact that the biomass estimates are quite variable from one year to the next.

Trends per Ecoregion

For the ICES area, the EG provides some information and figures broken down by Ecoregion. The main trends are summarised here.

The fishing pressure has decreased and the status of stocks has improved in all ICES Ecoregions. In 2016, the proportion of overexploited stocks ranged between to 29 - 50% across the different Ecoregions, while the modelled estimate of the F/F_{MSY} ratio for 2016 was between 0.89 and 1.18.

Some variations between Ecoregions in modelled trends can be seen. According to the latest indicator trends presented in the EG report, the fishing pressure decreased consistently over the whole period and the stock status improved most markedly in the Celtic Sea. Here the fishing mortality was at a very high level at the beginning of the time series ($F/F_{MSY}>1.9$) and decreased significantly to below 1.0. In the remaining areas, marked declines are also evident in the first part of the time series but the rate of decline of the indicator falls around 2010 and the indicator tends to level out. In the Bay of Biscay and Iberian Ecoregion, and stocks present throughout the wider Northeast Atlantic the indicator has fluctuated in the most recent years.

Coverage of the scientific advice

Coverage of biological stocks by the CFP monitoring

As stated previously (STECF PLEN 16-03), the analyses of the progress in achieving MSY objectives in the ICES area should consider all stocks with advice provided by ICES, on the condition of being distributed in EU waters, at least partially. Based on the ICES database accessed for the analysis, ICES provides a scientific advice for 257 biological stocks included in EU waters (at least in part). Of these, 159 stocks are data-poor, without an estimate of MSY reference points (ICES category 3 and above). Details of the numbers of ICES assessments by Category and by area are shown in Table 5.1.1.

Table 5.1.1. Numbers of stocks assessed by ICES for different stock categories in different areas. Note that not all of these stocks are managed by TACs and so the numbers are higher than those used in the CFP monitoring analysis.

	ICES Stock Category						
	1	2	3	4	5	6	Total
Arctic Ocean	10	1	11	0	3	10	35
Azores	0	0	3	0	0	2	5
Baltic Sea	8	0	9	1	0	0	18
BoBiscay & Iberia	11	1	20	1	9	4	46
Celtic Seas	30	0	19	1	13	11	74
Faroes	3	0	1	0	0	0	4
Greater North Sea	19	0	14	5	7	3	48
Greenland Sea	5	0	3	0	0	1	9
Iceland Sea	1	0	0	0	1	0	2
Northeast Atlantic	8	1	7	0	0	0	16
Total	95	3	87	8	33	31	257

The present CFP monitoring analysis is focused on stocks with a TAC and for which estimates of fishing mortality, biomass and biological reference points are available. As detailed in the EGs technical reports, not all indicators can be calculated for all stocks in all years, and the EG was able to compute indicators for 46 to 71 stocks of category 1 depending on indicators and years. These stocks represent the vast majority of catches but a large number of biological stocks present in EU waters are still not included in the CFP monitoring.

STECF notes however that the EG computed some additional indicators of trends in abundance index for 61 data poor stocks of category 3. These indicators are still considered experimental by the EG and are not presented in the current STECF overview. Once this indicator becomes part of the 'core' list, the total number of stocks included in the CFP analysis will be up to 50% of the stocks assessed by ICES (ie 71 Category 1-2 plus 61 Category 3). STECF notes also that MSY reference points are expected to be computed by ICES for an increasing number of data-poor stocks over the coming years, which will increase the coverage of the CFP monitoring.

In the Mediterranean region, the EG selected 230 stocks (Species/GSA) in the sampling frame (Mannini et.al 2017), of which 47 have been covered by a stock assessment in recent years. In the Mediterranean region, stocks status and trends can be monitored only for a minority of stocks.

Coverage of TAC regulation by scientific advice

According to the EG report, STECF notes that 156 TACs (combination of species and fishing management zones) were in place in 2016 in the EU waters of the NE Atlantic.

STECF underlines that in many cases, the boundaries of the TAC management areas are not aligned with the biological limits of stocks used in ICES assessments. The EG therefore computed an indicator of advice coverage, where a TAC is considered to be "covered" by a stock assessment when at least one of its divisions matched the spatial distribution of a stock for which reference points have been estimated from an ICES full assessment. Based on this indicator, 56% among the 156 TACs are covered, at least partially, by stock assessments that provide estimates of F_{MSY} (or a proxy) and 43% by stock assessments that have B_{pa} (or a proxy).

Additionally, STECF notes that, using this index, some TACs can be considered as "covered" even if they relate to several assessments contributing to a single TAC (e.g. *Nephrops* functional units in the North Sea) or to a scientific advice covering a different (but partially common) area (e.g. whiting in the Bay of Biscay). Thus, such an approach overestimates the spatial coverage of advice (i.e. the proportion of TACs based on a single and aligned assessment). This means that a large number of TACs are still imperfectly covered by scientific advice based on F_{MSY} or B_{pa} reference values.

General principles for future analysis

Based on the latest process of analysis and overview, STECF advises that the CFP monitoring process should continue with the following principles:

- The three indicators of stock status are useful and should be regularly computed in the coming years (expressed in stock numbers in the detailed report and in proportion in the synthesis)
- As soon as a representative number of B_{MSY} estimates become available from ICES assessments, the proportion (and number) of stocks below or above this reference point should become part of the 'core' indicator set, together with an indicator of trends in the B/B_{MSY} ratio.
- Regarding trends in fishing mortality and biomass, all indicators should be computed in a consistent way. STECF considers that the model-based indicators should continue to be used as the standard method for every time series (including indicators per Ecoregion and indicators for NE Atlantic stocks outside EU waters). These model-based indicators are preferable to arithmetic mean estimates, which although easy to communicate, are generally sensitive to outliers.
- To maintain ease of visual comparison, indicators of biomass trends should continue to be rescaled to the value of the starting year.
- As far as possible, according to data availability, the same indicators should be computed in the ICES area and in the Mediterranean region.

Ongoing development

STECF notes that the EG Report again includes sections providing preliminary outputs from a number of experimental indicators. STECF considers that these require further

development to fully understand their performance and stability before adoption as 'core' indicators. STECF draws attention to an STECF EWG planned for later in the year (STECF 18-15) which is dedicated to the development of CFP monitoring and suggests that further progress on the experimental indicators relating to fish stocks could be made. During this meeting STECF encourages exploration of indicators for other aggregations such as stock categories (eg pelagic fish versus demersal fish)

STECF conclusions

STECF acknowledges that monitoring the performance of the CFP requires significant effort in order to provide a comprehensive picture. The process presents a number of methodological challenges due to the annual variability in the number and categories of stocks assessed (especially in the Mediterranean) and due to the large variations in trends across stocks. As a result, the choice of indicators and their interpretation is being discussed, expanded and adjusted over time, as duly documented in the suite of STECF plenary reports and in the JRC EG technical reports. In particular, STECF notes that the CFP monitoring has improved this year thanks to the implementation of a revised protocol and ongoing improvements in the coverage of fish stock assessments and estimates of reference points. STECF is aware that minor differences in the indicators can occur compared to previous years. However STECF always use the latest assessment and best science available at the time of the report

Regarding the progress made in the achievement of F_{MSY} in line with the CFP, STECF notes that the latest results are generally in line with those reported in the 2017 CFP monitoring and confirm a reduction in the overall exploitation rate for the ICES area. On average the stock biomass is increasing and stock status is improving. Nevertheless, based on the set of assessed stocks included in the analyses, STECF notes that many stocks remain overfished and/or outside safe biological limits, and that progress achieved until 2016 seems too slow to ensure that all stocks will be rebuilt and managed according to F_{MSY} by 2020.

STECF also concludes that stocks from the Mediterranean Sea and Black sea remain in a very poor situation, with no change apparent in terms of fishing pressure or stock biomass.

STECF concludes that further progress has been made on the development of additional indicators relating to fish stocks which would benefit from some additional testing before being adopted as core indicators. STECF also recognises the need to broaden the scope of the CFP monitoring to cover additional aspects not so far dealt with. In particular, there is a need to develop the CFP monitoring process to cover wider ecosystem and socio-economic aspects in the analysis. STECF notes that the scheduled STECF EWG on CFP monitoring later in the year (STECF 18-15) will provide an opportunity to progress these requirements.

5.2 Monitoring the Landing Obligation

Background provided by the Commission

Regulation (EU) No 2015/812 (the so-called Omnibus Regulation), introduced an obligation for the Commission to report annually on the implementation of the landing obligation, based on information transmitted by the Member States, the Advisory Councils and other relevant sources.

According to Article 9 of the Omnibus Regulation, Commission report should include the following elements:

- steps taken by Member States and producer organisations to comply with the landing obligation;
- steps taken by Member States regarding control of compliance with the landing obligation;
- information on the socioeconomic impact of the landing obligation;
- information on the effect of the landing obligation on safety on board fishing vessels;
- information on the use and outlets of catches below the minimum conservation reference size of a species subject to the landing obligation;
- information on port infrastructures and of vessels' fitting with regard to the landing obligation; for each fishery concerned; and
- information on the difficulties encountered in the implementation of the landing obligation and recommendations to address them.

In order to facilitate the reporting, and in line with the outcome of STECF EWG 16-04, in 2017 Member States were invited on a voluntary basis to complete questionnaires seeking more detailed information on the impact of the landing obligation and national steps taken to assist with its implementation. This year, Member States were asked to update the information provided as appropriate. This information has been reviewed and summarized in an ad hoc contract.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

Based on:

- The report of the ad hoc contract for Evaluation of Member States Annual Reports on the Landing Obligation
- Annual reports received by Member States, the Advisory Councils, EFCA
- Any other relevant sources of information

The STECF is requested to:

1) To advise the Commission on the elements appropriate to meet the reporting requirements of Article 9 of Regulation 2015/812, review and summarise the main findings of the reports highlighting, in a structured manner, key salient points raised by each MS and to provide an overview of them at the sea basin level.
2) To identify to what extent discard rates are being reduced in specific fleets or fisheries.

3) Identify specific actions where MS have made adjustments to support the introduction of the landing obligation.
4) Identify the most important gaps or weakness in implementation and the lessons to be learned from best practices. Where available, identify specific fleets and stocks where the landing obligation has had a direct impact on fishing activity;
5) Highlight the most important weaknesses in reporting and the lessons to be learned from best practices.
6) Make any further recommendations as appropriate to improve implementation and reporting

STECF response

STECF response is based on the Member States' Annual Reports on the Landing Obligation (2017), and an ad-hoc contract issued to evaluate these reports.

The ad-hoc contract report is available on the plenary meeting website: https://stecf.jrc.ec.europa.eu/plen1801 under "documents".

Overview of the responses received by the Commission

STECF notes that for 2017, as in the 2 previous years, the Commission asked MS to complete a questionnaire based on proposals in STECF-16-03 and received reports from 15 Member States and 2 advisory Councils - this represents a decline in reporting rate since 21 MS and 3 advisory Councils submitted reports for 2016. These reports were reviewed and synthesised by means of an ad-hoc contract, whose report was presented to the STECF.

The Commission did not receive 2017 reports from eight MS: Croatia, France, Italy, Latvia, Netherlands, Portugal, Romania or United Kingdom. Six of these MS did report for 2016, see Table 5.2.1. Care is required in interpreting apparent annual changes since the composition of MS in the different areas has changed.

STECF notes that question 23 in the questionnaire circulated by the Commission relates to social and economic impacts of the Landing Obligation and the question refers to a list of indicators, but the list of indicators was actually not provided by the Commission.

Extract of text from the questionnaire sent by MARE to MS:

Information on the socioeconomic impact of the landing obligation

Q. 23. Using the most appropriate indicators defined below, provide information on the socioeconomics impacts on:

• The catching sector

• Upstream businesses

• Processors

• Consumption and markets

• Costs for Member States

However the list of indicators as found in table 6.10 below (extracted by STECF from EWG 16-04) (https://stecf.jrc.ec.europa.eu/c/document_library/get_file?uuid=d00b38c1-035c-43d6-80e3-0519e15eae5b&groupId=43805)was not attached to the letter.

Table 6.10 Metrics and data that would be useful, with linking evidence, to show effects of the implementation of the LO. N.B. *indicates information is already collected and presented in the fleet or processing sector Annual Economic Reports or in the STECF balance report. Bold type indicates a particularly useful metric.

Metrics and measurements for Catching sector business impacts

Operational	Financial	Economic	Social
• **Fuel use ratios** o **per tonne landed*** o per day at sea* • Total days at sea per segment • **Tonnes landed per day at sea*** • **Average trip duration** • **Vessel use indicator*** • **Number of choke situations** o **Vessel level** o **PO level** o **MS level** o **EU level** • **Ratio of anticipated chokes / observed choke situations** • **Quota uptake*** • **Ratio of landings for human/non-human consumption**	• **Sales prices per size grade of fish** • **Foregone Revenue due to change in size profile of landings** • Disposal costs for unsold fish • **Number of business failures attributed to choke situations** • **Total number of business failures** • **Value of fishing rights*** • **Fish prices pre and post fleet level choke** • Total landings income* • Labour costs* • Fuel costs* o Total* o Additional due to LO • Repair costs* • **Estimated value of uncaught fish**	• **Number of Vessels*** • **Number of inactive vessels*** • **Number of enterprises*** • **Inactive fleet indicator*** • Investments* • GVA* • **Operating (Gross) Profit*** o total per segment o average per vessel • Fishing rights values • Fishing rights ownership/allocation • Use of EMFF for vessel or gear adjustments to comply with the LO	• **Number of FTEs*** • **Wages/Crew share*** • **Average wages per FTE** • Working Hours* • Number and proportion of non-EEA crew • Incidence of non-compliant business practice. • Incidence of observer harassment • Weight of landings per crew member, by fleet segment.

Metrics and measurements for Upstream businesses impacts

Operational and Financial	Economic	Social
• **Value of sales by gear manufacturers** • **Number of improved selectivity fishing nets sold** • Value of sales of on-board technology • Value of sales by boat builders to fishing businesses • **Number of business failures, start-ups or expansions**	• Number of highly fishing dependent enterprises	• FTEs • Wages • Number of high-technology jobs

Metrics for Processing businesses reliant on landings by vessels subject to the LO

Operational	Financial	Economic	Social
• Volume of imported raw material to replace LO-caused foregone supplies • Volume of sales • Volume of raw material purchased for non-human consumption • **Business failures and start ups due to lack of raw material or availability of new raw material**	• **Value of purchased fish and raw material for production *** • **Turnover*** • **Total production costs*** • **Value of sales for non-human consumption**	• **Number of enterprises*** • GVA* • Strategic alliances eg. Processors engaging in gear selectivity trials or purchase of fishing rights • Net investments*	• **FTEs*** • **Wages***

Metrics and measurements relating to impacts in Consumption & Markets

- Consumption of different product sizes of fish in retail and foodservice
- Consumption of imported fish in retail and foodservice
- Incorporation of LO-related issues in environmental certification schemes
- Consumption of new products based on fish by-products
- Sales of non-human consumption products
- Sales of bait
- Public attitudes towards discarding and the LO

MS costs of implementing the LO

- Staff Costs
- Additional Control Costs
- Expanded Observer/REM Programmes
- Legal Costs
- Funding sources and amounts
- Use EMFF funding to cover additional administration costs

STECF notes that implementation measures reported by MS in response to the questionnaire do not necessarily imply successful implementation of the landing obligation or that it is achieving its aims. Successful outcomes of implementing the LO cannot be claimed without evidence that there has been significant relevant change in fishing practices and adequate monitoring and control of all fishing operations to ensure that catches are fully documented and reported.

Table 5.2.1. List of MS and AC reporting or not for 2016 and 2017.

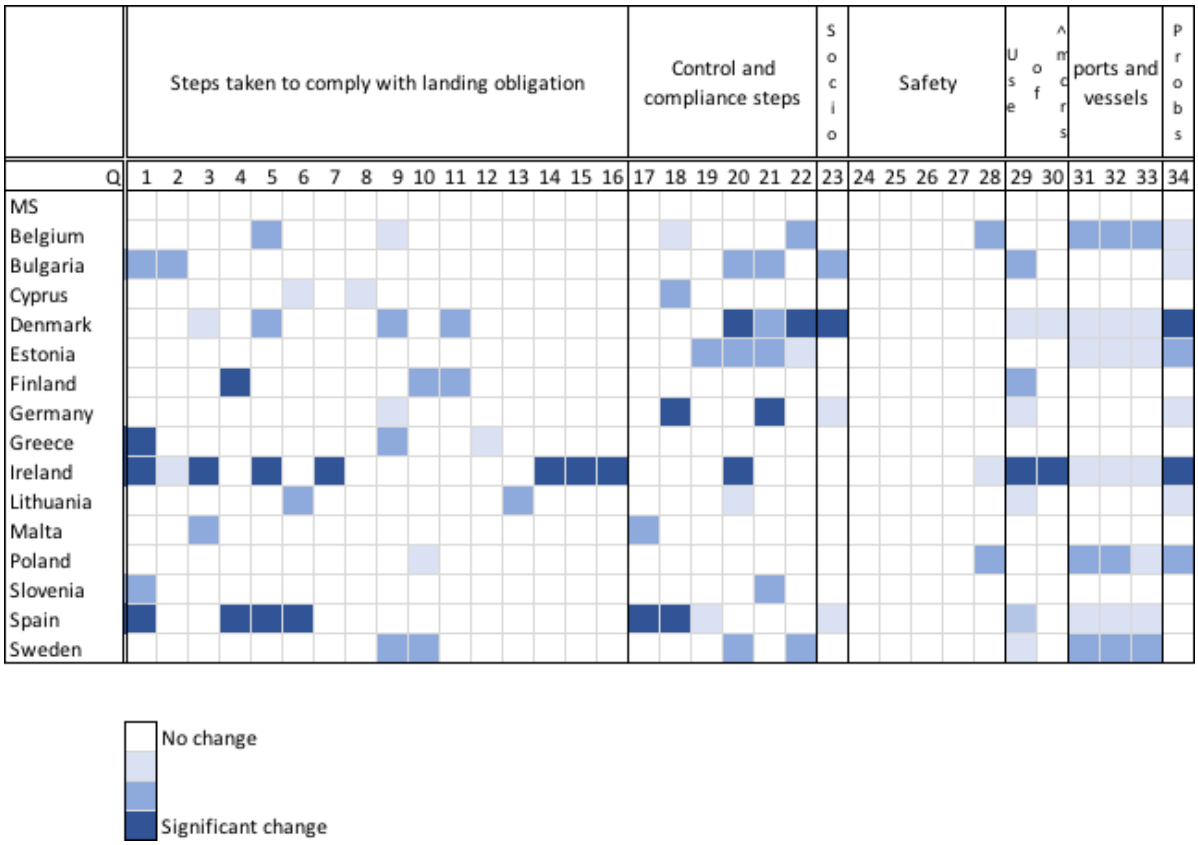
Member State or Advisory Committee	2016	2017
Belgium	Yes	Yes
Bulgaria	Yes	Yes
Croatia	Yes	No
Cyprus	Yes	Yes
Denmark	Yes	Yes
Estonia	Yes	Yes

Finland	Yes	Yes
France	Yes	No
Germany	Yes	Yes
Greece	Yes	Yes
Ireland	Yes	Yes
Italy	No	No
Latvia	Yes	No
Lithuania	Yes	Yes
Malta	Yes	Yes
Netherlands	Yes	No
Poland	Yes	Yes
Portugal	No	No
Romania	Yes	No
Slovenia	Yes	Yes
Spain	Yes	Yes
Sweden	Yes	Yes
UK	Yes	No
NWWAC	Yes	Yes*
SWWAC	Yes	No
NSAC	No	No
BSAC	No	Yes*
MEDAC	Yes	No
Black Sea AC	No	No

* For 2017, it was unclear whether the submissions were representative for the whole ACs.

Table 5.2.2 provides a summary of the aspects of the landing obligation where most change was evident. Here a simple colour scale from 'No change' to 'Significant change' has been used to classify the responses (by Member State) to the individual questions posed in the Commission questionnaire (the questions are included in Annex II of the STECF 16-13 – Methods and data requirements for LO report. https://stecf.jrc.ec.europa.eu/ewg1604).

Table 5.2.2. Summary by Member State of the aspects of the landing obligation implementation in 2017 where change from 2016 was evident. Numbering refers to the questionnaire within the broad topic headings.



Summary of background information provided to the Commission by MS

This section provides a synthesis of the background information received from Member States, Advisory Councils as well as of the report of the Ad-hoc contract (No.ARES(2018)1564295).

The following sections summarise the key points made in MS 2016 reports (included in the ad-hoc contract report) and highlights new content in MS 2017 reports relating to the different sea basins.

Most of what was reported in MS 2016 reports is again present in the 2017 reports of MS which reported in both years and hence 2016 summary notes are included again here as for those MS, the report also applies to 2017. For the six MS that reported for 2016 but did not report for 2017, we cannot say whether they continued activities reported in

relation to 2016. The comments below relating to 2017 highlight only new content from the 2017 reports of MS which reported in both years.

NORTH WESTERN WATERS

Of the seven MS which had vessels active in NWW in 2017, three (Spain, Ireland and Belgium) submitted a report to the Commission. France, Netherlands, Portugal and the UK did not submit reports for 2017. NWWAC did reply in 2017.

Relating to 2016 MS reports: Member States in NWW have been proactive in trying to implement the landing obligation and most have initiated studies and pilot projects. In addition, Member States have also made adaptations to their catch reporting systems or introduced specific management measures to assist with implementation. Member States have also worked extensively with the NWWAC to disseminate information to the fishing industry, but it is evident there is a lack of industry buy-in for the landing obligation which is hindering implementation.

New for 2017: there was considerably more reporting of outcomes from the studies and innovative ideas to encourage vessel operators to take up some of the options.

Relating to 2016 MS reports: Several specific cases of choke species have been reported by Member States in the NWW and this issue remains one of the key concerns in this sea basin. Analyses carried out in conjunction with the NWWAC highlight that the existing exemptions and tools within the Regulation are unlikely to fully alleviate the choke problems.

New for 2017: there were several references made to the workshops on choke analysis convened by the AC and Regional Group which has helped focus attention on key choke species.

Relating to 2016 MS reports: The difficulties in monitoring catches discarded under exemptions and the low level of landings of fish below Minimum Conservation Reference Sizes (MCRS) in NWW which generally have been low are also issues of concern for Member States. In this regard, at least one Member State reports difficulties in placing observers on board fishing vessels subject to the landing obligation.

SOUTH WESTERN WATERS

Belgium, France, Portugal and Spain had vessels active in SWW in 2017 and only Belgium and Spain submitted reports relating to 2017. SWWAC did not reply in 2017.

Relating to 2016 MS reports: Based on the reports received, the landing obligation seems to have had little impact on fishing activities in the SWW. Apart from one Member State, very few studies or specific measures are reported to have been taken to implement the landing obligation. Member States do point to issues in future years when more species and fisheries are subject to the landing obligation.

New for 2017: further detail on projects was given but there were few outcomes reported.

Relating to 2016 MS reports: Delays in the EMFF and difficulties in accessing funds have been listed as an issue by the SWWAC and generally, other than one Member State, very little funding for port infrastructures, to modify vessels to handle unwanted catches or for selective gears has been forthcoming.

New for 2017: one Member State presented a long list of potential difficulties without many suggestions for how these could be overcome.

NORTH SEA

Seven MS had fishing vessels active in the North Sea in 2017: Belgium, Denmark, Germany and Sweden submitted reports; France, Netherlands and UK did not submit reports for 2017. The NSAC did not reply in 2017.

Relating to 2016 MS reports: MS reports indicated a perceived general reluctance from the fishing industry to fully comply with the transition rules of the landing obligation. In particular reporting catches discarded under exemptions remains highly variable and landing fish below MCRS are well below levels that would be expected based on data of previous catches. There is little change observed in fishing practices to avoid unwanted catch of under MCRS fish.

In 2016 and 2017 changes to fishing practices in order to avoid unwanted catches has been widespread by vessel operators of many Member States in the North Sea, mostly focussed on improving selectivity of the fishing operation. However, uptake of selective gears by industry has been low.

In 2017 trials with control and monitoring tools such as Closed Circuit TV (CCTV) and Remote Electronic Monitoring (REM) have continued in the North Sea to assess their application in implementing the landing obligation, but the use of such tools has not progressed past the experimental phase.

One of the issues in the 2017 responses, reiterated from previous responses, is that of ensuring a level playing field between MS. There appears to be some concern that Member States which commit to this more stringent and continuous monitoring system will be disadvantaged compared to those which do not.

Identifying potential choke species and the impacts of these species on North Sea fisheries remains a priority in 2017 for Member States in the North Sea. Extensive analysis of the problem has been carried out by the Scheveningen group as well as the NSAC.

In 2016 and 2017 most Member States in the North Sea have been pro-active in allocating funding to enable implementation of the landing obligation.

BALTIC

Eight MS had fishing vessels active in the Baltic in 2017: Denmark, Estonia, Finland, Germany, Lithuania, Poland and Sweden submitted reports for 2017; Latvia did not submit a report for 2017. The BSAC did reply in 2017.

Relating to 2016 MS reports: Changes to fishing practices in order to avoid unwanted catches were a priority for many Member States with vessels fishing in the Baltic, mostly focussed on improving selectivity of the fishing operation. However, uptake of new selective gears by industry has so far been low.

Member States fishing in the Baltic, through the Baltfish group, report having been proactive in disseminating information to the fishing industry and inspectors from the Member States have worked extensively with the European Fisheries Control Agency (EFCA) on developing control and monitoring measures.

Some Member States fishing in the Baltic have made changes to their quota management systems. Some have created bycatch quotas reserved for vessel operators targeting other species, who may need a small amount of quota to avoid a choke situation. This adjustment has helped to avoid choke situations in the Baltic.

Damage to fish by seals was reported as being widespread and the exemption included in the landing obligation to allow discarding of such catches has been used by most Baltic Member States. However, the accuracy of how such discards are reported is not

uniform with some Member States supplying very detail information while others claiming it impossible to accurately record such discards.

MS reports for 2017 do not suggest any fundamental changes in the approaches reported by Member States for 2016 and the comments above remain valid.

MEDITERRANEAN

Eight MS had vessels fishing in the Mediterranean in 2017: Cyprus, Greece, Malta, Slovenia and Spain submitted reports for 2017; Croatia, France and Italy did not submit 2017 reports. The MEDAC did not reply in 2017

Relating to 2016 MS reports: The landing obligation appears to have had little impact on fishing activities in the Mediterranean, and many Member States report few difficulties in implementation. Most MS point to the importance of maintaining de minimis exemptions included in current discard plans to minimise impacts in the future. Some MS recognised that difficulties will arise when demersal fisheries become subject to the landing obligation, have instigated studies to consider the use of spatio-temporal closures and selective gears to protect juveniles.

For 2017 a new closed area was introduced to protect hake in the eastern Mediterranean.

Relating to the 2016 MS reports: Several Member States highlight specific problems with the existence of illegal sales of fish below MCRS and the need to widen the allowable uses for such catches to charitable purposes as a disincentive to the sale of fish below MCRS. This is not a new problem in the Mediterranean, but the Member States and the MEDAC see that the landing obligation may exacerbate the problem.

BLACK SEA

Only Bulgaria and Romania had vessels fishing in the Black Sea in 2017. Bulgaria submitted a report for both 2016 and 2017 but Romania submitted a report only for 2016. The Black Sea AC did not reply in 2017.

Relating to the 2016 MS reports: The landing obligation has had little or no impact on fisheries in the Black Sea. No specific actions or measures are reported by the Member States in this sea basin.

For 2017 Bulgaria reported some studies on the Rapana beam trawl fleet and its influence on juvenile turbot discards. There are concerns that impacts will increase in future years without any clear evidence to support this assertion.

Specific actions taken by Member States

Based on 2016 reports: Most Member States that reported appear to be moving towards a risk-based approach to control and monitoring, largely as a result of the efforts made by EFCA to assist Member States. The European Fisheries Control Agency (EFCA) has also shown the utility of the last observed haul analysis as a means to facilitate evaluation of overall, fleet-wide, compliance with the landing obligation provisions and provide information on catch composition across different fleets or metiers.

Most Member States have engaged with the relevant Advisory Councils since 2016 and in the case of the Mediterranean, have largely followed the advice provided by the MEDAC. Member States have also made significant efforts to disseminating information to vessel operators in a variety of ways – meetings, information notes or one-to-one meetings.

Reports by MS suggest that most Member States have provided specific training for inspectors, facilitated extensively by EFCA.

During 2017, reports suggest that engagement with fishing businesses continued and there seems to have been a focus on jointly developing tools to analyse and identify potential choke situations.

Key areas of concern and difficulties

Based on 2016 reports: Most Member States' reports indicated that problems have been minimal but are expected to increase as more species and fleets become subject to the landing obligation. Member States report that their main difficulty arises from the lack of engagement by the fishing industry and a reluctance to fully comply with the legislation. In many Member States, there is little or no evidence of change in fishing practices.

Choke stocks remain a concern for most Member States in 2017 although the actual extent of the problem is unclear and there are almost no examples of reported choke situations actually occurring since the introduction of the landing obligation. Belgium indicated that their quota for a main target species ran out (species not mentioned) although it is not clear that this was as a result of a choke situation. Estonia indicated that salmon (in the Baltic) had essentially become a choke but that the problem was mitigated by quota exchange with another member State. Denmark suggested that ling was a choke species for them in the Skagerrak/Kattegat but no details were provided on the circumstances surrounding this.

In 2016 only five Member States report having used EMFF funding to support vessel operators, except for funding selectivity experiments and assistance to modify fishing gear. Very little funding has been provided to improve the infrastructure of ports and harbours, reflecting low levels of landing unwanted catches below MCRS. Despite this, many Member States point out that this will be a serious issue in the future when the landing obligation is fully implemented. Similarly, many Member States highlight potential problems and safety issues that will be faced by fishermen in handling unwanted catches on board vessels. However, no evidence is presented that such problems exist, even in the pelagic fleets and the Baltic, where the landing obligation has been in place for more than two years.

In 2017 there was an increase in the reporting of detail on the use of the EMFF.

Specific gaps or weaknesses in implementation

A number of specific gaps and weaknesses in implementation were reported. These issues are grouped below into those that may require intervention by DGMARE and those that might require action by Member States, Regional Groups or vessel operators.

<u>Gaps or weaknesses in implementation requiring DGMARE response or action:</u>

•STECF notes that fewer MS reported to the Commission on implementation of the landing obligations for 2017. This reduction in reports has devalued the combined information. Much of the information included in reports is qualitative.

•Some Member States report ongoing improvements to data entry systems in 2017 but others continue to report problems with reporting de minimis discards and catches of fish below MCRS in the Electronic registration system (ERS), in paper logbooks and also in reporting these to the Commission. STECF observes that it is important to have standardised reporting across Member States which will assist vessel operators to meet their catch reporting obligations.

•Several of the reports for 2017 suggest again that despite the efforts of EFCA, there is evidence of different interpretations between Member States within regions and also across sea basins in the implementation of the landing obligation, for example, interpretations of reporting requirements and interpretation of the use of de minimis. These differences have created confusion and a level of mistrust among vessel operators, which has hindered compliance. Successful implementation of the landing obligation will rely on achieving assurance that all catches are accounted for.

Gaps or weaknesses in implementation requiring MEMBER STATES or REGIONAL GROUPS actions or response

•Feedback on progress of implementation at sea basin level is required to enable understanding of how effective the implementation of the landing obligation has been and what adjustments may be necessary to achieve its objectives. It is evident from the 2017 MS reports that there has been almost no cooperation between Member States in completing the questionnaire to prepare their reports. A co-ordinated approach to reporting might help to ensure that all Member States are involved in the response process to the Commission.

•Reports for 2017 again show that most Member States reporting have put a lot of effort into control and monitoring the landing obligation, particularly with the move towards a risk-based approach and the using last observed haul analysis developed by EFCA. However, it is apparent that forensic sampling of catches on board vessels and in ports is only applied in a few Member States and the level of STECF's confidence in catch reporting remains low. Observer coverage has not increased in several Member States and there have been anecdotal indications that it may have actually reduced in some cases, however, only one Member State (Estonia) reported 'refusal to carry observers' in their response and this was an isolated case. There is little uptake in the use of monitoring tools such as Remote Electronic Monitoring and there may be too much reliance on existing control and monitoring techniques to enforce the landing obligation.

•Catches of fish below MCRS reported for 2017 by most Member States are extremely low and, based on observer data and last observed haul analysis, STECF doubts that they reflect the true quantities actually being caught. Accurate reporting of unwanted catches is vital to effective implementation of the landing obligation and to understand the impact of the landing obligation.

•The Omnibus Regulation allows for technical measures regulations to be modified in discard plans. However, despite many Member States carrying out experiments with selective gears or avoidance measures, as yet few of these measures have been adopted into discard plans.

•Member States have not used all exemptions and flexibility tools available to them to implement the landing obligation. In particular, no Member State has used the inter-species quota flexibility mechanism, although Member States appear to recognise that this carries risks of elevated mortality rates and should be viewed as a last resort approach.

Gaps or weaknesses in implementation requiring FISHING INDUSTRY actions or responses

•Most Member States' 2017 reports again suggest that there is opposition and a sense of denial towards the landing obligation from the fishing industry with no evidence of any

change in fishing practices. Full and effective compliance with the landing obligation requires a change in fishing operations.

•Many of the 2017 MS reports indicate a lack of reporting by vessel operators of fish discarded under exemptions (i.e. de minimis and high survivability), discards of fish currently not subject to the landing obligation and catches of fish below MCRS. This lack of reporting is in part because the ERS system has not allowed for the recording of such catches. Based on the Member States reports, the quantities of discards and unwanted catches being recorded in logbooks are extremely low and do not match information from observer trips or from last observed haul analyses carried out by inspectors. Inaccurate or incomplete catch data will compromise the provision of scientific advice

STECF conclusions

ToR 1 - *To advise the Commission on the elements appropriate to meet the reporting requirements of Article 9 of Regulation 2015/812, review and summarise the main findings of the reports highlighting, in a structured manner, key salient points raised by each MS and to provide an overview of them at the sea basin level.*

STECF concludes that Member State reports relating to 2017 include more information and in a more structured manner than in the previous year. However, STECF notes that fewer reports were sent by Member States for 2017 than for 2016. This reduction hampers interpretation of year on year changes.

Since MS reports contain mostly qualitative statements, generally not supported with data, they cannot form a basis for an independent assessment of the implementation of or impacts of the landing obligation. Therefore, STECF concludes that the MS reports do not supply sufficient data to enable STECF to give the Commission the information required to fulfil the Commission's reporting obligations under Article 9 of the Omnibus Regulation.

STECF concludes that based on the submitted MS reports, overall implementation of the transitional phase of the landing obligation has been challenging for MS and vessel operators. However, there is no evidence of significant changes in fishing practices.

STECF concludes that there was no data included in MS reports that could amount to an assessment of the socio-economic impacts of the landing obligation.

Overall STECF concludes that provision of a more detailed, defined template for reporting as required by the regulation could result in more standardised and useful reports from MS.

ToR 2 – *To identify to what extent discard rates are being reduced in specific fleets or fisheries.*

STECF concludes that, based on MS reports submitted, it is not possible to identify to what extent discard rates have been reduced in specific fleets or for specific fish stocks.

STECF suggests that a comparison between vessel reports and onboard control reports (last haul) would be useful to investigate suspected widespread under-declaration by vessel operators of fish under MCRS and discarded fish. Uncertainty about reported catch and discard data results in low confidence that regulations are being followed, and may lead to biased scientific advice and underestimates of fishing mortality.

STECF reiterates that accurate reporting of all catches is vital to understanding the impact of the landing obligation.

STECF concludes that, for those MS which reported, observer coverage of fishing activity did not increase in 2017, and in a few Member States there are indications that observer coverage had actually reduced due to increased refusal to take observers on board.

ToR 3 - *Identify specific actions where MS have made adjustments to support the introduction of the landing obligation.*

STECF concludes that Member State Reports and the sea basin summaries contain numerous examples of specific actions undertaken to support the introduction of the landing obligation. These include numerous gear trials attempting to adjust size and/or species selectivity. In one MS, an incentive scheme to encourage uptake of selective gears has been implemented. The use of spatial measures has so far been more limited. A few MS have made adjustments to their quota management systems, while substantially more have been involved in ongoing changes to compliance and monitoring utilising risk-based approaches and last haul analysis. There is a mixed picture regarding providing financial support to assist with vessel changes or port modifications to facilitate the landing obligation. Some Member States indicate use of EMFF funding (quoting numbers of projects and expenditure), others appear not to have used these provisions at all.

While it is possible to identify specific actions, there is very little information provided on the outcomes arising from these actions. For example, information on proportions of vessels utilising new gears is very sparse and few statistics are provided on levels of monitoring of vessels at sea. STECF concludes that it is not possible to make any judgement on the impact of the specific actions in assisting the introduction of the Landing Obligation and its effectiveness.

ToR 4 - *Identify the most important gaps or weakness in implementation and the lessons to be learned from best practices. Where available, identify specific fleets and stocks where the landing obligation has had a direct impact on fishing activity*

STECF concludes that many of the concerns with the implementation of the landing obligation highlighted in the reports of several Member States are anticipated for the future and not yet necessarily observed. The reports of limited impact in some regions such as Mediterranean and Black Sea may also be related to non-implementation of the landing obligation, rather than because the landing obligation does not pose any issue. These statements must thus be interpreted with caution.

STECF concludes that many Member States report few problems with the implementation of the landing obligation. Several MS reported lack of engagement by the industry to adapt to the landing obligation and Member States are unable to point to significant changes in fishing practices. Based on the MS reports available, STECF is unable to identify specific fleets and stocks where the landing obligation has had direct impact on fishing activity.

ToR 5 - *Highlight the most important weaknesses in reporting and the lessons to be learned from best practices*

STECF concludes that the major weaknesses is reporting all catches so that the effects of changes in fishing practices in response to the implementation of the landing obligation can be identified. This weakness creates a lack of overall knowledge of fishing practices. Another one of the most serious and important gaps in reporting is lack of reporting on the socio-economic impacts of the landing obligation. No MS has adequately reported on this topic.

STECF concludes that the questionnaire provided to Member States by the Commission has helped to structure the responses supplied by Member States. However, much of the information supplied remains largely qualitative and any increase in the level of quantitative information would provide a better means of assessing the implementation of the landing obligation. In particular, the reports would benefit from reliable quantitative information on fish discarded under exemptions (i.e. de minimis and high survivability), discards of fish currently not subject to the landing obligation and catches of fish below MCRS.

ToR 6 - *Make any further recommendations as appropriate to improve implementation and reporting*

Although Member States continue to develop enforcement and monitoring activities, particularly the risk-based approach and the use of the last observed haul analysis, it is apparent that there is only limited use of comparative data and forensic sampling. STECF concludes that more reliable data could be achieved if more effort was made to compare data from sampling on board with vessel-reported data on caches, discards and landings.

As in previous years STECF concludes that monitoring at sea would need to be increased significantly and this can be achieved by promoting alternative techniques to monitor vessels at sea. Member States still rely heavily on traditional compliance and monitoring tools to observe the landing obligation and enforce it. There are no indications that innovative monitoring at sea, such as Remote Electronic Monitoring (REM, CCTV + sensor system), are being used as a more effective means to monitor the landing obligation (STECF EWG 13-17).

STECF concludes that, to encourage more and better data submission, the Commission could provide a template tables to help MS to supply information on de minimis quantities and fish below MCRS.

STECF concludes that on the 2 additional questions asked in the accompanying letter from the Commission in 2018, very little information was provided by the Member States. There are no detected infringements of the landing obligation reported by any Member State. However, it was mentioned that it is difficult to detect infringements in relation to the LO and that prosecutions are even more difficult.

STECF concludes that a comparison between the 2017 data provided by Member States and forthcoming 2017 data from other sources (e.g. ICES and STECF NEW-FDI database) would be useful.

STECF concludes that it would be helpful to MS in completing their reports on social and economic impacts of the landing obligation if the Commission were to include the list of indicators, which is provided in STECF-16-13, table 6.10 on pages 67-68.

5.3 Review of the North Western Waters Combined *de minimis* request

Background provided by the Commission

As part of preparations for the full implementation of the landing obligation in 2019, the Member States Regional Groups are exploring several mechanisms and methodologies to include in joint recommendations and discard plans. The STECF has previously reviewed the suggestion of a combined *de minimis* in 2017. Several concerns were raised by STECF on how such a methodology would be applied to annual quota setting in the North Western Waters. The Commission has received an updated proposal that contains several changes to the proposed methodology for a combined *de minimis*, specifically for gadoids in the Celtic Sea and Channel. As such the STECF is asked to verify the information in the attached paper and evaluate the potential implications for annual quota setting, data recording and catch advice.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

STECF is requested to review the paper received from the North Western Waters Member States Technical Group on a potential combined *de minimis* for gadoids (cod, haddock, whiting) for vessels using bottom trawls (OTB, OTT) >80mm in the Celtic Sea and the Channel (ICES 7b-c, e-k).

In particular is the STECF is requested to:

- Advise if the proposed combined *de minimis* has sufficient modifications and safeguards to address the previous concerns raised by STECF in 2017.
- Based on the species and methods provided and using the most recent catch and discard information, verify and confirm the data and calculations therein and evaluate if the proposed combined *de minimis* would allow sustainable fishing in line with the Common Fisheries Policy.
- Advise on potential modifications to a combined *de minimis* to mitigate any concerns
- Advise how the proposed method or modified methods could be applied in annual TAC and quota setting process, where currently quotas are set on a single stock basis.
- Evaluate potential implications for accurate recording and data collection of catches, landings, discards and the catch advice process

Summary of the information provided to STECF

According to the supporting document the *de minimis* exemption would come into effect in 2019 and would be at a maximum of 7% of the total annual catches of cod, haddock and whiting for bottom trawl fisheries with a mesh size ≥ 80 mm in the Celtic Sea and the Channel (OTB, OTT in ICES divisions 7 b-c, e-k). The suggested *de minimis*

exemption would continue to be set at a maximum of 7% in 2020, up to a maximum of 6% in 2021 and 2022, and up to a maximum of 5% from 2023 of the total annual catches of those species. The proposal is made on the basis that selectivity is very difficult to improve without losing large parts of commercial landings and the disproportionate costs of handling and sorting previously discarded catches. The previous submission proposed a *de minimis* level of 5%.

The basis for the exemption

The supporting document includes a definition of the two fisheries, TR1 (vessels fishing with bottom trawls and seines of a mesh size greater than 100mm) and TR2 (vessels fishing with bottom trawls and seines of a mesh size less than 100mm). It provides information on the estimated weights of catch, landings and discards for the selected fisheries operating in the Celtic Sea and Western Channel from 2013-2016 (derived from STECF FDI database). The updated proposal does not include information on the two criteria for a *de minimis* exemption, namely evidence on difficulties to improve selectivity (although one selectivity project is mentioned REJEMCELEC) and on the disproportionate costs of handling and sorting catches. However, in the previous submission, EWG 17-08 noted the following selectivity projects were listed : CELCELCT, SELSELEC, REJEMCELEC, SELECCAB, COBRENORD, EODE and the discard study OPN.

The proposal includes an updated estimate of the level of discards that would be allowed under the *de minimis* exemption, which has been increased from 5% to 7% in the updated submission. The estimate is calculated based on 2013-2016 average total catches of haddock, whiting and cod combined. For all EU TR1 mixed demersal vessels in Celtic Sea and Western Channel the total catches of 20,057 tonnes of whiting, cod and haddock (average 2013-2016) which would represent a maximum volume of discards of 1,404 tonnes at a *de minimis* of 7%. According to the profile of discard established on those STECF data, discards of each species would represent:

- Whiting: 33% of the total gadoids discards volume (cod, whiting, haddock)
- Haddock: 61.5% of the total gadoids discards volume (cod, whiting, haddock)
- Cod: 5.1% of the total gadoids discards volume (cod, whiting, haddock)

For all EU TR2 vessels in Celtic sea and Western Channel, total catches of whiting, cod and haddock were estimated at 12,383 tonnes (average 2013-2016). A *de minimis* of 7% would represent a weight of 867 tonnes of discards, with contributions by each species to overall discards based on:

- Whiting: 53% of the total gadoids discard volume (cod, whiting, haddock)
- Haddock: 43.31% of the total gadoids discard volume (cod, whiting, haddock)
- Cod: 3.64% of the total gadoids discard volume (cod, whiting, haddock)

As with the previous submission, a safeguard provision to limit the *de minimis* species flexibility is included. This is set at the level of a maximum 25% for all species included in the overall *de minimis* percentage. Therefore, the proportionate contribution to the discards for any one of the species cannot increase by more than 25%. For example, the % of whiting discards in TR2 cannot exceed 53+25%=66.25% of the total gadoid discard volume. To avoid exceeding the total *de minimis* quantity amount (across the three species), if the proportionate contribution to the discards increases for one species, then the *de minimis* provision available to the other species reduces by the same weight. According to the supporting document, this flexibility is to limit the risk of discarding of

only one species and these safeguards should be revised if necessary and according to discard profile that can evolve over the years.

Details of how this approach would be applied are given for each fleet, including the maximum amount discards allowed for each stock and the remainder that would be available for the other two stocks to avoid exceeding the combined 7% *de minimis* level. The suggested approach recognises the requirement to identify the part of the fleet taking advantage of the *de minimis* exemption and the discards it accounts for. Furthermore, the proposal states that, when it comes to TAC setting, for a combined *de minimis* exemption, the percentage *de minimis* level needs to account for the maximum possible discard volumes per stock, for each of the fisheries (TR1 or TR2), including the +25% safeguard. This is because it is not possible to determine in advance from which of the combined stocks the *de minimis* provision will be utilized.

STECF observations

The STECF EWG notes that the latest submission provides clarification on some observations made by STECF in the previous review.

The STECF EWG on Fisheries Dependent Information has previously drawn attention to the uncertainty in estimated discard quantities (STECF EWG 15-08) and STECF has advised on the need for care in the use these data in the context of making TAC adjustments related to the Landing Obligation (STECF Plen 15-03 and associated standalone report STECF 15-17). Furthermore, based on a series of 6 EWG reports focused on the topic, STECF has regularly provided advice on many aspects of the Landing Obligation (see for example STECF Plen 13-03). STECF notes that this advice includes warnings about the difficulty of establishing and operating *de minimis* provisions and difficulties associated with monitoring and controlling these provisions. STECF reiterates this earlier advice and notes that while it has attempted to provide the quantities involved in the request, this should not be taken to imply that STECF considers the proposal to be a suitable approach.

Further to this, STECF notes that the uncertainty associated with the discards estimates and the aggregation of the data sources (FDI levels), is likely to generate error levels in catch estimates larger than the precision required to evaluate this exemption. As such estimates of future *de minimis* levels must be considered with care and only as indicative of potential outcomes of the fishing activity. However, the evaluation presented here does demonstrate the relative differences between different *de minimis* approaches.

STECF corroborated the catches, landings and discards data by checking samples of data from the proposal against the STECF FDI database. STECF has recalculated *de minimis* volumes and percentages identified and small differences in the results for calculations on TR1 fleets, the updated figures are presented in Table 5.3.1. To determine if the proposed combined *de minimis* contains sufficient modifications and safeguards to address the EWG 17-08 concerns. The main observations from EWG 17-08 are tabulated against the relevant information supplied in the updated submission:

EWG 17-08 observation	NWW regional group response
Only detailed information for the French and Irish fleets is provided. If the intention is to apply this *de minimis* to other fleets, then information on these fleets is needed.	The updated submission again presents *de minimis* calculations based on all EU fleets, but only detailed information for the French and Irish fleets is provided. It remains unclear if the *de minimis* is intended to cover all EU fleets.

Only limited qualitative information on the economic impact of increasing selectivity and of sorting and handling catch is provided.	No further information is provided.
The assertion that it is difficult to improve selectivity is supported, but only for the French fleets.	No further information on selectivity trials from other Member States is provided.
To avoid increasing catches by more than intended levels, *de minimis* exemptions are based on a percentage of the total catch of the given species in the given fishery where the exemption is sought (i.e. a single species approach).	The new submission clarifies that in the proposed approach, the total *de minimis* quantity across the selected stocks would not be exceeded (1,404 t for TR1 and 867 t for TR2).
If all species reach the 25% maximum, then the 5% overall *de minimis* is surpassed. With the 25% safeguard, the *de minimis* percentage exemption requested is 6.25% for TR1 and 6.01% for TR2.	It is clarified that the total *de minimis* quantity across the selected species would not exceed the quantity based on a 7% *de minimis*. STECF note that the 25% safeguard remains in the proposal, and the *de minimis* level has been increased to 7% (and then 6%). If all species did reach their maximum level of discards, the requested *de minimis* would effectively be 8.8% for TR1 and 8.7% for TR2.
The 5% *de minimis* level provides only partial solution to sorting and handling challenges when discard rates are 27.8% for TR1 and 35.5% for TR2, indicating significant selectivity improvements are still required.	The proposed approach increases the level of *de minimis* (7% then 6%), this means that an estimated 18-20% (Table 6.3_1) of the discards for each of the stocks would be covered by the *de minimis* (at 7% *de minimis* with safeguard at 0%). It is not stated whether this is sufficient to alleviate sorting and handling problems.
There are risks of significant discarding and increases in catches with a combined *de minimis* approach even with a safeguard mechanism in place. *De minimis* discard quantities should be deducted from the catch opportunities arising from F_{MSY} based catch advice. Under a combined *de minimis*, the separate *de minimis* volume for each individual species within the combined species can only be accounted for in respective stocks TACs by discounting the maximum possible amount of *de minimis* for each species that could potentially be discarded.	In agreement with EWG 17-03 the updated proposal states that for a combined *de minimis* exemptions, the percentage *de minimis* level needs to account for the maximum possible discard volumes per stock, for each of the fisheries (TR1 or TR2), including the +25% safeguard (Table 6.3_1). In the proposal, the total deduction from the TAC would be 2,838 tonnes for the combined *de minimis*, compared with 2,280 t for single species *de minimis* provisions for the same three species.

STECF observes that the effect of the combined *de minimis* approach is to modify the proportions of each species that can be discarded. Table 6.3_1 shows comparative data of a 5% and 7% combined *de minimis* and a 5% and 7% single stock *de minimis* based on this proposal. The differences in catch and discard rate between species means that with a combined *de minimis*, there is less whiting and cod available under a *de minimis* exemption and more haddock, compared with the single species approach. For example, for TR2, 117 tonnes more haddock can be discarded under a combined *de minimis*, compared with 117 tonnes more whiting and cod that could be discarded under a single

species *de minimis*. Therefore, the combined *de minimis* approach offers an alternate composition of discards rather than an increasing flexibility. The principle of the *de minimis* exemptions is to deal with difficulties in selectivity and sorting and handling, and that all catches discarded under *de minimis* should be counted against quota. STECF infer from the proposal that the difficulties in selectivity and handling are more pronounced for haddock compared to whiting and cod. However, there is no information provided to confirm this.

STECF observe that the proportion of the estimated unwanted catch (historical discards) that can be discarded under a *de minimis* is modified under a combined *de minimis*. In this case, the amount of unwanted catches that could be discarded under a 7% combined *de minimis* are 18-19% of the total for all three species in both TR1 and TR2. Therefore, around 80% of the previously unwanted catches would still have to be landed. With the application of the maximum 25% safeguard, this increases to 22-25%, i.e. in the absence of selectivity improvements, there would still be a requirement to land no less than 75% of previously discarded catches. In comparison, under the single species approach for the two fleets, it is estimated that 21-22% of whiting, 42-56% of cod and 13-15% of haddock that was previously discarded, would be discarded under a de minims provision, and the remainder would have to be landed. It is not clear whether these levels of *de minimis* are sufficient to mitigate the sorting and handling problems for these fleets, or whether the small differences when applying a safeguard maximum are meaningful.

Table 5.3_1. Calculations to demonstrate the relative implications on discard amounts of combined *de minimis* set at 5% and 7% and 7% with a 25% safeguard, and single species *de minimis* set at 5% and 7% for TR1 (above) and TR2 (below) Celtic Sea and Western Channel EU vessels

TR1												
Species subject to the DM	Stock	Total catch (Av. 13-16)	Av Discard rate (13-16) (%)	Estimated unwanted catch (historical discards)	Estimated discard share composition %	Weight of discard with a 5% DM (t)	Weight of discard with a 7% DM (t)	% of estimated discards covered by 7% DM	Maximum discard share based on 25% safeguard %	Estimate of Maximum volume under a 7% *de minimis*	Max. % of estimated discards covered by 7% DM	Max. *de minimis* levels with 7% (+25%)
whiting	7e-k	7505.1	33	2484.8	33.8	339.0	474.6	19.1	42.3	593	24%	7.9%
cod	7e-k	2559.3	13	320.3	4.4	43.7	61.2	19.1	5.4	76	24%	3.0%
haddock	7b-k	9993.2	45	4546.1	61.8	620.2	868.3	19.1	77.3	1085	24%	10.9%
Total		20057.6		7351.2	100	1002.9	1404.0	19.1		1755.04		
Single species approach												
whiting	7e-k	7505.1	33	2484.8	33.8	375.3	525.4	21.1				
cod	7e-k	2559.3	13	320.3	4.4	128.0	179.1	55.9				
haddock	7b-k	9993.2	45	4546.1	61.8	499.7	699.5	15.4				
Total		20057.6		7351.2	100	1002.9	1404.0	19.1				

Table 6.3_1 cont'd

TR2												
Species subject to the DM	Stock	Total catch (Av. 13-16)	Av Discard rate (13-16) (%)	Estimated unwanted catch (historical discards)	Estimated discard share composition %	Weight of discard with a 5% DM (t)	Weight of discard with a 7% DM (t)	% of estimated discards covered by 7% DM	Maximum discard share based on 25% safeguard %	Estimate of Maximum volume under a 7% *de minimis*	Max. % of estimated discards covered by 7% DM	Max. *de minimis* levels with 7% (+25%)
whiting	7e-k	7719.0	33.1	2555.6	53.0	328.2	459.4	18.0	66.31	574.8	22%	7.4%
cod	7e-k	967.1	16.6	161.0	3.6	22.5	31.6	19.6	4.55	39.4	25%	4.1%
haddock	7b-k	3697.1	52.1	1924.9	43.3	268.2	375.4	19.5	54.14	469.3	24%	12.7%
Total		12383.2		4641.5	100	619.2	866.8	18.7		1083.5		
Single species approach												
whiting	7e-k	7719.0	33.1	2555.6	53.0	385.9	540.3	21.1				
cod	7e-k	967.1	16.6	161.0	3.6	48.4	67.7	42.1				
haddock	7b-k	3697.1	52.1	1924.9	43.3	184.9	258.8	13.4				
Total		12383.2		4641.5	100.0	619.2	866.8	18.7				

STECF observes that in the proposed approach, while the total combined *de minimis* should not exceed 7% across the selected species, for each of those species the maximum percentage of the total catch that could be discarded can differ substantially from 7%. For example, up to 4.1% of the cod catch made by the TR2 fleets can be discarded while up to 12.7% of haddock can be discarded (Table 6.3_1). Therefore, while there is a combined *de minimis* of 7% there is a nominal single species *de minimis* level of up to 12.7% with the combined species approach.

STECF observe that to enable the approach to allow sustainable fishing in line with the CFP objectives the following two conditions should be met:

1. For quota setting, the maximum possible amount of *de minimis* discard quantity should be deducted from the catch opportunities arising from F_{MSY} based catch advice for each stock. This is stated in the updated proposal and is required because the proportion contribution from each stock to the total *de minimis* amount would not be known until it is fully taken. This would result in a reduction to fishing opportunities because not all the deducted *de minimis* quantities can be taken to remain within the 7% *de minimis* limit. In the example presented, there would be a 2,838 tonne deduction from the TACs for these species, compared with a total of 2,280 t under single species *de minimis* for the selected species. The additional reduction in fishing opportunities for cod, haddock and/or whiting would be split as 351 tonnes (1755-1404) for TR1 and 217 (1083-867) tonnes for TR2 (Table 63_1). This reduction in permitted catch, based on this example, would imply lower revenues compared with the single species approach and therefore there are economic consequences associated with a combined *de minimis*. STECF notes that with the adoption of this combined *de minimis* with safeguard, 25% more catch would need to be deducted from the relevant TACs compared with a single species *de minimis*.
2. Accurate real-time recording of discard quantities is required so that the uptake of the *de minimis* quantity can be constantly monitored. There would be two thresholds at which discarding would stop, and catches would have to be retained onboard; i) when the maximum quantity for a stock (including +25% safeguard) has been discarded, ii) when the total *de minimis* quantity across all selected stocks has been discarded. To identify when these thresholds are met, real-time monitoring across Member States would be required. The inclusion of the safeguard increases the monitoring requirement, because uptake must be monitored across Member States. At the current time, there is no mechanism in place that would enable real-time reporting of *de minimis* uptake across Member States. Single species *de minimis* have a fixed limit and therefore, can be managed independently by each Member State.

STECF notes that in the previous submission, a 5% *de minimis* was requested, while this number was increased to 7% and 6% in the most recent request. STECF observe that, based on the data provided, a 7% *de minimis* would enable 1,404 t of discards in TR1 for the three species combined, compared with 1,003 t from a 5% *de minimis*. For TR2, a 7% *de minimis* represents 1,005 t compared with 867 t from a 5% *de minimis*. There is no explanation provided on why the proposed *de minimis* percentage was increased to 7% and 6% in the updated submission.

STECF conclusions

STECF concludes that to be in line with CFP objectives, the maximum possible amount of *de minimis* (i.e. the maximum safeguard amount) for each species that could potentially be discarded, must be deducted from the TAC. Consequently, the deduction from the TAC

to account for *de minimis* discards is higher than for single species *de minimis.* There is thus a direct tradeoff between flexibility of *de minimis* and the precautionary TAC deduction; in this case a 25% flexibility requires a 25% higher deduction from each stock TAC.

STECF concludes that under a combined *de minimis* of 7% with 25% safeguard, the allowed discards can be substantially more than 7% for the individual species. For example, in the proposal, for haddock catches taken by TR2, a *de minimis* level of up to 12.7% would be possible.

STECF concludes that the total amount of discards permitted under a combined *de minimis* with a safeguard should be same as the sum of single species *de minimis* for the same stocks. Rather than increasing flexibility, the effect of a combined species *de minimis* is to modify the relative quantities that can be discarded of the selected species. STECF is not aware of differences in handling difficulties between different species which would justify the need for securing higher *de minimis* levels for some species.

STECF concludes that based on the proposal, for the three single-species *de minimis* provisions, around 80% of the historical discards would need to be landed (assuming no selectivity improvements). The combined *de minimis,* with a 25% safeguard flexibility, does not reduce the overall amount of unwanted catches to be landed (~80%), and for each stock >75% of historical discards would still need to be landed, demonstrating the limited benefits of this approach.

STECF concludes that the use of a safeguard requires that monitoring requirements are significantly increased to include integrated international real-time catch monitoring and reporting, and this is not currently in place but also not likely to be achieved in the near future.

5.4 Impact of exploitation pattern on MSY yields

Background provided by the Commission

Technical measures have a direct impact on the exploitation pattern on commercially exploited stocks. This in turn has an influence in the yield that can be taken for a given level of fishing mortality. As a first exploration of the current exploitation relative to the optimum, a scoping analysis has been done for a limited number of stocks.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

Based on the ad hoc contract for the Analysis of exploitation patterns for some sample stocks, the STECF is requested to:

(i) review the methodological approaches developed and provide comment on whether the approach would be useful for the potential development of reference points that could be used to identify current and optimal exploitation patterns.

(ii) consider how such reference points could be reconciled in a mixed fisheries context and provide comment on what biological and economic factors should be considered.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

STECF comments

Theoretical effects of selectivity on yield, stock abundance and fisheries profitability

It is a well-known result, already presented in the seminal book of Beverton and Holt (1957), that the fishing mortality that maximises the long term catch (F_{MSY}) depends on fisheries selectivity. Simple yield per recruit models, where selectivity is defined by a length or an age at first catch, show that one specific value of F_{MSY} and one value of MSY is associated to each fishing pattern (Fig. 5.4.1). In other words, the value of F_{MSY} (and thus the limit of overfishing) depends on minimum legal sizes, mesh sizes, technical measures, etc.

The general rule is usually as follows: the higher the age at first catch (and more generally the older the fish targeted), the larger the value of F_{MSY} and the MSY tonnage itself. Simple yield per recruit models also show that the highest possible catch is theoretically obtained for an infinitely high fishing mortality or fishing effort with the age at first catch equal to t_{opt} (or a size L_{opt}) where the biomass of the cohort is maximal.

Biomass or SSB per recruit models highlight an additional important point. Changing the fisheries selectivity has a strong impact on stock abundance. Thus, the same amount of catch can be obtained with very different impacts on the fish stock biomass. In many cases, fishing around t_{opt} (or L_{opt}) would not only produce higher yields but also much higher biomass at sea for the exploited stocks. Thus, managing selectivity may contribute to restore marine ecosystem structure and resilience and to achieve several

goals of ecosystem-based fisheries management, such as rebuilding the biomass of prey and predator species in the system.

Finally, changing fish stock abundance by managing selectivity modifies catches per unit of effort and therefore may have a huge positive impact on the profitability of fisheries.

Minimizing the impact of fishing and ensuring economic sustainability for fisheries are two clear objective of the CFP (respectively, articles 2.3 and 2.1 of the basic regulation). Thus, STECF considers that managing fisheries selectivity is a key issue that deserves to be better considered in fisheries management.

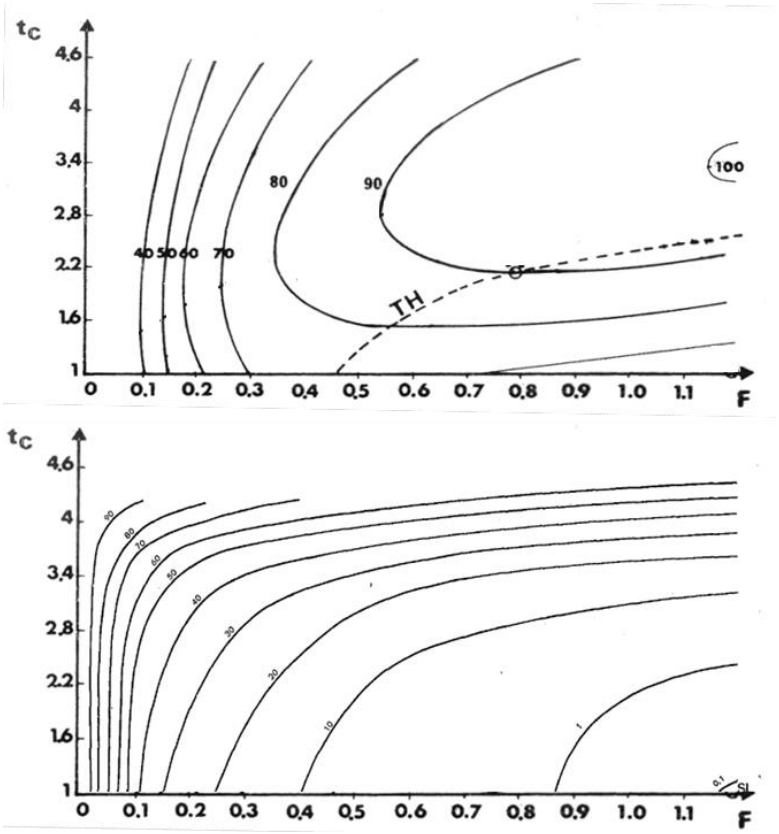


Figure 5.4.1. Theoretical changes in yield (top) and stock abundance (bottom), according to the fishing mortality F (x-axis) and the age at first catch t_c (y-axis). Such representation is obtained using the Beverton and Holt yield and biomass per recruit model (here redrawn from Le Guen 1974 in the case of *P. elongatus*). Yield per recruit (top) are expressed as percentages of the maximum theoretical value, which is obtained in the area marked 100 (i.e. for very high F and $t_c=t_{opt}$, here equal to 3.5 year). Biomass per recruit (bottom) is expressed as the percentage of the unexploited value, and is minimal for high F and low t_c. The horizontal tangents curve T.H. (dotted line), is joining the values of MSY provided by any age at first catch t_c, and thus can be used to identify the related value of F_{MSY}. (here for instance, for an age at first catch equal to 2.2, according to the point marked by a small circle MSY is equal to 90% of the theoretical maximum, and is obtained for F_{MSY} equal to 0.8)

Some lessons from recent case studies

Several recent publications have underlined the benefit that would result from improving size and age selectivity in fisheries and the fact that the MSY approach calculated on the current selectivity do not lead to an optimal catch and even less to a minimized impact on fish stocks and ecosystem. Cardinale and Hjelm (2012) showed for instance that changing the size range of harvested cod in the Baltic, makes it possible to largely increase the yield and revenue from the fishery compared to the fishing mortality F_{MSY} stipulated in the management plan. Analysing a set of 36 Mediterranean fish stocks, Colloca et al. (2013) estimated that shifting the size of first capture towards the size L_{opt} at which fish cohorts achieve their maximum biomass would produce on average between two and three times higher economic yields and much higher biomass at sea for the exploited stocks.

Similar results were for instance obtained for the Atlantic cod (Diekert et al., 2010). More generally, analysing a set of 31 North East Atlantic stocks, Vasilakopoulos et al. (2016) showed that catching fish a year or more after they mature (combined with an intermediate exploitation rate $F \approx 0.3$) promotes high sustainable yields at low levels of stock depletion. These authors concluded that explicitly incorporating selectivity scenarios in fisheries advice would allow the identification of optimal exploitation regimes and benefit results-based management. Based on the case study of 9 stocks from the North Sea and the Baltic, Froese et al. (2008) also argue that size matters for ecosystem-based fisheries management and present a list of additional advantages associated with fishing at Lopt, including a minimal impact on size structure, a reduction in the genetic selection pressure, or an increase in the stability of biomass and catch.

Based on the Beverton and Holt model and the von Bertalanffy growth equation, Froese et al (2016) established a formula to determine the length at first catch leading to a mean length in catch equal to L_{opt} 1. This formula suggests that minimal legal lengths or mesh sizes should be dramatically increased for most stocks. In the case of the North Sea cod for instance, the theoretical value of the optimal length at first catch is equal to 72 cm (see Fig. 5.4.2).

1 Based on the Beverton and Holt yield per recruit model and related equations, Froese et al. (2016) demonstrated that a length at first catch $L_{c\_opt} = L\infty \cdot (2+3F/M) / [(1+F/M)(3+M/K)]$ results in a mean length in the catch equal to L_{opt}. To provide an order of magnitude, this generic equation can be simplified under the assumption of F=M and M/K=1.5. In such case, $L_{c\_opt} = 0.56 \cdot L\infty$, while $L_{opt} = 0.67 \cdot L\infty$

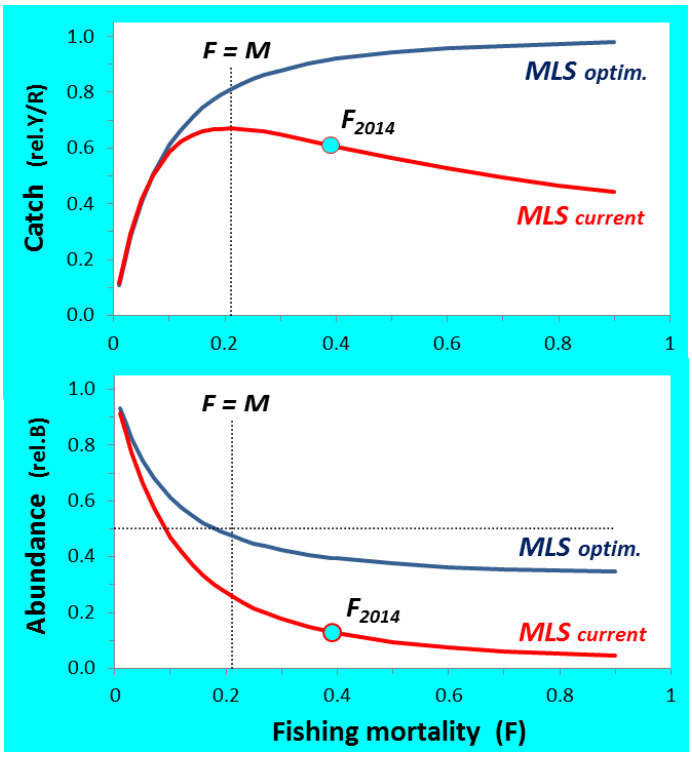


Figure 5.4.2 Illustration of the potential effects of changing the Minimum landing size (MLS), using the North sea cod as a case study. a) Yield per recruit relative to the theoretical maximum yield and b) Biomass per recruit relative to unexploited biomass, for the current and for the optimal lengths at first capture. For this stock, reducing twice the current fishing mortality while increasing MLS to L_{c_opt}, would lead to an increase of 30% in the catch and of 260 % in the stock abundance (redrawn from Froese et al., 2016).

It should be underlined that in such case of an optimal selectivity pattern, there is no realistic value of the fishing mortality that maximises the long term catch (the theoretical value of F_{MSY} is infinity). This means that defining a management target for the exploitation rate implies reference to other objectives or considerations rather than maximising the catch. Various candidate targets can be suggested based on empirical ecological considerations. This includes: the F0.1 threshold (assumed to be the lower limit of full exploitation), the value F=M (take no more than nature), $F_{50\%}$ (the fishing mortality resulting in a stock biomass equal to half of the virgin one), while economic approaches usually refer to F_{MEY} (the fishing mortality resulting in the maximum economic yield) as the most appropriate target.

Main finding of the ad-hoc contract (in relation to ToR i)

The ad-hoc contract presents results from catch simulations for a selection of eight example stocks, these results are relevant in considering ToR i. A generic FLR framework was developed, based on an age-structured per recruit analysis combined with assumptions about recruitment (i.e. using alternatively a mean recruitment or an empirical stock-recruitment relationship). The framework was used to estimate MSY based reference points and proxies such as $F_{0.1}$. A selectivity model was developed for

the eight species for a range of mesh sizes. Each mesh was associated with a specific length L_{50}, used as a proxy of the length at first catch and defined as the length for which 50% of the fish are retained by the fishing gear. Then, simulations were conducted to compare difference in stock specific MSY for the range of mesh sizes.

Simulations fully confirmed the above presented results. For all the studied species/stocks it was found that improving the exploitation pattern through e.g. mesh size increased the expected yield, as well as value of the MSY. F_{MSY} increases accordingly, reaching very high (and rather unreasonable) values for the largest studied mesh sizes. Finally, the report provides estimates of the optimal length for the studied stocks, suggesting again that from a single-species point of view, increases in the length or age at first catch (or the L_{50}) produce very tangible benefits.

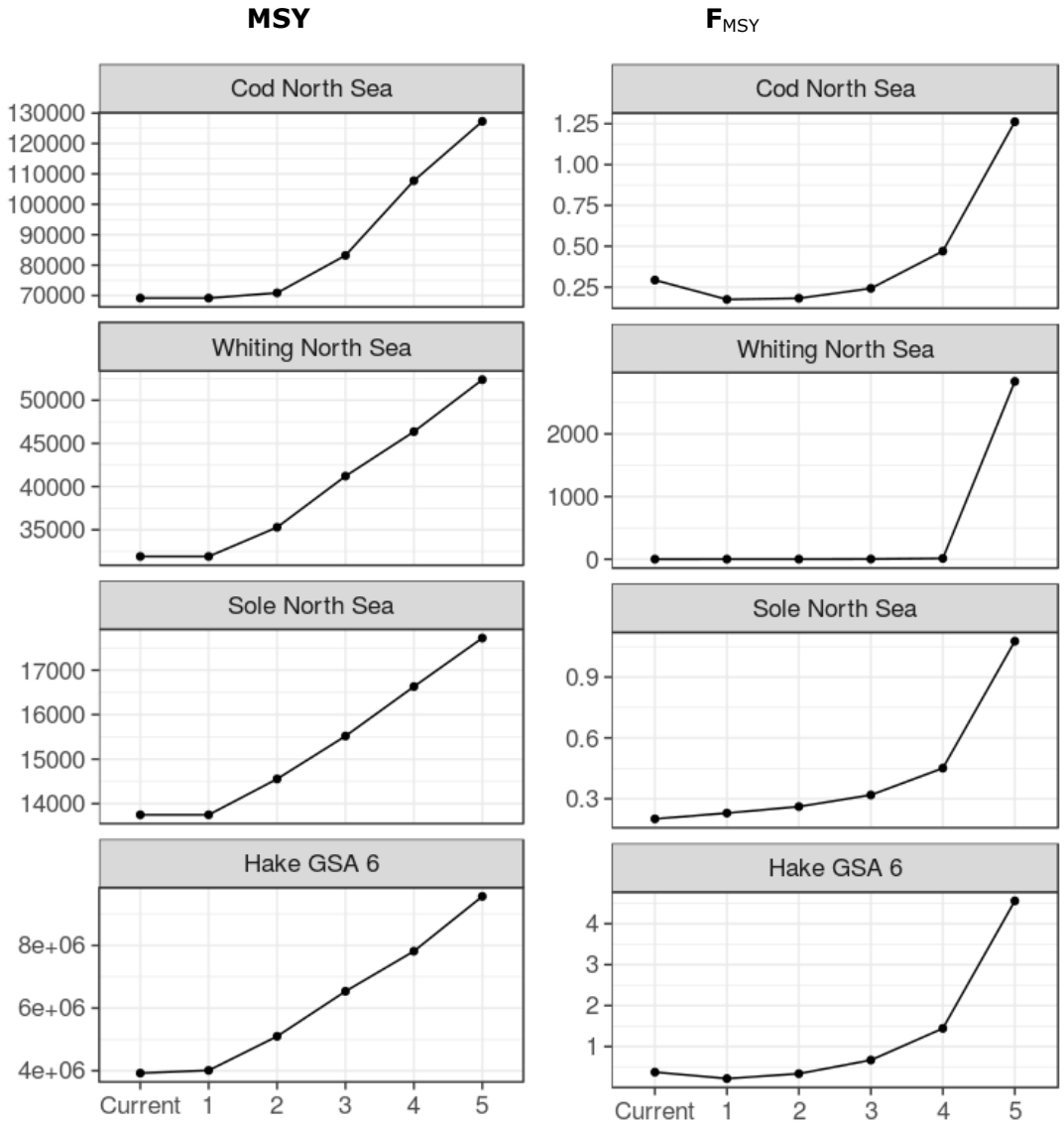


Figure 5.4.3 – Outputs of simulations for a subset of 4 stocks: values of MSY (left) and F_{MSY} (right) for increasing mesh sizes. Numbers on the x-axis refer to the age as

first catch (here defined by L_{50} as the age of 50% retention in the fishing gear) (From Kell, 2018)

While acknowledging that the methodological approach developed is appropriate, STECF notes that no results are provided in the report (and neither were they requested by the ad-hoc contract ToRs) regarding the impact of the simulated mesh sizes on the stock abundance or on the fisheries profitability. Thus the report fulfils the ToRs it was given, but does not provide the new selectivity-related biomass reference points which would have been needed by STECF to fully answer its own ToRs. This would require additional analysis.

Practical implementation (in relation to ToR ii)

STECF was asked to consider how size-based approaches could be reconciled in a mixed fisheries context and to provide comments on what biological and economic factors should be considered.

Two issues make it difficult to improve, in practice, the selectivity pattern of fisheries. The first one is that changing the size profile of catch toward larger fish, while often leading to long term benefits, always implies short term losses in term of catch and profitability. As a consequence, such changes are usually feared by stakeholders, and economically difficult to implement.

The second difficulty relates to mixed fisheries and is even more challenging. There is no unique selection pattern which could ensure fishing each species in a mixed species fishery according to its own optimal length L_{opt}. Any size-based measure such as MCRS intended to constrain the selectivity applied to each species would certainly lead to very large unwanted (i.e. under-sized) catches.

Therefore, optimising the size profile of catches in mixed fisheries will always imply a trade-off between species and often between fleets. Economic assessment is useful to inform the political decision process, but cannot resolve this trade off which will remain a political decision.

This means that any attempt to change mesh sizes or MCRS should be carefully evaluated with MSE approaches before any implementation. They should include impacts assessment of selectivity patterns on the economic performances of fleet segments. Such an analysis could be for instance conducted at the time Multi Annual Plans are discussed.

There are various ways to improve exploitation patterns in populations using technical measures such as MCRS, minimum mesh size or selective devices, closed areas, gear restrictions, juvenile's protection, etc. Bearing this in mind, STECF considers that a result-based approach deserves to be promoted, developing incentives for fishermen to improve their selectivity (and reduce unwanted catches at the same time). This would be likely to lead to a requirement to demonstrate the achievement of any exploitation pattern targets. Such requirements would not be without cost but on the other hand results-based approaches do provide the opportunity for fishermen to utilise their capacity for innovation in ways tailored to their specific fisheries.

In practice, targets related to selectivity should be defined on a case by case basis, taking into account trade-offs between species and fleet segments. ICES standard procedure already provides estimates of L_{opt} for data poor species using the LBI (Length-Based Indicators) package. It should be recognized that for most species L_{opt} is far above

the current mean length of catch. Thus, in most fisheries, reaching an optimal selectivity is not a realistic objective on the short or even medium term. Nevertheless, using results-based indicators (for instance the ratios between the current mean length or mean age in catch and L_{opt} or t_{opt}) could be useful to assess the current selectivity performances of fisheries, to monitor or encourage selectivity improvements, or to define intermediate targets, for instance in the frame of MAPs.

STECF notes that monitoring and managing the size profile of fishing fleets also requires having proper mechanisms of data collection and collation in place and due recognition of the additional analysis requirements.

STECF conclusions

STECF underlines that by changing the size range of harvested fish, it is possible in most fisheries to largely increase the long term yield and profit, compared to the current fisheries management at F_{MSY} based on the current selectivity. Optimized fishing regimes (including F and selectivity targets) may also ensure significant increase in fish stock abundance, thus contributing to minimize the ecosystem impacts of fishing and to improve ecosystems resilience.

In order to progressively promote such optimized fishing regimes STECF suggests evaluating the potential effects of changing the selectivity patterns, on catches, stocks biomass and when possible fisheries profitability.

STECF considers this question could be assessed using MSE in bio-economic multispecies models (and ecosystem models when available), for example in the framework of the definition of MAPs or in the framework of the future CFP. Improving selectivity is a key issue to be maintained in the dialogue with stakeholders.

There are several management measures by which selectivity could be improved. Traditional technical measures including changes in mesh sizes, MCRS or closed areas have intended to achieve this, but have not always been successful in doing so (cf STECF EWG 15-01). When fully enforced, the landing obligation could provide additional results-based incentives for the industry to reduce unwanted catches and thus improve selectivity.

In order to monitor changes in selectivity, additional length-based indicators would need to be developed. In the first instance, simple indicators could be tested on some case study fisheries. The upcoming expert working group dedicated to the expansion of indicators used to monitor the ecosystem performances of the CFP is scheduled for the autumn (STECF 18-15) and would provide an opportunity to address this.

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5.5 Review of the UK avoidance programme for picked dogfish

Background provided by the Commission

Since 2016, an amendment to the fishing opportunities for 2016 (regulation 2016/72) and subsequent regulations have allowed for a catch avoidance programme for picked dogfish (*Squalus acanthias*) by the UK. The current regulation on fishing opportunities, 2018/120, provides a derogation from the 'Prohibited species' listing of picked dogfish, for UK fishing vessels participating in the catch avoidance programme to land limited quantities of dead picked dogfish. UK has been granted an overall annual allocation of 100 tonnes, with a vessel monthly limit of 2 tonnes, to incentivise industry participation in the programme. Based on the STECF opinions on this programme the Commission has requested the UK to keep it informed of the results of the by-catch avoidance programme, in order to assess its effectiveness in reaching the objectives.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

STECF is requested to review the report received from UK on the catch avoidance programme for picked dogfish (12 month progress update: interim evaluation Nov 2016-Oct 2017) in light of the STECF opinions2, and on this basis assess whether, taking into account the latest ICES advice on the stock3:

- The programme overall contributes to the avoidance of picked dogfish in the fisheries concerned.
- The objectives of the UK bycatch avoidance programme can be or are already being met, and what improvements can be made, especially in terms of:
    - Improving the current data deficiencies.
    - Increasing the knowledge on spatial aggregations of picked dogfish.
    - Increasing the knowledge on discard survival.

2 https://stecf.jrc.ec.europa.eu/documents/43805/1281129/2015-11_STECF+PLEN+15-03_JRC98672.pdf, p. 50, https://stecf.jrc.ec.europa.eu/documents/43805/896390/2014-11_STECF+PLEN-14-03_JRC93037.pdf, p. 82, https://stecf.jrc.ec.europa.eu/documents/43805/662804/2013-11_STECF+PLEN+13-03_JRC86096.pdf, p. 50

3 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2016/2016/dgs-nea.pdf

- Facilitating the introduction of the landing obligation, including whether such a programme offers a beneficial alternative to a Prohibited Species' listing, to prevent 'choke' species under the CFP landing obligation.

In order to improve the effectiveness of the programme, and considering the seasonal component to picked dogfish by-catch in the Celtic Sea, the UK is proposing to modify the current 2 tonnes per month, per vessel, dead picked dogfish by-catch allowance to a seasonal, gear specific, dead by-catch allowance (details set out in the report).

- The STECF is asked to assess whether the programme, if amended in line with the UK proposal, is considered scientifically justifiable.

Previous STECF comments on picked dogfish avoidance programs

This is the latest in a series of four related requests to STECF. For consistency and context, previous conclusions that are relevant to the current request are summarized below:

STECF PLEN 13-03

On granting exemptions to land unintended picked dogfish by-catches, STECF PLEN 13-03 considers it will generate additional mortality and compromise the recovery of the stock.

- It may be possible to monitor long term trends in abundance of picked dogfish using existing monitoring programmes, but due to the wide distribution, low abundance, and low predicted rate of recovery, any change in abundance is unlikely to be detected for at least 10 years.
- STECF PLEN 13-03 supports additional information collection systems, that would not increase mortality, including observer programs, remote electronic monitoring, and skippers' self-reporting, but exemptions to land unintended by-catches are likely to be less effective at achieving recovery of picked dogfish than maintaining a zero TAC.

STECF PLEN 14-03 (UK programme)

- The UK proposed a real-time monitoring programme using a picked dogfish bycatch quota as an incentive for skippers to participate. The proposal incorporated reporting of by-catches by fishermen, which is validated by observer sampling, and includes agreed move-on rules to avoid areas where picked dogfish catches were high.
- STECF PLEN 14-03 supported the collaborative approach and the use of an incentive whereby good behaviour is rewarded with a landing allowance of picked dogfish, that comes at no apparent cost to the stock.
- Monthly quota limits and the prohibition of quota movement was supported by STECF to avoid the possibility of the development a targeted fishery.
- STECF PLEN 14-03 noted that when picked dogfish catch levels are below the maximum monthly threshold, there may be an incentive to misreport the "lively" fish as "dead" and land those fish and increase fishing mortality by landing fish

that may have otherwise survived. Measures needed to avoid this include observer coverage or CCTV systems.

- While the landing of dead discards would mean there should be no increase in fishing mortality, without successful avoidance behaviour from skippers, the programme would not progress the conservation objectives for picked dogfish.
- STECF PLEN 14-03 observed that it would not possible to predict the usefulness of move-on rules because it is not known whether moving from one area to a different area will result in higher or lower incidental catches. Moreover, there were no indicators presented against which individual avoidance behaviour could be measured.
- STECF PLEN 14-03 concluded that managers need to base their decision on whether to permit the pilot to go ahead without having access to objective scientific advice.

STECF PLEN 15-03 (UK programme)

- The UK undertook a pilot project on the management of picked dogfish and proposed a full avoidance programme, based on real-time monitoring and a bycatch quota.
- STECF 15-03 considered the UK proposal could potentially aid the rebuilding of the stock of picked dogfish by promoting avoidance behaviour, which may in turn lead to reductions in fishing mortality.
- STECF 15-03 considered that the main potential benefits of the proposed pilot project are in providing an incentive for participating vessels to report incidental catches of picked dogfish and the proportions of the catch that are brought aboard dead and alive.
- If operationally successful, it would require that vessels move away from areas of high incidental catch, which may result in a reduction in fishing mortality relative to that which would occur in the absence of the programme.
- Picked dogfish is not included in any discard plans to implement the Landing Obligation (Delegated Regulations), therefore vessels that do not opt into the programme can continue discarding catches of picked dogfish, it is likely that realised catches will exceed any agreed by-catch TAC.
- In order to promote a reduction in fishing mortality through discard avoidance, provisions to opt into the project should be expanded to include additional vessels and MS.

STECF PLEN 17-02 (Ireland programme)

- STECF PLEN 17-02 concluded that there was no a priori means to assess whether implementation of the proposed programme will result in a reduction in catches of picked dogfish (through the avoidance provisions) relative to the catches that would occur in the absence of the programme.
- The programme would potentially provide detailed information on the fishing activity and catches of the participating vessels. However, any provision for the landing of picked dogfish bycatch should include close monitoring of the stock and fisheries.
- STECF PLEN 17-02 concludes that to improve the chances of meeting its objectives, further details are needed before the programme is initiated. This includes, among others, the mechanisms to capture and exchange information on incidental picked dogfish catches between participants and with the wider fleets

- STECF PLEN 17-02 concludes that to investigate the trade-offs and risks to the stock and to the fishing industry for adopting different management approaches, it is necessary to have more detailed data on catch levels.

Summary of the information provided to STECF

In the TAC 2017 regulation (European Union, 2017), picked dogfish (spurdog, *Squalus acanthias*) was listed as a prohibited species (article 12). Specimens should therefore not be harmed and if caught should be released immediately, with the exception for vessels operating in a specific area where landings up to 270 tonnes of dead picked dogfish are allowed, as long as vessels are engaged in a Members State 'bycatch avoidance programmes'. Furthermore, a vessel engaged in the bycatch avoidance programme may land not more than 2 tonnes per month of picked dogfish that is dead at the moment when the fishing gear is hauled on board.

The UK is the highest TAC (270 tonnes) quota holder with 100 tonnes, followed by France and Ireland with 83 and 53 tonnes, respectively. The UK and Ireland have ongoing spurdog bycatch avoidance programmes. No information is available from France, or from the remaining quota holder Member States (Belgium 20 tonnes, Spain 10, Germany 4, Portugal and Netherlands 0).

STECF notes that the objective of the UK bycatch avoidance programme is, according to the report, to "assess the feasibility of the near real-time Spurdog By-catch Avoidance Programme as an alternative to a 'Prohibited Species' listing, meeting Defra's policy need to align spurdog with the landing obligation by 2019, whilst significantly reducing dead discards and fishing mortality, without 'choking' the fishery through the use of a dead spurdog by-catch allowance."

The UK bycatch avoidance programme includes several features that advance the knowledge on spurdog biology, its fisheries and possible management measures. Such features include, among others:

- improve knowledge on spurdog finer scale abundance and spatial distribution
- typology of gillnets and trawlers daily catches
- use of real-time catch self-reporting and mapping system
- collaborative approach between stakeholder
- possible applied alternatives to reduce choke effects in the Landing Obligation
- the applicability of incentives to foster industry participation to report incidental catches

Although the UK bycatch avoidance programme is based on a small sample of vessels, namely three gillnets and three trawlers, some of the features listed above could be applicable to a larger sample of vessels, to other areas or to other species. In this context, the programme has (and could potentially) achieve (further) significant results.

STECF notes that to assess whether there has been active avoidance of picked dogfish catch or any reduction in picked dogfish mortality during the UK bycatch avoidance

programme, the report refers to a comparison made between past and the recorded fishing activity and picked dogfish distribution in the programme in two ways:

Comparison 1 - between the fishing activity on the two first months, where skippers were not provided risk maps, and the remaining duration of the project (Table 5.5.1 & 2)

Comparison 2 - between past annual fishing activity maps (for gillnetters only) and the activity during the programme (Figure 5.5.1).

Table 5.5.1. Proportion of cells fished by risk status in November-December 2016. Advisory information was not communicated to the skippers during this period.

Vessel	Cell days fished	Days fished in high risk cells	Days fished in medium risk cells	Days fished in low risk cells	Days fished in cells where risk unknown
A	51	4%	10%	35%	51%
B	37	5%	8%	14%	73%
C	35	3%	9%	9%	80%
D	10	0%	0%	20%	80%
E	2	0%	0%	0%	100%

Table 5.5.2. Risk of spurdog bycatch in grid cell days available to be fished and cell days that were fished by participating vessels in the first 10 months that RAG advisory maps were issued in the spurdog bycatch avoidance programme (January-October 2017).

Vessel	Total cell days	Cell days with high risk of Spurdog by-catch (red)				Cell days with medium risk of Spurdog by-catch (amber)				Cell days with low risk of Spurdog by-catch (green)				Cell days with unknown risk of Spurdog by-catch			
	N cells days fished	N cell days available	N cell days fished	% cell days available that were fished	% total cell days fished in red cells	N cell days available	N cell days fished	% cell days available that were fished	% total cell days fished in amber cells	N cell days available	N cell days fished	% cell days available that were fished	% total cell days fished in green cells	N cell days available	N cell days fished	% cell days available that were fished	% total cell days fished in unknown cells
A	166	208	2	1%	1%	598	6	1%	4%	4,223	42	1%	25%	N/K	117	N/K	70%
B	237	106	2	2%	1%	425	10	2%	4%	4,961	59	1%	25%	N/K	169	N/K	71%
C	202	174	7	4%	3%	510	6	1%	3%	4,926	47	1%	23%	N/K	146	N/K	72%
D	140	7	0	0%	0%	53	2	4%	1%	1,739	62	4%	44%	N/K	81	N/K	58%
E	256	8	0	0%	0%	5	0	0%	0%	1,578	85	5%	33%	N/K	174	N/K	68%
F	10	1	0	0%	0%	15	0	0%	0%	1,131	2	0%	20%	N/K	8	N/K	80%
3 netters	**605**	**488**	**11**	**2%**	**2%**	**1,533**	**22**	**1%**	**4%**	**14,110**	**148**	**1%**	**24%**	**N/K**	**432**	**N/K**	**71%**
3 trawlers	**406**	**16**	**0**	**0%**	**0%**	**73**	**2**	**3%**	**0%**	**4,448**	**149**	**3%**	**37%**	**N/K**	**263**	**N/K**	**65%**
6 vessels	**1,011**	**504**	**11**	**2%**	**1%**	**1,606**	**24**	**1%**	**2%**	**18,558**	**297**	**2%**	**29%**	**N/K**	**695**	**N/K**	**69%**

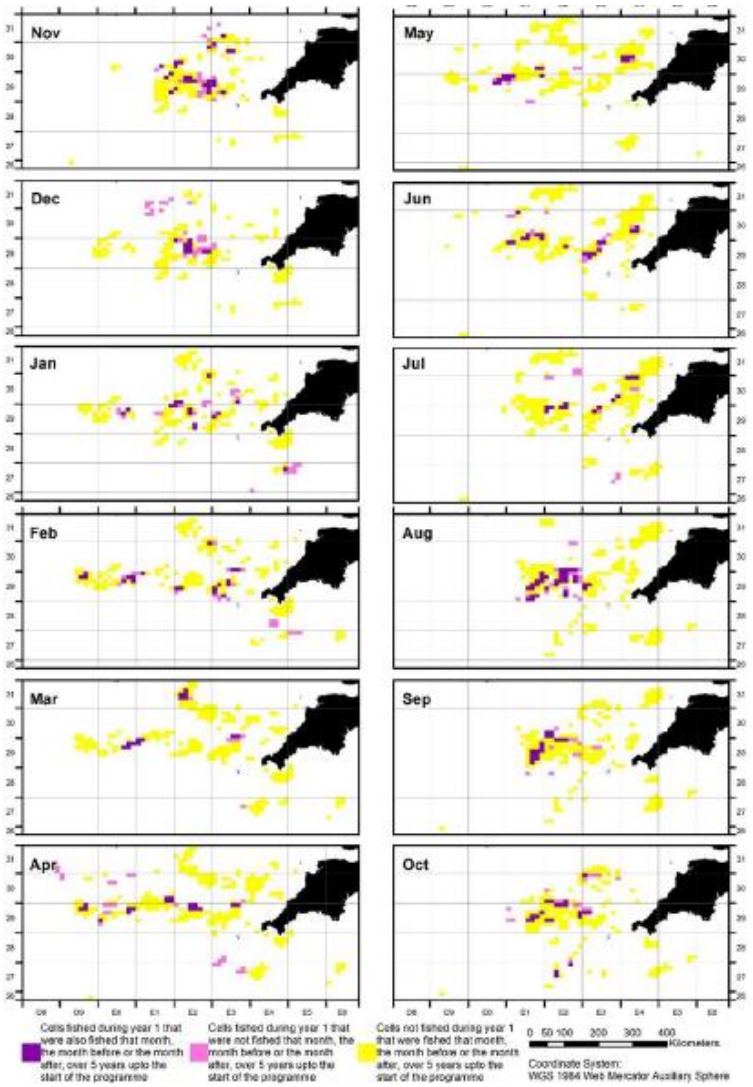


Figure 5.5.1. Similarities and differences in fishing activity by the three participating gill netters between November 2016 – October 2017 compared with fishing activity by the same vessels in November 2011 – October 2016. (purple – cell fished in "both" periods; pink – cells fished only between November 2016 – October 2017; yellow – cell fished only in November 2011 – October 2016)

Based on the above results the report concludes that "preliminary evidence indicates avoidance of red (high risk of significant spurdog by-catch) and amber (medium risk of significant spurdog by-catch) cells, with no more than 5% of cell days fished by any vessel in red or amber risk cells". However, it also states that these results were also partly a reflection of the limited red and amber cell days available.

STECF comments

STECF does not see much evidence of the statement from the report regarding observed changes in fishing behavior and thus in the level of picked dogfish catch relative to that which would occur in the absence of the programme. STECF notes no obvious changes in fishing patterns between the first two months and the rest of the project (comparison 1; similar % levels of high and amber risk cells fished) or between the cells fished in the past and during the project (comparison 2, no obvious predominance of pink cells).

STECF also notes that of the 60 tonnes of bycatch allowance given to the 6 vessels to land dead picked dogfish for the duration of the programme, subject to a 2 tonnes maximum monthly threshold per vessel, only 38 tonnes in total were landed. However, the 60 tonnes were sufficient to cover the dead catches of picked dogfish during the whole programme, but because catches were almost exclusively limited to the winter months, the maximum monthly threshold has in effect, limited the overall quota uptake by the participating vessels. However, the programme was not set up in a landing obligation scenario, so the vessels were allowed to continue discard dead catches after the bycatch allowance was reached. As such this limitation on landing quota uptake did not result in a strong incentive to avoid catches.

STECF also notes that, in line with previous observations (STECF PLEN 14-03), when picked dogfish catch levels are below the maximum monthly threshold, there may be an incentive for skippers to either: a) misreport the "lively" fish as "dead" and land those fish thereby increasing fishing mortality by landing fish that may otherwise have survived; or, as documented in the report of the UK bycatch avoidance programme, on one occasion, b) to continue fishing in high risk areas to take up the permitted monthly 2 tonnes dead-catch limit.

Such issues are of particularly importance if the maximum monthly threshold is changed, as proposed. The UK proposal is to retain the 60 tonnes annual bycatch limit, but to permit vessels to retain and land up to 5 tonnes per month between October and April and 1 tonne per month between May and September for gillnetters and the opposite for trawlers. In doing so, and if such practices occur, there is a risk that fishing mortality will increase as the variable monthly threshold will not necessarily match the monthly unavoidable dead picked dogfish catch

On the other hand, and noting the programme results that "partial overlap between the spatial abundance of tagged picked dogfish and commercial gillnet vessels occurs throughout all seasons, but most notably in autumn", higher unavoidable dead picked dogfish catches do occur and are likely to continue to occur in autumn/winter. If the threshold objective is to avoid "choking" the fishery in a landing obligation scenario by accounting for unavoidable dead picked dogfish catches, but still incentivizing avoidance of catches, then a seasonal change with a variable monthly limit is justifiable. However, if the maximum level of that threshold is set consistent with present bycatch levels, there will be little incentive to avoid catches. As STECF PLEN 14-03 noted, while the landing of dead discards would mean there should be no increase in fishing mortality, without successful avoidance behaviour from skippers, the programme would not progress the conservation objectives for picked dogfish.

STECF notes that considering the status of the picked dogfish stock and their biology and life strategy, the main objectives of any picked dogfish bycatch avoidance programme should be to reduce mortality by firstly reduce or eliminate contact with fishing gears, secondly to improve the survival of live discards, and only after to allow for the landing and commercialization of unavoidable dead picked dogfish catches. These objectives prioritizations should be clear in any programme.

Finally, STECF notes that the proposal to continue the programme while introducing an obligation for skippers to report the reasons why they chose to fish a high or medium risk cell, together with the associated AIS/VMS and Remote Electronic Monitoring would provide information that may prove useful in attempting to understand and evaluate the fishing decision-making and behavior. However, project improvements will necessary have to include also a limitation on allowed catches, namely that when the monthly threshold is reached the vessels is not allowed to continue fishing and discarding.

STECF conclusions

STECF notes that the UK bycatch avoidance program has several objectives and provides useful information on challenges linked to the management of valuable sensitive bycatch that go beyond the focus of the UK fisheries catching picked dogfish, and in particularly, in providing practical answers to some of the challenges of the Landing Obligation.

ToR 1. The programme overall contributes to the avoidance of picked dogfish in the fisheries concerned

STECF concludes that there is little evidence that UK bycatch avoidance programme has resulted in a reduction in catches of picked dogfish (through the avoidance provisions) relative to the catches that would occur in the absence of the programme. This is likely the result that when the bycatch allowance is reached the vessels are allowed to continue discarding dead picked dogfish catches.

ToR 2. The objectives of the UK bycatch avoidance programme can be or are already being met, and what improvements can be made especially in terms of:

- **Improving the current data deficiencies.**
- **Increasing the knowledge on spatial aggregations of picked dogfish.**
- **Increasing the knowledge on discard survival.**
- **Facilitating the introduction of the landing obligation, including whether such a programme offers a beneficial alternative to a Prohibited Species' listing, to prevent 'choke' species under the CFP landing obligation.**

STECF concludes that although the avoidance objectives may not have been achieved, the project has provided useful and new information on a number of aspects, such as increasing knowledge of picked dogfish abundance and distribution, finer scale catch data, real-time reporting system.

Regarding the facilitating the introduction of the LO, STECF concludes that without running the programme in an actual LO scenario including choke mechanisms, i.e. that when the bycatch allowance is reached the vessels would not be allowed to continue fishing and discard dead catches, the programme offers very little insight whether the avoidance objective can be reached.

ToR3. Assess whether the programme, if amended in line with the UK proposal, is considered scientifically justifiable

STECF notes that the proposed amendment of changing the seasonal monthly threshold by gear corresponds to the present catch levels (landings + discards) of the 6 vessels engaged. STECF concludes therefore that the amended UK bycatch avoidance programme may not incentivize the avoidance of catches and thus will not progress the conservation objectives for picked dogfish. Furthermore, (monthly) landing threshold can provide disincentives for avoidance when picked dogfish catch levels are below the threshold.

STECF notes that the project has the potential to suggest areas and seasons of high probability of picked dogfish encounter. Fishing away from these areas and seasons may results in effective avoidance of picked dogfish catches. STECF therefore suggest that in the next phase of the project and before a decision is made on the management of picked dogfish from 2019 onwards, the programme continues but that when the bycatch allowance is reached the vessels would not be allowed to continue fishing and discarding dead catches.

5.6 Skipjack HCR

Background provided by the Commission

Resolution 16/02 'On harvest control rules for Skipjack tuna in the IOTC Area of Competence" provides the pre-agreed framework based on depletion reference points including a mechanism to calculate the total annual catch limit on the basis of the following formula:

I x Etarg x SSBcurr

Where

- I is the fishing intensity, in percentage, for alternative levels of estimated stock status (SSBcurr/SSBo) where SSBo is the estimate of the unfished spawning stock biomass

- E targ is the estimate of the equilibrium exploitation rate associated with sustaining the stock at SSBtarg

- SSBcurr is the estimate of the current spawning stock biomass

At the recent 20th Scientific Committee the application of the agreed HCR and related formula provides a total annual catch limit of 470,020 t valid over the next 3-year period 2018-2020.

Request to the STECF

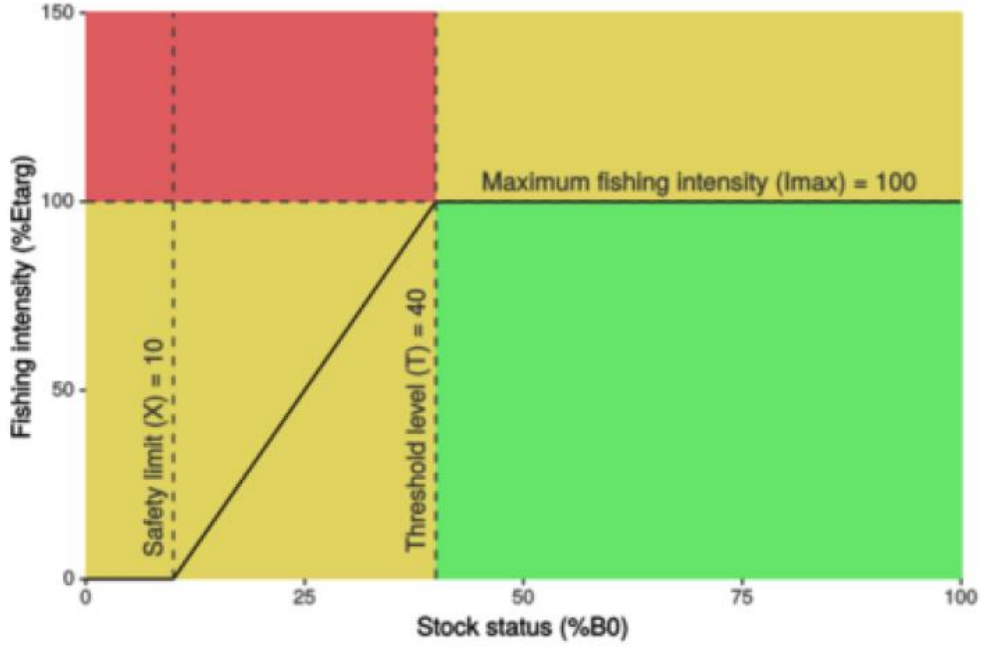
STECF is requested:

- to provide the adaptation of the abovementioned formula with a view to take into account the estimated current exploitable biomass instead of only the current spawning stock biomass. The scientific information underpinning such adaptation shall be provided and commented as required

- to calculate the annual catch limit if the abovementioned formula was applied to the estimated exploitable biomass instead of only the current spawning stock biomass

- to provide an updated overview of the HCR performance indicators on status, safety, yield, abundance and stability

- to provide an estimate of the likely difference in the economic value between the two catch limits by taking into account, inter alia, the possible price elasticity and other changes that may affect the market



STECF response

Background

Since 2013, the IOTC SC has undertaken a Management Strategy Evaluation (MSE) for the IO SKJ fishery. Between 2014 and 2016, the results of this work program, including the operating model, evaluation methods, performance statistics, and approaches for developing harvest control rules (HCRs) were reviewed by the Working Party on Tropical Tunas (WPTT), Working Party on Methods (WPM), the Scientific Committee (SC) and the Management Procedures Dialogue (MPD).

In May 2016, various HCR were presented and discussed during the 2nd Management Procedure Dialogue of IOTC and afterwards the IOTC Commission in its annual meeting adopted a Harvest Control Rule for skipjack (IOTC Resolution 16/02). The adopted HCR has five control parameters tuned to provide better management performance with respect to the Commission's management objectives and the underlying dynamics of the stock, which are

- Threshold level, the percentage of SSB_0 below which reductions in fishing mortality are required, $SSB_{threshold}$= 40% SSB_0. This was set on the target biomass reference point of 40% of the unfished level (SSB_{targ} = 0.4 * SSB_0);
- Maximum fishing intensity (I_{max}), the percentage of E_{targ} that will be applied when the stock status is at or above the threshold level = 100%.
- Safety limit, the percentage of B_0 below which non-subsistence catches are set to zero i.e. the non-subsistence fishery is closed B_{safety} = 10%.

- Maximum catch limit (C_{max}), the maximum recommended catch limit = 900,000t. This value is based upon the estimated upper limit of the MSY range in the 2014 Skipjack stock assessment.
- Maximum change in catch limit (D_{max}), the maximum percentage change in the catch limit = 30% from year to year.

The adopted HCR seeks to maintain the skipjack tuna stock biomass at, or above, the target reference point while avoiding the biomass limit reference point, which is the biomass of 20% of the unfished level (SSB_{lim} = 0.2*SSB_0). Note that the biomass limit reference point (0.2*SSB_0) is different to the Safety limit of the HCR (0.1*SSB_0).

The adopted Harvest Control Rule (HCR) specifies that the skipjack tuna stock assessment shall be conducted every three years, with the first application of the HCR based on the 2017 stock assessment. The skipjack tuna HCR then provides a total annual catch limit using three different values estimated from each skipjack stock assessment. For each value, the reported median from the reference case adopted by the Scientific Committee shall be used. These values are:

- The estimate of current spawning stock biomass (SSB_{curr});
- The estimate of the unfished spawning stock biomass (SSB_0);
- The estimate of the equilibrium exploitation rate (E_{targ}) associated with sustaining the stock at SSB_{targ}.

And the total annual catch limit is calculated using the following:

- If the current spawning biomass (SSB_{curr}) is estimated to be at or above the threshold spawning biomass i.e., SSB_{curr} >= 0.4*SSB_0, then the catch limit shall be set at [I_{max} * E_{targ} * SSBcurr]
- If the current spawning biomass (SSB_{curr}) is estimated to be below the threshold biomass i.e, SSB_{curr} < 0.4*B_0, but greater than the safety limit i.e., 0.1*SSB_0, then the catch limit shall be set at [I * E_{targ} * SSB_{curr}]. See Table of Appendix 1 of Resolution 16/02 for values of fishing intensity (I) for specific SSB_{curr}.
- If the spawning biomass is estimated to be below the safety limit, i.e. SSB_{curr} < 0.1*SSB_0 then the catch limit shall be at 0 for all fisheries other than subsistence fisheries.

The STECF notes that 2017 IOTC Scientific Committee applied the HCR to advice a total annual catch limit for 2018-2020 using the following values estimated from the 2017 skipjack stock assessment. For each value, the reported median from the reference grid adopted by the Scientific Committee for advising the Commission is used:

- The median of SSB_{2016}/SSB_0 = 0.40;
- The estimate median of current spawning stock biomass (SSB_{curr}) is 796,660 tons;
- The estimate of the equilibrium exploitation rate associated with sustaining the stock at SSBtarg is Etarg = 0,59;

- As current spawning biomass (SSB_{curr}) is estimated to be at or above the threshold spawning biomass i.e., SSB_{curr} >= $0.4*SSB_0$, then the fishing intensity parameter (I) corresponds to Imax (1);

Therefore, according to Resolution 16/02, the catch limit is calculated as [I_{max} * E_{targ} * B_{curr}] = 1 * 0.59 * 796,660 t. which results in an annual overall catch limit of 470,029 t for the period 2018-2020.

The STECF notes the catch of skipjack in the Indian Ocean was 446,000 tonnes in 2016, which is below the overall catch limit adopted for 2018-2020 period.

STECF notes that Resolution 12/06 also includes provisions to develop a workplan to review the adopted HCR using Management Strategy Evaluation (MSE), including (i) the refinement of operating models, (ii) alternative management procedures and (iii) performance statistics; no later than 2021 (i.e. five years from its implementation).

STECF observations

1: Adaptation of HCR to consider exploitable biomass instead of SSB

The STECF notes that the only change to the current HCR would be to replace the SSB by the exploitable biomass (B_{exp}) in the catch limit calculation and, therefore, the skipjack tuna HCR would recommend a total annual catch limit using four (4) values estimated from each skipjack stock assessment, as follows:

- If SSB_{curr} => $0.4*SSB_0$, then the catch limit is set at [I_{max} * E_{targ} * B_{exp}]
- If SSB_{curr} < $0.4*SSB_0$ but > $0.1*SSB_0$, then the catch limit is set at [I * E_{targ} * B_{exp}].
- If SSB_{curr} < $0.1*SSB_0$ then the catch limit shall be at 0 for all fisheries other than subsistence fisheries.

The STECF notes that the skipjack fisheries in the Indian Ocean exploit mainly, but not only, the spawning stock population as fish selected by the fishery are already mature due to fast growth and early maturation of skipjack. Thus, exploitable biomass is around 7 % larger than Spawning Stock Biomass. The STECF notes that the basis of using exploitable biomass in the HCR is to use as an indicator the biomass that will be affected by the equilibrium exploitation rate associated with sustaining the stock at SSB_{target}.

Calculation of the annual catch limit when using exploitable biomass HCR

The STECF notes following values were estimated in the 2017 skipjack stock assessment:

- The median of SB_{2016}/SB_0 = 0.40;
- The median estimate of current exploitable biomass (B_{exp}) is 853,922 tons;
- The estimate of the equilibrium exploitation rate associated with sustaining the stock at B_{targ} is E_{targ} = 0,59;
- As SSB_{curr} >= $0.4*SSB_0$, then the fishing intensity parameter (I) corresponds to Imax (1);

Therefore, the catch limit is calculated as [I_{max} * E_{targ} * B_{exp}] = 1 * 0.59 * 853,922 t. would result in an annual overall catch limit of 503,814 t. for the period 2018-2020; which represents an increase of 7% from the current overall catch limit.

STECF notes that using Spawning Stock Biomass for setting the current catch limit is more conservative than using the exploitable biomass.

HCR performance indicators on status, safety, yield, abundance and stability

The performance statistics for stock status, safety, yield, and stability of the current SKJ HCR (using SSB and not Bexpl) for the 2015 to 2025 period are shown in the table below (for definitions of performance statistics see Appendix VIa of 2016 IOTC SC report).

Performance statistic		Percentiles				
	Mean	10th	25th	50th	75th	90th
Status (Mean %B0)	60.74	38.76	49.97	60.83	72.0	83.5
Fishing intensity (F/F40%B0)	0.74	0.11	0.23	0.54	1.0	1.6
Kobe green (Years %)	68.65	23.26	46.51	76.74	100.0	100.0
Kobe top-right (Years %)	18.04	0.00	0.00	0.00	25.6	72.1
Kobe red (Years %)	5.40	0.00	0.00	0.00	7.0	18.6
Kobe bottom-left (Years %)	7.91	0.00	0.00	0.00	9.3	30.2
Safety (Prop. years B>20%B0)	96.51	88.37	100.00	100.00	100.0	100.0
Yield (Mean catch; kt)	522.39	242.75	335.78	612.92	667.2	692.6
Yield (Years catch>=425kt %)	63.52	0.00	18.60	81.40	97.7	100.0
Stability (MAPC %)	16.88	11.37	13.44	16.15	19.3	22.9
Probability of shutdown (Years catch<1kt %)	0.16	0.00	0.00	0.00	0.0	0.0
Stability (Years TAC decrease %)	8.22	0.00	0.00	0.00	12.5	25.0
Stability (Years TAC increase %)	16.77	0.00	12.50	25.00	25.0	25.0

The STECF notes that detailed performance indicators on status, safety, yield and stability for the alternative HCR based on exploitable biomass were not available to STECF.

The STECF also notes that, although the performance statistics were not available for the HCR with B_{exp}, the performance of such HCR might not differ too much from those of the one based on SSB. This is so because most of the Bexp is SSB. The STECF also recognized that the difference between the current catch limit and the one that would arise from the new HCR (7%), is in the order of magnitude, or lower than typical implementation errors.

However, it would be necessary to confirm this by reviewing the performance statistics of the new HCR as, for example, including younger ages in the catch calculation of the HCR could likely to make it more variable due to larger recruitment variability in those ages. The same level of risk as the current HCR would be obtained by setting a more conservative catch strategy in an HCR based on Bexpl . Therefore, the STECF recommends that before any amendment to the current HCR is proposed, the performance statistics of updated HCR should be made available to assure the sustainability of the stock.

Difference in the economic value between the two catch limits

In order to analyse the economic consequences of the change in the adopted harvest control rule, STECF observes that the 2016 catch of SKJ in the Indian Ocean is 446,895 tons, which is lower than the 2016 overall catch limit of 470,029 tonnes. Thus, it is expected that neither the current catch limit nor the "new" catch limit will affect immediately the EU Purse seiner fleet activity, unless there are changes in for instance costs, sales prices or technology, giving the fleets incentive to catch more skipjack tuna.

STECF observes that if the current overall catch limit is 100% utilised, this will imply an increase in catches of 23,000 tonnes compared to 2016. Under the new catch limit of 504,000 tonnes, this will imply a potential further increase in catches of 34,000 tonnes. Thus, assuming 100% utilisation of the TAC with the HCR, catches of skipjack tuna can be increased by up to 57,000 tonnes in total.

STECF notes that the contribution of European Purse seiners (PS) to the total catch of skipjack was 24 % in 2016 (IOTC, 2017)4. Thus, the EU fleet could potentially increase its catches 5,520 tons with the current overall catch limit and 13,680 tons with the "new" overall catch limit.

STECF observes that the average monthly price of skipjack tuna from April 2016 to September 2017 was 1,504 Euro per tonnes with the lowest price in June 2016 of 1,245 Euro and the highest price in July 2017 of 1,701 Euro (https://www.undercurrentnews.com/prices/#/skipjackBKK). Using the average price implies that the total catch value of skipjack tuna can be increased with 86 million Euro, where 35 million Euro is due using the current TAC, and the remaining 51 million Euro due to the increased catch possibilities under the HCR. This corresponds the total value of EU PS skipjack could be increased with 20.6 million Euros, where 8.3 million Euro is due to the current overall catch limit and the remaining 12.3 million Euro due to the increased catch possibilities under the new HCR for the EU PS fleet.

STECF observes that such an increased activity would result also in increased costs. Using the cost structure of the Spanish, Italian and French purse seiners catching fish in the Other Fishing Regions (OFR) supra region, the variable costs per landed Euro was

4 IOTC–SC20 2017. Report of the 20th Session of the IOTC Scientific Committee. Seychelles, 30 November – 4 December 2017. *IOTC–2017–SC20–R[E]: 232 pp.*

0.65 Euro on average for the years 2013-2015 (STECF 17-12)[5]. The remaining 0.35 Euro covers non-variable costs, depreciation and any profits for the owners.

Based on the cost figures above, an increase in catch value of 20.6 million Euro for the European PS will, if it can be caught by the current fleet, give rise to an increase of costs comprising in total 13.4 million Euro, Thus resulting in increased profits before non-variable costs and depreciation costs of 7.2 million Euro, amounting to approximately an increase of 1.3% compared to the average of 2013-2015.

Regarding potential effects on the market for skipjack tuna, STECF observes that the market for skipjack tuna is considered global, with much bigger volumes of skipjack being caught in the Western Central Pacific Ocean (around two million tonnes). Thus, any potential market/price effects should be considered in relation to this global market.

STECF conclusions

STECF concludes that the considerations made here should be taken into account when the first revision of the adopted skipjack HCR Resolution takes place no later than 2021. IOTC has indicated its commitment to extend the current resolution from an HCR to a full Management Procedures (MP), which will require a new evaluation and tuning exercise of alternative MP.

Adaptation of HCR to consider exploitable biomass instead of SSB

STECF notes that skipjack fisheries in the Indian Ocean exploit mainly, but not only, the spawning stock population as most fish selected by the fisheries are already mature due to fast growth and early maturation of skipjack. Thus, exploitable biomass is around 7 % larger than Spawning Stock Biomass. The STECF concludes that the basis of using exploitable biomass in the HCR is to use as an indicator the biomass that will be affected by the equilibrium exploitation rate associated with sustaining the stock at SSB_{target}.

The shift of the HCR parameters to use exploitable biomass will require a revision of the performance of the HCR. STECF notes that to obtain an equivalent risk levels to those of the current HCR, the shift to exploitable biomass will require an update of other HCR parameters, which could easily deliver similar catch levels.

STECF further notes that differences between total biomass, exploitable biomass and SSB are taken into account in the simulation testing of the HCR to set the catch limit, and, as long as the HCR was proven to deliver the policy objectives, the differences between biomass aggregations should not greatly affect the HCR performance.

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5 Scientific, Technical and Economic Committee for Fisheries (STECF) – The 2017 Annual Economic Report on the EU Fishing Fleet (STECF-17-12). Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73426-7, doi:10.2760/36154, PUBSY No. JRC107883

Calculation of the annual catch limit when using exploitable biomass HCR

The STECF estimates an overall catch limit of 503,814 t. for the period 2018-2020 when the SKJ HCR is applied using exploitable biomass instead of spawning stock biomass; which represents an increase of 7% from the current overall catch limit (470,000 t.).

HCR performance indicators on status, safety, yield, abundance and stability

Detailed performance indicators on status, safety, yield and stability for a HCR based on exploitable biomass were not available to STECF. STECF considers however that the performance of such HCR is likely to be reasonably close to the performance of the currently adopted HCR. Nevertheless, the STECF concludes that before any amendment to the current HCR is proposed, the performance statistics of any updated HCR should be made available to assure the sustainability of the stock.

Difference in the economic value between the two catch limits

STECF concludes that any increase in the catches of skipjack tuna, following by utilising the current TAC 100% and also the increased potential catches following the HCR, can increase the profits of the European PS fleet with 6.9 million Euro for and will most likely not have any impact on the global market price of skipjack tuna.

The STECF notes that this is a mixed fishery also catching juvenile yellowfin, which is currently overfished. Thus, the effect of skipjack catch increase may have in other species would need to be considered by IOTC before any recommendation of catch increase is proposed.

5.7 Preparation for the EWG on mandatory surveys

Background provided by the Commission

Member States regularly conduct research surveys of marine fish resources to provide fundamental data for assessing the condition of exploited fish stocks and for monitoring general conditions of the marine ecosystem. A number of these surveys are included in the Data Collection Framework (DCF) and have been and are being consequently supported financially by direct management (2002-2013) and EMFF (2014-2020). The list of mandatory research surveys at sea (Appendix IX of the Multiannual Community Programme6) was first reviewed in 2007 (SGRN 07-017). This meeting was followed by two other EWGs (SGRN 09-048 which developed the TORs and roadmap for SGRN 10-039). However, the resulting 2010 STECF recommendations did not lead to modifications in the legal framework of 201110, because the specific elements were incorporated in the National Programmes of Member States. The ensuing legal revisions of the DCF (roll over 2014-201611 and current EU MAP12) have kept the original list of surveys intact, as reviewed in 2007.

STECF recommended that surveys should be subject to frequent evaluation (at least once every 5 years). An EWG was originally called to revise the existing research surveys listed in Table 10 of the EU MAP in 2017, but this was subsequently moved to May 2018, in order to allow for proper preparation. Since then, Regional Coordination Groups (RCGs) and Member States have been compiling information on current and future

6 COM Decision of 6 November 2008 adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy

7 Scientific, Technical and Economic Committee for Fisheries (STECF). Report of the Working Group on Research Needs: Review of list of surveys at sea (Appendix XIV OF EU Commission Regulation N°1581/2004) with their priorities (SGRN 07-01), Brussels, 12-16 February 2007.

8 Scientific, Technical and Economic Committee for Fisheries (STECF) Framework and a Roadmap for the Review of Surveys. Report of the Subgroup on Research Needs (SGECA/SGRN 09-04) Joint Subgroup on Economic Affairs (SGECA) and on Research Needs (SGRN) of the Scientific, Technical and Economic Committee for Fisheries (STECF), 07-11 December 2009, Hamburg.

9 Scientific, Technical and Economic Committee for Fisheries (STECF). Sub-Group on Research Needs: SGRN 10-03. Review of needs related to surveys. 4-8 October 2010, Brussels, Belgium.

10 COM Decision of 18 December 2009 adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013.

11 COM Implementing Decision of 13.8.2013 extending the multiannual Union programme for the collection, management and use of data in the fisheries sector for the period 2011-2013 to the period 2014-2016.

12 COM Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019.

surveys, naming conventions and coordinating with main end users (ICES). This preparatory work is not yet finalised and/or consistent across all sea basins. In addition, STECF has recommended that criteria, scoring rules and criteria weightings for evaluating the surveys should be adopted and approved by the STECF before the surveys review meeting (as was the case in 2010). The STECF work carried out in 2009/2010 needs to be updated, if one takes into account (i) the new regulatory DCF framework (Recast13, EU MAP) that has been adopted recently (2016-2017), in which specific requirements should be met, (ii) new management needs and (ii) the experience gained by Member States, the priorities that have changed and the science that has advanced.

In view of the above, there is a clear need to change the scope of EWG 18-04 from conducting a review of surveys into a scoping meeting. This will also allow for Member State and end user consultation between the proposed scoping meeting in May and the actual review of surveys (tbd).

Request to the STECF

STECF is requested:

- to assess the proposed plan of action: change of EWG 18-04 into a scoping meeting, in order to prepare for the review of surveys; propose timeline for next steps, leading to an EWG that will revise the list of research surveys
- to critically discuss the draft TORs of EWG 18-04
- to discuss composition of EWG 18-04, ensuring both adequate regional coverage and independence, as well as possible added value of keeping the same composition for the EWG on the revision of surveys
- to discuss the need for any preparatory work before EWG 18-04

STECF observations

Assessment of proposed plan of action

13 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (recast).

STECF observes that the preparation of the review of mandatory research surveys-at-sea under the Data Collection Framework has not progressed sufficiently to allow a full review of surveys with the necessary information basis at the EWG 18-04 meeting scheduled for 14-18 May 2018.

Considering the relatively short time left until the EWG 18-04, STECF acknowledges the proposed change in direction of the EWG from the originally foreseen review of surveys to a scoping meeting, setting the framework and procedures for the actual survey review.

Timeline for next steps towards survey review

STECF would like to draw the attention to the preparation process of the latest survey review conducted by STECF in 2009-2010 and suggests applying a similar timeline as proposed by SGRN 09-04 (endorsed by STECF Plenary 10-01). STECF considers that the steps towards the survey review should again include the collation of required detailed background information, the review of that information on a regional level (Regional Coordination Groups), by Member States, data end-users and the Commission. STECF suggests that all feedback from the involved parties should be compiled in a consistent manner into updated background information for the full STECF survey review. A detailed STECF proposal for steps to be followed until the survey review is given below under "STECF conclusions".

ToRs of EWG 18-04

STECF considers that all elements needed for a scoping meeting on the DCF survey review have been provided in the Commission proposal for ToRs for the EWG 18-04. Minor editorial suggestions for re-structuring the ToRs have been provided in a separate document.

Composition of EWG 18-04

STECF suggests that the composition of experts (and observers) of the EWG 18-04 should account for coverage of all regions (relevant sea basins) and expertise needed, such as fish stock assessment and advice, survey design and statistical aspects, ecosystem and environmental monitoring.

Need for preparatory work before EWG 18-04

STECF considers that the ToRs for the EWG 18-04 are published soon after this Plenary meeting and experts be invited soon. STECF is aware of continued efforts of ICES as one of the main data end-users to check the use of DCF surveys in the advice and suggests that this work is concluded before EWG 18-04.

STECF conclusions

Assessment of proposed plan of action

STECF concludes that the EWG 18-04 should be held as a scoping meeting, setting the framework and procedures for the actual survey review.

Timeline for next steps towards survey review

STECF concludes that a similar timeline as in 2010 should be used:

Action	Responsible	Before
Finalise checking surveys against use in the advice, prepared by ICES	ICES	EWG 18-04
Gather background information on surveys in the Mediterranean, Black Sea and ICCAT region from the RCG Med&BS and RCG on Large Pelagics	RCG Med&BS and RCG LP chairs	EWG 18-04
Agree on criteria, ToRs, roadmap and preparation needed for the survey review	EWG 18-04	end of May 2018
Endorse EWG 18-04 report	STECF PLEN 18-02	mid-July 2018
Send request for consistent information on surveys (template to fill in) to MS	EC	mid-July 2018
Fill out the template on survey information and send to RCGs	MS	end of Aug 2018
Compile the survey information from MS by region	RCGs	end of Sep 2018
Compile survey information for all regions	Liaison Meeting	Oct 2018
Send compiled survey information to MS and end-users for final checks	EC	end of Oct 2018
Provide final updated background information on surveys to survey review meeting	EC	end of 2018
Review group meeting (EWG 19-XX)	STECF	early 2019
Report survey review to STECF Plenary	EWG 19-XX chair	April 2019

ToRs of EWG 18-04

STECF agrees with the Commission proposal for ToRs for the EWG 18-04. Minor editorial suggestions for re-structuring the ToRs have been provided in a separate document, applying 'track-changes' (Annex ?).

Composition of EWG 18-04

STECF concludes that the composition of experts (and observers) of the EWG 18-04 should account for coverage of all regions (relevant sea basins) and expertise needed, such as fish stock assessment and advice, survey design and statistical aspects, ecosystem and environmental monitoring.

The composition of experts (and observers) for the actual survey review, however, should be discussed by the EWG 18-04 and should contain a similar fraction of external (non-EU) experts as SGRN 10-03.

Need for preparatory work before EWG 18-04

STECF concludes that the ToRs for the EWG 18-04 should be published as soon as possible and the experts be invited soon. STECF suggests that the Commission asks ICES as one of the main data end-users to conclude the checking of the use of DCF surveys in the advice before the EWG 18-04. For the surveys in the Mediterranean and Black Sea region, as well as the ICCAT region, STECF suggests that the RCG Med&BS and RCG LP (chairs) provide information on the use of surveys for advice.

5.8 Evaluation of Italian national management plans for demersal stocks in GSA 9, 10, 11, 16, 17-18 and 19

Background provided by the Commission

Under Article 19 of Council Regulation (EC) No 1967/2006 (hereafter referred to as "MEDREG"[14]), Member States are expected to adopt management plans for fisheries conducted by trawl nets, boats seines, shore seines, surrounding nets and dredges within their territorial waters.

In 2013, the Common Fisheries Policy (CFP[15]) introduced new elements for conservation such as the target of maximum sustainable yield (MSY) for all the stocks by 2020 at the latest, the landing obligation and the regionalisation approach.

In line with these two regulations, the plans shall be based on scientific, technical and economic advice, and shall contain conservation measures to restore and maintain fish stocks above levels capable of producing maximum sustainable yield or MSY. Where targets relating to the MSY (e.g. fishing mortality at MSY) cannot be determined, owing to insufficient data, the plans shall provide for measures based on the precautionary approach, ensuring at least a comparable degree of conservation of the relevant stocks.

The plans shall also contain specific conservation measures based on the ecosystem approach to achieve the objectives set. In particular, they may incorporate any measure included in the following list to limit fishing mortality and the environmental impact of fishing activities: limiting catches, fixing the number and type of fishing vessels authorized to fish, limiting fishing effort, adopting technical measures (structure of fishing gears, fishing practices, areas/period of fishing restriction, minimum size, reduction of impact of fishing activities on marine ecosystems and non-target species), establishing incentives to promote more selective fisheries, conduct pilot projects on alternative types of fishing management techniques, etc.

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14 Council Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, amending Regulation (EEC) No 2847/93 and repealing Regulation (EC) No 1626/94. OJ L 409, 30.12.2006, p. 11–85.

15 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. OJ L 354, 28.12.2013, p. 22–61.

In 2011, Italy submitted consolidated management plans for demersal fisheries to the European Commission (EC). Since 2018 Italy is without national management plans for demersal fisheries and in January 2018, Italy submitted new management plan which should be examined by the STECF. The 6 new plans cover the following areas: GSA 9, 10, 11, 16, 17-18 and 19.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

1) To assess and advice whether the management plans for marine commercial fishing in the territorial waters of the Republic of Italy contains adequate elements in terms of:

The description of the fisheries

- Recent and historical data on catches (landings and discards) of the species concerned, fishing effort and abundance indices such as catch-per-unit-effort (or CPUE).
- Data on length-frequency distribution of the catches, with particular reference to the species subject to minimum sizes in accordance with Annex III of the MEDREG.
- An updated state of the exploited resources.
- Information on economic indicators, including the profitability of the fisheries.

Objectives, safeguards and conservation/technical measures

- Objectives consistent with article 2 of the CFP and quantifiable targets, such as fishing mortality rates and total biomass.
- Measures proportionate to the objectives, the targets and the expected time frame.
- Safeguards to ensure that quantifiable targets are met, as well as remedial actions, where needed, including situations where the deteriorating quality of data or non-availability places the sustainability of the main stocks of the fishery at risk.
- Other conservation measures, in particular measures to fully monitor catches of the target species, to gradually eliminate discards and to minimise the negative impact of fishing on the ecosystem.

Other aspects

- Quantifiable indicators for periodic monitoring and assessment of progress in achieving the objectives of the plan.

- Evaluate if the stock assessment basis is scientifically robust. For example some assessments underlying the management plan in GSA 17-18 are similar to those being evaluated by PLEN 18-01 emerging from STECF EWG 17-15 Med assessment part II.

2) If deemed necessary, provide any recommendations and guidance on how to obtain improved scientific/technical supporting material for the plan. This could be done in terms of collection of data, evaluation of the status of the target stocks, evaluation of conservation measures, impact on the marine ecosystem and monitoring programme.

Documentation: The management plan for the fleets targeting demersal stocks in GSA 9 (ITA-EN),10(ITA-EN machine translation),11(ITA-EN machine translation),16(ITA-EN machine translation),17-18 (ITA-EN) and 19 (ITA-EN) in the territorial waters of the Republic of Italy (ENG).

Summary of the background documents provided to STECF

Six Italian Management Plans (MPs) for the fleets targeting demersal resources were submitted to STECF-PLEN 18-01. The plans are presented by GSA: GSA 9 Ligurian and North Tyrrhenian, GSA 10 Southern and Central Tyrrhenian, GSA 11 Sardinia, GSA 16 Southern Sicily, GSA 17-18 Northern - Southern Adriatic, and GSA 19 Western Ionian Sea.

According to the stated objectives, the MPs aim to recover stocks to within safe biological limits by 2020, in line with Reg. EU 1380/2013. STECF notes that according to Reg. 1380/2013, recovery to within safe biological limits is not necessarily in line with the objective of achieving F_{MSY}. STECF is of the understanding that it is the F_{MSY} objective that is referred to in the stated aims of the MPs.

All six MPs are organized in the same way. The selection of the stocks, which will be used for the characterization of the overall status of the demersal resources, is based on the availability of stock assessments, and fleet segments are those that fish at least 2% of the landings of the selected stocks. The stock assessments that were used were those available at the time the MPs were prepared. This means that the term 'current situation' in the MPs corresponds to the situation in 2015 for most of the stock assessments considered. The number of selected stocks varies from two in GSA 16 to five in GSA 9. The number of bottom trawl and small-scale fleet segments considered varies from 5 in GSAs 16 to 14 in GSA 17-18.

The selected stocks were the following: HKE *Merluccius merluccius,* DPS *Parapenaeus longirostris,* MUT *Mullus barbatus,* MUR *Mullus surmuletus* and NEP *Nephrops norvegicus* in GSA 9; HKE *Merluccius merluccius,* DPS *Parapenaeus longirostris* and MUT *Mullus barbatus* in GSA 10; HKE *Merluccius merluccius*, MUT *Mullus barbatus* and ARS *Aristaeomorpha foliacea* in GSA 11; DPS *Parapenaeus longirostris* and HKE *Merluccius merluccius* in GSA16; HKE *Merluccius merluccius*, DPS *Parapenaeus longirostris*, SOL *Solea solea* and MUT *Mullus barbatus* in GSA 17-18; and HKE *Merluccius merluccius*, DPS *Parapenaeus longirostris* and ARS *Aristaeomorpha foliacea* in GSA 19.

The MPs include detailed information on many aspects essential to understanding the fishing activity in each GSA. However, no data on catches (landings and discards) or species-specific effort are provided. Abundance indices such as catch-per-unit-of-effort (CPUE) are presented for only a very limited number of stocks. Data on length-frequency distribution of the catches, with particular reference to the species subject to minimum landing size in accordance with Annex III of the MEDREG are not considered in the MPs.

The description of the fishing activity and fishing areas includes the regulations in force; the biology of the target species; the physical and oceanographic characteristics of GSAs (currents, biocenosis, bathymetry, morphology); the description of the fishing activity (fishing fleets, spatial distribution of the trawl fishing effort expressed in fishing hours, with no differentiation among segments,, activity by season expressed in fishing days); cost trends by fleet segment; biomass trends (MEDITS) for a limited number of stocks; landings trends of the so called associated species; and prices and market dynamics. Biological reference points are given for the selected stocks. Harvest control rules are proposed, and these are the same for all areas, species and stocks.

An overall reduction of fishing capacity by 5% through a decommissioning scheme was adopted in the frame of the MPs in force for the period 2011-17. Future fishing effort reductions through reductions of fishing days, not through reduction of fishing capacity, is proposed in the submitted MPs:

2018: no change and the quantification of fishing days in that period will be used as the baseline of the plan.
2019: 5 % reduction of fishing days compared to 2018 level;
2020: 10 % reduction of fishing days compared to in 2018 level.

Four scenarios were considered to assess the likely consequences of the application of different levels of fishing effort (fishing days) measures in the selected stocks and the corresponding socio-economic consequences. The scenarios considered were the following:

Scenario 0: Status quo (F constant over the period 2016 – 2023)
Scenario 1: fishing days reduction by 5% each year over the period 2017 - 2020
Scenario 2: fishing days reduction by 15% each year over the period 2017 – 2020
Scenario 3: fishing days reduction to meet F_{MSY} by 2020

The implementation of the plans will be managed through a structure of governance organized in each GSA, with the participation of all involved stakeholders. The functions of this structure include management, control and monitoring.

STECF comments

ToR 1: The STECF evaluation of whether the management plans for demersal fishing of the territorial waters of the Republic of Italy contains adequate elements is given in the table below for each of the 6 MPs.

ToR 1) To assess and advice whether the management plans for marine commercial fishing in the territorial waters of the Republic of Italy contains adequate elements in terms of:

Description of the fisheries		
Recent and historical data on catches (landings and discards) of the species concerned, fishing effort and abundance indices such as catch-per-unit-effort (or CPUE).		Comments
GSA 9	Data on landings are available only for the selected and for a short list of the so called associated species. No data on discards are presented. Fishing effort is given by AER fleet segment but not the transversal data by métier. Abundance indices (MEDITS) are presented only for the associated species, and not for the selected species. CPUE based on the commercial catches are not presented.	The five selected stocks represent less than 25% of the demersal fleets' landings.
GSA 10	The same as in GSA 9	The three selected stocks about 8% of the demersal fleets' landings.
GSA 11	The same as in GSA 9	The three selected species represented around 30% and 16 % of the total landings of the segments concerned in 2004 and 2015 respectively.
GSA 16	The same as in GSA 9	The two selected species represented in 2015-2016 around 50% of the total production of demersal fisheries in the Strait of Sicily. Note that DPS is not fished by small-scale fishing and more than 90% of HKE landings corresponds

		to trawl.
GSA 17-18	The same as in GSA 9	The four selected stocks represent about 25% of the demersal fleets' landings.
GSA 19	The same as in GSA 9	The three selected stocks represent less than 15% of the demersal fleets' landings.
Data on length-frequency distribution of the catches, with particular reference to the species subject to minimum sizes in accordance with Annex III of the MEDREG.		Comments
All GSAs	No data on length frequency distributions of the species subject to minimum sizes is presented, neither for Annex III nor for the selected species.	
An updated state of the exploited resources.		Comments
GSA 9	The stock assessment information derives from assessments performed in 2016-2017 within the GFCM and STECF EWG, with 2015 as the most recent year with available data.	
GSA 10	No recent stock assessment was available and therefore the selected species were assessed with XSA, using as input catch data (landings+discards) over 2007-2015 and MEDITS data for tuning.	
GSA 11	No stock assessment was available and therefore the selected species were assessed with XSA, using as input catch data (landings+discards) over 2007-2015 and MEDITS data for tuning.	
GSA 16	Stocks assessments of hake and white shrimp for combined GSAs 12 to 16. Reporting period 2007-2015 (SAC-GFCM, 2016).	

GSA 17-18	The stock assessment information derives from assessments performed in 2016 (SAC-GFCM, 2016) with 2015 as the most recent year.	
GSA 19	The stock assessment information for *Aristaeomorfa foliacea* derives from 2014 (with the most recent data 2013); for *Parapeneaeus longirostris* derives from 2016 (with most recent data 2015) and for *Merluccius merluccius* derives from 2015 (with most recent data 2014).	
Information on economic indicators, including the profitability of the fisheries.		Comments
All GSAs	Time series of economic data from 2004 to 2015 are presented for the fleet segments affected by the plan as well as projection for the period covered by the simulated scenarios. Data refer to: capacity, effort, landings value and volume, income, operative costs and employment. Economic indicators are also presented for the whole time series in terms of gross cash flow and average values per vessel. Data analysis is reported in the text and times series are reported in the statistical annex.	Data provide complete infomation on the economic status and profitability of the fleet segments concerned for the past, the status quo as well as projections for the period covered by simulated scenarios.

Objectives, safeguards and conservation/technical measures		
Objectives consistent with article 2 of the CFP and quantifiable targets, such as fishing mortality rates and total biomass.		Comments
GSA 9	The plan states that it aims achieving MSY and at an improvement in SSB by reducing the exploitation rate (measured for the pool of selected species) from the current level to a level that meets the sustainability standards set in art. 2 of the CFP but it is clear how catches will be reduced to reach this objectives. The HCR stated is a 5% reduction of fishing effort in 2019 and 2020 No limits for F are proposed. No catch limits are proposed. No Biomass limits are proposed.	The HCR has been assessed through scenarios 0 (*status quo*) to 3 (fishing at F_{MSY}). Scenario 1 assumes reductions of 5% by year and shows that F_{MSY} cannot be reached by 2020. According to scenario 3, the effort reduction should be 74%
GSA 10	The same as in GSA 9	According to scenario 3, the effort reduction should be by 78%
GSA 11	The same as in GSA 9	According to scenario 3, the effort reduction should be by 75%
GSA 16	The same as in GSA 9	According to scenario 3, the effort reduction should be by 75% for HKE and 30% for DPS
GSA 17-18	The same as in GSA 9	According to scenario 3, the effort reduction should be by 57%; by 25% for SOL

GSA 19	The same as in GSA 9	According to scenario 3, the effort reduction should be by 80%
Measures proportionate to the objectives, the targets and the expected time frame.		Comments
GSA 9	A general reduction of fishing effort (fishing days) is proposed based on the quantified fishing days in 2018, which will be by 5% in 2019 and by 10% in 2020, for all fleet segments. Measures are not proportionate to the objectives for the selected stocks, as shown in the projections results.	Only in the case of DPS *Parapenaeus longirostris* and MUR *Mullus surmuletus*, the current F is currently consistent with F_{MSY} and hence the objective can be considered already reached. For other assessed species, especially for hake and red mullet, the current F is too high and is unlikely to reach adequate rates with the proposed measures of effort reduction and associated technical measures
GSA 10	The same as in GSA 9	Only in the case of MUT *Mullus barbatus*, the current F is currently consistent with F_{MSY} and hence the objective can be considered already reached. For other species, especially for hake and rose shrimp, the current F is too high and is unlikely to reach adequate rates with the proposed measures of effort reduction and

		associated technical measures
GSA 11	The same as in GSA 9	
GSA 16	The same as in GSA 9	
GSA 17-18	The same as in GSA 9	Only MUT *Mullus barbatus* in GSA 18 meet objectives by performing the proposed measure
GSA 19	The same as in GSA 9	
Safeguards to ensure that quantifiable targets are met, as well as remedial actions, where needed, including situations where the deteriorating quality of data or non-availability places the sustainability of the main stocks of the fishery at risk.		Comments
All GSAs	HCRs are proposed, which include remedial actions in the case that fishing mortality remains largely over F_{MSY}. HCRs have been proposed in line with GFCM (2014). These are limit reference points for 2020 and 2023: $F/F_{MSY} \leq 1.66$ and SSB or survey index ≥ 66 percentile along the time series. In such case fishing effort will be reduced by 33% compared to the previous year. This HCR are the same for all GSAs and stocks. The data used come from the DCF. No measures proposed in case of deteriorating quality of data.	No measure is described to ensure that the F_{MSY} objective is met for all stocks. So it is unclear which actions will be undertaken if F/F_{MSY} remains between 1 and 1.66 in 2020.

Other conservation measures, in particular measures to fully monitor catches of the target species, to gradually eliminate discards and to minimize the negative impact of fishing on the ecosystem.		Comments
GSA 9	No particular measures proposed to fully monitor catches of the target species, to gradually eliminate discards and to minimize the negative impact of fishing on the ecosystem. Some new areas of limited size are proposed where fishing would be not allowed in the future. The need of implementation of new fishing techniques aimed at reducing discards is mentioned, with no further details. The discard plans in place are not mentioned	Five Biological Protection zones are proposed
GSA 10	The same as in GSA 9	No new areas of protection proposed
GSA 11	The same as in GSA 9	Three Active Biological Protection zones implemented, closed to trawl and with limitations for the small-scale fishing (Gulfs of Cagliari, Palmas and Oristano). To these, MPAs, sites of Community importance (SCI) and of special protection (SPA) and areas subject to military uses will be added (no further details as for the implementation of the new areas)
GSA 16	The same as in GSA 9	Resolution REC.CM-GFCM/40/2016/4 of GFCM adopted a MP for hake and deep-water rose

		shrimp in the Strait of Sicily, which includes a the closure of two nurseries areas
GSA 17-18	The same as in GSA 9	From 1 May 2017 the fishing activity is prohibited in the area known as "Scalata del Fondaletto"
GSA 19	The same as in GSA 9	No new areas of protection proposed
Other aspects		
Quantifiable indicators for periodic monitoring and assessment of progress in achieving the objectives of the plan.		Comments
All GSAs	A list of biological, economic and social indicators to monitor the plan is proposed. A calendar for the targets is proposed (2020 and 2023). The MP will be reviewed, and if required will be revised after three years of implementation. The governance committee will closely monitor the implementation and results of the plan.	Biological indicators: $F \leq F_{MSY}$; SSB≥66 percentile along the time series Economic indicators: MON≥20; CR/BER≥1 Social indicators linked to labour cost and number of fishermen within OTB12-40 and mixed passive gears
Evaluate if the stock assessment basis is scientifically robust. For example some assessments underlying the management plan in GSA 17-18 are similar to those being evaluated by PLEN 18-01		Comments

emerging from STECF EWG 17-15 Med assessment part II.		
All GSAs	The MPs were based on the most recent stock assessments at the time (GFCM-WGSAD or STECF-EWGs) of the preparation of the plan. The species selected are not fully representative of the fisheries included in the MP. It would be advisable to include more information on the status of other stocks in the MP. The most recent stock assessments from STECF EWG 17-15 should be taken into account for adjusting reference points and the needed measures.	STECF comments that the governance committee should make use of new stock assessments as soon as some become available, for example the ones from 17-15

STECF notes that selected stocks are not fully representative in terms of quantity and value of the demersal landings since some of the main fishing targets of the demersal fleets operating in the different GSAs are not considered (see table above).

Despite the large amount of information provided, important information regarding the main target species of the demersal species fished in each GSA is not included in the plan. This applies, for example, to the exploited sizes by fishing gear for the main fishing targets. Also, no information is given on the impact of the fishing activity on non-commercial species, or on discards.

The species are targeted by different segments of the fleets. Some species appear in a given GSA in overexploitation status and in others with F close to F_{MSY}. This complicates the decisions regarding the choice of an adequate level of fishing pressure as it is necessary to drive the major part of the stocks to a safe and productive status. With the current available information based on rough levels of vessels aggregation and no information on effort partitioning by species or mixed species targets, it is not possible to define an efficient articulated set of management measures.

Species involved in demersal fisheries are in general exploited with different gears and vessels segments. Gears and segments catch them in different amounts, with different vulnerability and selectivity, catch rates and remove different age fractions of the population. Moreover, the vessels of a same segment may operate at different depths targeting different stocks. Such dynamics make difficult the quantification of the distribution of fishing effort among fleet segments. Effort-based management need more detailed information on specific effort. The aggregation level used in the MPs is not sufficient for understanding the real fishing pressure exerted on each stock (actual number of vessels targeting each stock, gears used, involved fractions of the population structure for each fishery, periods, areas). The number of daily fishing trips provided for big aggregations (i.e. segments defined by vessels' size) does not allow the identification of any change in targets and is not informative for making attempts of finding functional relationships between fishing mortality F and fishing effort. It is not possible without disaggregated detailed information on the métiers practiced by each fleet segment to translate overall F in corresponding fishing effort to be assigned to each gear and segment. For the reasons mentioned, the proposal included in the text for assigning fractions of effort among segments/gears only based on CPUE appears as not entirely adequate.

It has to be taken into account that the status of the stocks and the fishing pressure are different among GSAs. It is therefore unclear from the MPs the reason why exactly the same reduction of fishing effort is proposed for all GSAs.

The MPs propose a reduction by 5% and 10% of effort (fishing days) in 2019 and 2020 departing from the 2018 level (status quo). STECF notes that since 2018 is ongoing there is a risk that fishers might increase the activity during the rest of this year and reach a higher effort than in 2017 increase that will be reflected in the fishing effort in 2019 and 2020, with negative consequences regarding the desired reduction of fishing effort.

STECF notes inconsistencies regarding the growth parameters used in different GSAs. Such differences are too high for being simply attributed to the influence of local environmental characteristics. For example, *Mullus barbatus* is defined in some cases as a relatively low

growing species while in others as very fast growing (von Bertalanffy's *K* value varied from 0.24 in GSA 10 to 0.6 in GSA 9, two adjacent GSAs).

ToR 2) If deemed necessary, provide any recommendations and guidance on how to obtain improved scientific/technical supporting material for the plan. This could be done in terms of collection of data, evaluation of the status of the target stocks, evaluation of conservation measures, impact on the marine ecosystem and monitoring programme.

STECF notes that the stock assessments used in the MPs correspond in the majority of the cases to a single GSA, while it can be that some stocks are shared by more than one GSA and/or country. In the future, the MPs should take in consideration the stock boundaries and corresponding GSAs, countries and fishing fleets.

The selected species used as a basis for the elaboration of a MP should represent a major part of the stocks involved in the fisheries that are the target of the MP. The presented MPs are based on a very limited number of stocks which are considered as representative of the mixed species complex that characterise most of the demersal fisheries in the areas. Those stocks, with the exception of GSA 16 (around 50%), accounted for a relatively low amount of the total landings of the demersal fleets.

The description of quantitative and qualitative structure of the catch of the concerned fishing fleets (landings and discards), by year, season and fishing area, should be part of the MP. In addition, if possible, this information should be presented by métier.

Several scenarios are assessed, and their likely biological and economic consequences are shown for each GSA. Assessments do not show for all the GSAs equal perceptions of the current exploitation status of their stocks, and simulations indicate that different levels of reduction of fishing pressure should be needed for reaching the same objectives. However, independently of the perception of the status of the assessed stocks within each GSA and changes under alternative management choices, the proposal of reductions in effort is the exactly same for all the GSAs. The proposed measures of effort reduction in terms of fishing days (5% in 2019 and 10% in 2020 in relation to the fishing days quantified in 2018) for most of the stocks considered will not meet the objectives of CFP art. 2 in 2020.

The MP does not include information on the current impact of the different demersal gears on the ecosystem nor on the improvements resulting from the introduction of technical measures aimed at the reduction of discards.

STECF conclusions

STECF considers that the main issue is that the Management Plans have no probability of reaching their stated objectives or achieving F_{MSY}. According to the simulations presented effort reductions should be decreased by 75-80% in most of the GSAs in order to achieve F_{MSY} in 2020.

STECF acknowledges that the six MPs were presented following the same structure, which facilitated their revision and the comparison among plans. Effort were made to bring together a lot of information. In particular, the progresses made in the socio-economic analyses and the simulations showing the pros and cons of different levels of effort reduction, as well as the proposal for a governance structure for the implementation of the MPs, with participation of all the involved sectors, administrations and stakeholders, is acknowledged.

The MPs are based on a small number of stocks within each GSA and the selection was done depending on the availability of a recent stock assessment. The selected stocks may not be fully representative of the catch of different demersal fleets operating in a given area nor on the status of the other stocks under the current level of fishing pressure. In particular, the selected species are mainly target of the bottom trawl fleet. Therefore STECF suggests the inclusion of more stocks, taking also into account the small-scale fishing so that the selected stocks are representative of the overall demersal fishing. Whenever a formal stock assessment is not feasible for more stocks, STECF recommends the use of all the information potentially useful for a perception of their status of exploitation and for giving advice on other stocks status (abundance indices, mean size in the catch, etc.).

Information on discards of commercial stocks, in particular those subject to minimum sizes in accordance with Annex III of the MEDREG, as well as on the catch of non-commercial species, by fleet, are not included in the MP. This is information should be an important component of a MP. The proposal for the reduction of fishing effort in the MPs applies in the same way to all fleet segments. Nevertheless, for the decision on the allocation of fishing effort, which may result on consequences on F quite different, information on the length-frequencies distributions by fleet segment and on specific fishing effort should be taken into account.

Finally, STECF highlights again the need to approach management at a more regional scale rather than for the individual GSAs. Work is ongoing to establish a multi-annual plan for the fisheries exploiting demersal stocks in the western Mediterranean Sea, and STECF underlines any national or local MP as those evaluated here should be framed consistently with this regional approach.

5.9 Evaluation of the quality of DCF data for data limited information

Background provided by the Commission

DG MARE issued an ad-hoc contract to Mr Francesco Ferretti in December 2017. The purpose of this contract was to obtain summary information to be used to identify stocks with promising or unpromising data for future work. The objective was to check for consistency of data in terms of availability, and sampling, and the potential for significant changes in time that might provide useful signals. The contractor was requested to concentrate on demersal data for stocks of general interest. The ToRs of the ad-hoc contract are as given below.

ToRs of the ad hoc contract to evaluate quality of DCF data for data limited information

The purpose of this contract is to obtain summary information to be used to identify stocks with promising or unpromising data for future work. The objective would be to check for consistency of data in terms of availability, and sampling, and the potential for significant changes in time that might provide useful signals. The proposal is to concentrate on demersal data for stocks of general interest. Two types of DCF data should be evaluated, survey data and catch data.

Survey evaluation: MEDITS survey by species by GSA presented on no more than one page per species/ GSA; this should be based on annually tabulated summary data in a simple data frame (in R) and then output in plots on a single page, combined with some overall statistics for the data set for a species in a GSA.

Annual summary stats for each species for each year calculate and tabulate and plot.

DCF calls for TA file (hauls), TB (catch by species and haul), TC (length, sex and maturity by target species). Analysis on biomass and density indexes should be possible for all the species caught during the survey (based on the TB file in the DataCall) while the length analysis can be carried out only for target species (TC file in the DataCall). For example in TB file GSA9 for year (2015) reported data for 270 species and for 63 in TC file and obviously not for all these species we have enough information to do anything. The following should be stored in a data frame and plotted:

- Total number of trawl stations by year;
- Proportion of positive stations by year;
- Mean and CV of (standardized) catch abundance (including zero values) by year;
- Mean and CV of (standardized) catch weight (including zero values) by year;
- Min. max and mean day in year of survey data by year (or 5, 50, 95%).

For species with length data (TC data file):

- 5, 50 and 95% on fish length caught by year;
- Mean and CV of (standardized) mature catch abundance (including zero values) by year;
- Mean and CV of (standardized) mature catch weight (including zero values) by year.

Age based evaluation based on deterministic length slicing using VBGF from the Data Call biological file. In addition for a limited number of species and limited years age data has been collected since 2012 for some target species (Hake, Red mullet, Striped red mullet) and stored in TE MEDITS file. This should be used if available:-

- Matrix plot of n at age at age in year y with n at age a+1 in year y+1

Series Summary statistics across all years

- Autocorrelation coefficient on mean abundance (1st order);
- Autocorrelation coefficient on mean catch weight (1st order);
- Autocorrelation coefficient on mean time (1st order);
- Fraction of years with the mean abundance outside median of mean values +-2CV;
- Fraction of years with the mean biomass outside median of mean values +-2CV.

For Multiple GSAs

In addition to single GSA the following combinations should also be presented:

1, 5, 6, 7, 8, 9, 10, 11, 15, 16 17-18, 20,22,23.

Notes:

MEDITS is a standardized survey based on random sampling stratification with hauls number by strata allocated based on the surface of the strata (see MEDITS handbook under: http://www.sibm.it/MEDITS%202011/principaledownload.htm).

The TA file contains hauls information including distance covered and horizontal net open so we can estimate swept area by haul. For all the GSA, the JRC has the stratification scheme by strata and stratum so we can compute the abundance and biomass index by square kilometre.

Having the stratification surface we can combine across GSAs.

Issues might arise dealing with some GSAs in which MEDITS time series is different (e.g. GSA17 ITALY, CROATIA and SLOVENIA), for which some extra assumptions may be needed (maybe assuming some kind of proportion for the missing year(s), based on the years for which we have data).

Additionally, in some areas (16 and maybe 18), the random stratified design has been violated with the addition of a new area of sampling after 10 years of survey. As such, in this case a statistical standardization with GLMs would likely be more appropriate.

Identification of stocks to be moved to higher category

Identify on the basis of the available data, which of the current data limited stocks can be potentially moved to a higher category (category 1 stock sensu ICES).

Request to the STECF

STECF is requested to evaluate the results - Request for services – 1734 - Ad hoc Contract on "The Quality Evaluation of DCF data for data limited Information" delivered by Mr Francesco Ferretti. In detail:

- Determine the adequacy of the statistical analysis in respect of the data.
- Evaluate the potential new stocks that may be suitable for stock assessment.
- Advise on the potential to upgrade category of assessment for the identified stock.

STECF observations

STECF notes that the ad-hoc report summarized an exploratory data analysis and elaboration of the survey and commercial landings focusing on demersal species of the Mediterranean Sea.

STECF observes that the objective of the exploration was identifying stocks (combinations between species and GSA) with suitable data to conduct stock assessment through either production models or methods using catch at age data. These should be the stocks not yet assessed by STECF but for which there are sufficient data to evaluate their status. For this goal the ad-hoc report focuses on two main groups of data: 1) fishery independent data coming from the MEDITS surveys, and 2) commercial landings data coming from fisheries operating in the Mediterranean Sea. These datasets were provided by the European Commission's (EC) Joint Research Centre (JRC).

STECF notes that the ad-hoc report explored whether in the pool of demersal stocks occurring in the regions there are additional species that could be included in the list of stocks suitable for stock assessment. In the ad-hoc report it was stated that the explorations indicated there might be at least 75 stocks (Table 1), on top of the 77 already done, for which stock assessment can be done.

Regarding the survey data coming from the MEDITS surveys, the ad-hoc report took into consideration the MEDITS' reference list of species (Anonymous 2013). For each of those species an analysis was presented by GSA and for the whole Mediterranean basin. Such analyses showed:

1. Total number of trawl stations by year;
2. Proportion of positive stations by year;
3. Mean and CV of (standardized) catch abundance (including zero values) by year;
4. Mean and CV of (standardized) catch weight (including zero values) by year;

5. Min. max and mean day in year of survey data by year (or 5,50,95%);

7. 5, 50 and 95% on fish length caught by year;

8. Mean and CV of (standardized) mature catch abundance (including zero values) by year;

9. Mean and CV of (standardized) mature catch weight (including zero values) by year;

10. Autocorrelation coefficient on mean abundance (1st order);

11. Autocorrelation coefficient on mean catch weight (1st order);

12. Autocorrelation coefficient on mean time (1st order);

13. Fraction of years with the mean abundance outside median of mean values +-2CV;

14. Fraction of years with the mean biomass outside median of mean values +-2CV.

Regarding the commercial landing data coming from fisheries operating in the Mediterranean Sea, the following analyses were presented in the ad-hoc report:

1. evaluation of different fleet segments or metiers reporting landings by year;

2. calculation of the fraction of landings with samples (sum of catch with samples/total);

3. for species with length data, estimation of the 5th, 50th and 95th percentile of fish lengths caught by year;

4. for species with age data, compilation of matrix plots of number at age *a* in year *y* with number at age *a+1* in year *y+1*.

Such analyses were carried out by species and GSA. Of all the species available in the commercial landing data, only those occurring in the MEDITS' reference list were considered.

Given the high number of output plots produced in the framework of such report, html dashboards were assembled for an easy and straightforward consultation. To facilitate the identification of stock for which there may be sufficient data for stock assessment, a score field that counted the materials available for each stock was also available in the dashboards. The unassessed stocks score the maximum level (6) having all the following summary statistics available:

- MEDITS survey summary;
- Length Boxplot Time-series of commercial landings;
- Length Distributions of commercial landing by metier;
- Age Class Trends of commercial landings;
- Cross-Correlation Plots Age Classes of commercial landings
- Correlation Plots Age Classes of commercial landings.

Stocks with full statistics available were considered as potential candidates for an age based stock assessment (Table 1). STECF notes that such statistics were not evaluated in the

framework of the ad-hoc contract report in term of quality and internal coherence (in the case of Cross-Correlation plot).

STECF notes that commercial landings and effort dataset is also available in the Economic Database of JRC, and it might be useful to compare it in term of species coverage, year and GSA with the input data utilized in the ad-hoc report.

STECF notices that out of the 28 stocks that are listed in the ToRs of the two Mediterranean EWGs foreseen in 2018 (EWG-18-12 and EWG-18-16), 4 stocks (as combination of species and GSA) are listed in the ad-hoc report as potential candidates for age based stock assessment (in bold in Table 5.9.1). Of the remaining 24 stocks, 22 stocks have been already assessed and it seems there is no possibility to upgrade the category of assessment, while for 2 stocks (Caramote prawn in GSA 17 and Anglerfish in GSA 17&18) the summary statistics listed before are not available.

Table 5.9.1. List of Mediterranean potential new stocks that may be suitable for stock assessment. In bold are the combination of species and GSA which are planned to be assessed in the framework of the 2018 STECF-EWG on Mediterranean Sea stocks.

GSA	Scientific name	Code	English name	GSA	Scientific name	Code	English name
1	*Lophius budegassa*	ANK	Blackbellied angler	11	*Raja clavata*	RJC	Thornback ray
1	*Mullus surmuletus*	MUR	Surmullet	11	*Scyliorhinus canicula*	SYC	Small-spotted catshark
1	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel	11	*Sepia officinalis*	CTC	Common cuttlefish
1	*Trachurus trachurus*	HOM	Atlantic horse mackerel	11	*Spicara smaris*	SPC	Picarel
2	*Aristeus antennatus*	ARA	Blue and red shrimp	11	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel
5	***Aristeus antennatus***	**ARA**	**Blue and red shrimp**	11	*Trachurus trachurus*	HOM	Atlantic horse mackerel
5	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel	11	*Zeus faber*	JOD	John dory
5	*Trachurus trachurus*	HOM	Atlantic horse mackerel	16	*Sardina pilchardus*	PIL	European pilchard(=Sardine)

6	*Mullus surmuletus*	MUR	Surmullet	16	*Sepia officinalis*	CTC	Common cuttlefish
6	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel	16	*Trachurus trachurus*	HOM	Atlantic horse mackerel
6	*Trachurus trachurus*	HOM	Atlantic horse mackerel	17	*Eledone cirrhosa*	EOI	Horned octopus
7	*Aristeus antennatus*	ARA	Blue and red shrimp	**17**	***Eledone moschata***	**EDT**	**Musky octopus**
7	*Micromesistius poutassou*	WHB	Blue whiting(=Poutassou)	17	*Lophius budegassa*	ANK	Blackbellied angler
7	*Mullus surmuletus*	MUR	Surmullet	17	*Mullus surmuletus*	MUR	Surmullet
7	*Nephrops norvegicus*	NEP	Norway lobster	17	*Octopus vulgaris*	OCC	Common octopus
7	*Parapenaeus longirostris*	DPS	Deep-water rose shrimp	17	*Spicara smaris*	SPC	Picarel
7	*Trachurus trachurus*	HOM	Atlantic horse mackerel	17	*Trachurus trachurus*	HOM	Atlantic horse mackerel
9	*Boops boops*	BOG	Bogue	18	*Boops boops*	BOG	Bogue
9	*Eledone cirrhosa*	EOI	Horned octopus	18	*Eledone cirrhosa*	EOI	Horned octopus
9	*Eledone moschata*	EDT	Musky octopus	**18**	***Eutrigla gurnardus***	**GUG**	**Grey gurnard**
9	*Loligo vulgaris*	SQR	European squid	18	*Lophius budegassa*	ANK	Blackbellied angler
9	*Lophius budegassa*	ANK	Blackbellied angler	18	*Micromesistius poutassou*	WHB	Blue whiting(=Poutassou)
9	*Octopus vulgaris*	OCC	Common octopus	18	*Mullus surmuletus*	MUR	Surmullet
9	*Pagellus acarne*	SBA	Axillary seabream	**18**	***Pagellus erythrinus***	**PAC**	**Common pandora**
9	*Scyliorhinus canicula*	SYC	Small-spotted catshark	18	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel
9	*Sepia officinalis*	CTC	Common cuttlefish	18	*Trachurus trachurus*	HOM	Atlantic horse mackerel

9	*Spicara smaris*	SPC	Picarel	19	*Mullus surmuletus*	MUR	Surmullet
9	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel	19	*Nephrops norvegicus*	NEP	Norway lobster
9	*Trachurus trachurus*	HOM	Atlantic horse mackerel	22	*Lophius budegassa*	ANK	Blackbellied angler
11	*Boops boops*	BOG	Bogue	22	*Mullus barbatus*	MUT	Red mullet
11	*Eledone cirrhosa*	EOI	Horned octopus	22	*Mullus surmuletus*	MUR	Surmullet
11	*Loligo vulgaris*	SQR	European squid	22	*Pagellus erythrinus*	PAC	Common pandora
11	*Lophius piscatorius*	MON	Angler(=Monk)	22	*Spicara smaris*	SPC	Picarel
11	*Micromesistius poutassou*	WHB	Blue whiting(=Poutassou)	22	*Trachurus mediterraneus*	HMM	Mediterranean horse mackerel
11	*Mullus surmuletus*	MUR	Surmullet	22	*Trachurus trachurus*	HOM	Atlantic horse mackerel
11	*Octopus vulgaris*	OCC	Common octopus	25	*Mullus surmuletus*	MUR	Surmullet
11	*Pagellus erythrinus*	PAC	Common pandora	25	*Pagellus erythrinus*	PAC	Common pandora
11	*Phycis blennoides*	GFB	Greater forkbeard				

STECF conclusions

STECF concludes that the ad-hoc report addressed all ToRs properly and provides an appropriate summary of information to be used to identify stocks with suitable data for future work, which are available in the datasets used by the STECF EWG on Mediterranean assessment.

Due to limited time STECF is not in a position to go into details and determine the adequacy of the statistical analysis in respect of the data as well as to evaluate the potential list of new stocks that may be suitable for stock assessment (Table 1) or to advice on the possibility to upgrade category of assessment for the identified stocks. However, taking into consideration the description of the methodology available from the ad-hoc report STECF agrees that the outputs of the exploratory analysis are useful for the STECF Mediterranean EWGs and suggests using them as tools to be consulted during the assessment meetings.

References

Anonymous (2013). International bottom trawl survey in the Mediterranean. Instruction manual, vol. Version 7. MEDITS Working Group.

5.10 Evaluation of the national management plan for boat dredges in Catalonia, Spain

Background provided by the Commission

The evaluation of national management plans prepared in line with the MEDREG and the CFP is a recurrent task for the STECF. The management plan for boat dredges in Catalonia (Spain) was previously assessed by the STECF during its EWG 15-16 (Rome, Dec 2015) and subsequently reviewed at the Plenary 16-01 (Brussels, Apr 2016). Early 2018, the Spanish authorities submitted a draft management plan accompanied by a technical study.

Background information is provided on: https://stecf.jrc.ec.europa.eu/plen1801

Request to the STECF

The STECF is requested to:

1) To assess and advice whether the management plans for marine commercial fishing in the territorial waters of Catalonia, Spain contains adequate elements in terms of:

The description of the fisheries

- Recent and historical data on catches (landings and discards) of the species concerned, fishing effort and abundance indices such as catch-per-unit-effort (or CPUE).
- Data on length-frequency distribution of the catches, with particular reference to the species subject to minimum sizes in accordance with Annex III of the MEDREG.
- An updated state of the exploited resources.
- Information on economic indicators, including the profitability of the fisheries.

Objectives, safeguards and conservation/technical measures

- Objectives consistent with article 2 of the CFP and quantifiable targets, such as fishing mortality rates and total biomass.
- Measures proportionate to the objectives, the targets and the expected time frame.
- Safeguards to ensure that quantifiable targets are met, as well as remedial actions, where needed, including situations where the deteriorating quality of data or non-availability places the sustainability of the main stocks of the fishery at risk.

- Other conservation measures, in particular measures to fully monitor catches of the target species, to gradually eliminate discards and to minimise the negative impact of fishing on the ecosystem.

Other aspects

- Quantifiable indicators for periodic monitoring and assessment of progress in achieving the objectives of the plan.

2) If deemed necessary, provide any recommendations and guidance on how to obtain improved scientific/technical supporting material for the plan. This could be done in terms of collection of data, evaluation of the status of the target stocks, evaluation of conservation measures, impact on the marine ecosystem and monitoring programme.

3) Assess whether the plan provides a robust overview of the catch composition of boat dredges and, in particular whether the catch of species other than shellfish does not exceed 10 % of the total live weight of the catch (in accordance with Article 13(1) of the MEDREG).

Background documents

- Draft management plan - ESP/ENG
- Supporting technical study (ICM-CSIC) - ESP

Summary of the background documents submitted to STECF

STECF notes that documents were provided in Spanish or in machine-translated English, and disclaims against possible misunderstandings.

has examined two documents:

(a) Technical report (from the Catalan Administration) on boat dredges in the Catalan Coastal Mediterranean & Draft order amending the management plan for boat dredges (PGDE)

(b) Supporting technical study 'Evaluación y seguimiento del Plan de Gestión de Dragas para Embarcación (ICM-CSIC)'

The "rastell de cadenes" (referred in the plan document as "dredges") is a beam trawl aimed to capture mollusks and crustaceans. In Catalonia, it is only used in areas surrounding the Ebro delta (Sant Carles de la Ràpita, l'Ampolla and l'Ametlla de Mar) and in Vilanova i la Geltrú by small-scale fishermen. The Mediterranean Fisheries Regulation (EC) 1967/2006 classifies it as a "boat dredge", that is, a towed fishing gear that should only be used at least 3 nm offshore. However, its use is authorized at less than 3 nm if the catch of species other than "shellfish" does not exceed 10% of the total catch in weight (article

13(1)). STECF recalls the comment made in the EWG 15-16 (Rome, Dec 2015) regarding the interpretation of "shellfish" in the Regulation:

"According to Regulation (EC) No.1967/2006, "dredge" means gears conceived to catch bivalves, gastropods or sponges (Art.2) …. In the MP it is stated that "shellfish" refers to "marine organisms other that finfish" based on the interpretative document forwarded by the EC in August 2014. This interpretation enlarges the range of organisms that can be included in such category." In the case of the Catalan "rastell de cadenes", the gear targets molluscs and gastropods, which are mainly distributed inside the 3 nm zone. It is, therefore, necessary to check whether the limit of 10% catch (other than shellfish) is fulfilled in order to allow these particular dredges to fish on shallow bottoms near the coast where they usually operate.

The first version of the dredge management plan was submitted by the Generalitat de Catalunya (Catalan administration) in 2015, assessed by the STECF during its EWG 15-16 (Rome, Dec 2015) and subsequently reviewed in PLEN 16-01. Both EWG 15-16 and STECF 16-1 concluded that the information included in the plan was not sufficient for assessing the sustainability of the activity neither under biological nor socio-economic points of view. Specifically, as noted by EWG 15-16, information regarding the fishery (e.g. fleet structure, exerted effort, specific composition of catches and discards, fishing grounds, landings and CPUE trends of the two shellfish target species [purple dye murex *Bolinus brandaris* and Venus clam *Chamelea gallina*], catch size distributions of both target and bycatch species) was scarce or non-existent. Moreover, no information on the status of the involved stocks was given, neither any conservation objective or management measures necessary to grant a sustainable use of the exploited resources with this gear. There was a complete lack of information on the impact of the use of the gear on the fishing grounds and benthic community along the swept area and survival studies of discarded individuals were not foreseen. Finally, the socio-economic performance of the "rastrillo de cadenas" fleet was not considered.

The EC conditioned the approval of a dredge management plan in Catalonia, Spain to the development of a scientific monitoring to determine whether the "rastell de cadenes" can be used inside the 3 mn zone (i.e. if the catch of species other than shellfish is less than 10% of the total catch). This scientific monitoring has been carried out for a period of one year by the Institute of Marine Sciences (ICM-CSIC), commissioned by the Department of Agriculture, Livestock, Fisheries and Food of the Generalitat de Catalunya. The study was performed in the fishing areas where this fishery takes place, between the harbours of Vilanova and Sant Carles de la Ràpita. The sources of information used were the first sale notes from the fish market auction, catch questionnaires distributed among the fishermen, and various experimental samplings (scientific monitoring) on board the "rastell de cadenes" fleet in their fishing grounds, made by the Institut de Ciències del Mar (ICM-CSIC). Moreover, a geolocation system was installed on the boats to obtain accurate maps of the actual fishing areas. The results of the monitoring are presented in document (b), with the goal to determine the detailed catch composition obtained by the "rastell de cadenes".

The document (a), in its first part (Technical report), summarizes the information contained in document (b) and, in its second part ("Draft order"), presents an updated version of the management plan. This new draft management plan is a replacement of the plan that was previously assessed by the STECF. The new draft management plan is based on the findings of the one-year monitoring of the fishery and includes a series of measures to control the fishing activity in space and time.

The Order ARP/219/2016 of the Catalan administration which establishes the management plan for the boat dredges targeting shellfish in Catalan waters, points out that, for the practice of this activity, fishers must be in possession of special permission granted by the Catalan administration. The maximum number of permits granted throughout Catalonia is 34, with a maximum duration of one year and distributed in the following way:

Area 1: Vilanova i la Geltru: 5 permits granted for boat dredges

Area 2: l'Ametlla de Mar-Ampolla: 6 permits granted for boat dredges

Area 3: Sant Carles de la Rápita: 19 permits granted for boat dredges.

According to the results of the scientific monitoring made by the ICM-CSIC in document (b) and summarized in document (a) by the Catalan administration, the percentage of finfish in the dredge catch (after sorting, i.e. after removing living plant material, traces of human activity such as plastics, live animal and plant debris, and inorganic material such as stones and mud), during the scientific monitoring in 2017, was 13% in Area 1, 20% in Area 2 and 4% in Area 3. In 2017, the total landings of shellfish and the respective landing value of boats fishing with dredges in Area 3 was estimated to be 5-6 times higher than in the other two areas.

Based on these findings, the new draft management plan proposes that the use of boat dredges shall be permitted only in Area 3 (south of the mouth of Ebro river) and the exact location of the fishing ground, where the boat dredging will be allowed, is specified based on an analysis of signals emitted by geolocation devices (AIS) installed on the vessels during the one-year study. The permits to fish with dredges shall be withdrawn from vessels operating in Area 1 which is located faraway from Area 3. The vessels permitted to operate in Area 2 (which is in close vicinity to Area 1) will continue to use dredges but only in Area 3.

Given that fishing will only be permitted in Area 3 (Sant Carles de la Ràpita), STECF has reviewed in particular the data obtained for that area.

Control of fishing effort

The new plan contains a series of measures to further control the fishing effort and justifications are given for taking these measures. A 'Monitoring Committee' will oversee the implementation of the measures which include:

a) The reduction of the number of vessels authorized to use a dredge from 34 (previous version of management plan) to 21.

b) The reduction of the number of fishing days from 5550 (previous management plan) to 2428 per year.
c) The restriction of the daily period of fishing (06:00-16:00).

The following Table summarizes the information regarding the number of vessels and total annual number of fishing days:

	Previous version of management plan (Areas 1, 2 & 3)	**Fishing period of 2017 (Areas 1, 2 & 3)**	**Fishing period of 2017 (Area 3)**	**New version of the management plan (Area 3)**
Number of vessels authorized	34	30	19	21
Number of fishing days	5550	2469	1669	2428

In brief, the previous version of the management plan allowed for a maximum of 34 fishing permits and a total of 5550 fishing days. However, in the 2017 fishing period, only 30 permits were granted and the actual number of days used by these 30 vessels was 2469 in all three fishing Areas. According to the information presented in Table 4 of document (a), a total of 19 vessels were granted a permit in 2017 and used a total of 1669 fishing days in Area 3 alone. The new version of the plan allows for 21 fishing licences, permanently excluding vessels in Area 1, vessels that were scrapped under EMFF and vessels that did not use their allocated fishing days in 2017. STECF notes that, in the new version of the plan, the total number of fishing days allocated to the 21 vessels in Area 3 is similar to the total days realized in 2017 in Areas 1, 2 and 3 together, by a higher number of vessels (30). This is likely to result in an increase of fishing pressure locally in area 3. Indeed, if the 21 vessels will use all days allowed (2428), fishing effort in Area 3 will increase by 31% in comparison to 2017.

Finally, the new version of the management plan foresees that a maturity study will be carried out on purple dye murex (*Bolinus brandaris*), one of the main target species of the boat dredges, to help adjusting its minimum legal size beyond its size at first maturity.

STECF notes that Article 7.2 of the draft plan states "Catches of different species of molluscs, crustaceans and echinoderms may not exceed 10 % of the total catches by weight at the time of landing". This obviously needs to be corrected as also noted by EWG 15-16,

as this is a different wording from "catch of species other than shellfish should not exceed 10% of the total catch in weight [article 13(1)])".

Information on size compositions

The document (b) from the ICM-CSIC provides length data for some of the main target species of dredges from the scientific monitoring, which are summarized below:

Purple dye murex (*Bolinus brandaris*)

In Sant Carles de la Ràpita, the average size of alive individuals was 27.7 mm TSS (size without the siphonal canal) whereas the average size of dead animals was 25.4 mm. STECF notices that the minimum legal landing size (set by the Catalan administration) is 25 mm but in width, not TSS. Therefore, STECF is not able to detect if individuals caught were above or below the minimum landing size. Furthermore, report (b) highlights that there is still no consensus on which size of the shell to use to regulate the minimum size of capture of *Bolinus brandaris* in Spain. For example, in Andalusia the administration set minimum legal size of 70 mm, but in this case it includes the length of the siphonal canal.

Caramote prawn (*Penaeus kerathurus*)

Despite the seasonal variations, few specimens (0.6% of total) had a cephalothorax length lower than the minimum legal size (22.54 mm).

Mantis shrimp (*Squilla mantis*)

The size range of the individuals caught in Sant Carles de la Ràpita is wide, between 6-35 mm LC (carapace length). The smallest sizes, between 6-15 mm, appear in its great majority in the port of Sant Carles de la Ràpita, where this species has a great commercial importance. No legal size exists.

Cephalopods

From all cephalopod species caught in Sant Carles, only one (*Octopus vulgaris*) has a minimum landing weight (1000g). Data show that only 3 individuals weighing 690-1050 g were caught during the scientific monitoring.

Fishes

The diversity of fishes observed in the experimental fishing was high. In the port of Sant Carles, 41 species have been recorded. Although in 10 of the 20 species captured the range of sizes displayed in the report showed that an unknown percentage of individuals were smaller than existing minimum legal sizes, in all these cases the species were caught in low

numbers (<=20 individuals per species). Within the Actinopterigii the group of flatfish was the most frequent with more than 10 species caught. The most frequent species was a small non-commercial gobiid, *Lesueurigobius suerii*, followed by four commercial species: *Arnoglossus laterna*, *Chelidonichthys lucerna*, *Monochirus hispidus* and *Citharus linguatula*.

STECF comments

STECF response to ToRs 1 & 2

STECF observations regarding ToRs 1 & 2 are listed in the following table:

ToR	STECF observations
ToR1 - Description of Fisheries - Recent and historical data on catches (landings and discards) of the species concerned, fishing effort and abundance indices such as catch-per-unit-effort (or CPUE). - Data on length-frequency distribution of the catches, with particular reference to the species subject to minimum sizes in accordance with Annex III of the MEDREG. - An updated state of the exploited resources. - Information on economic indicators, including the profitability of the fisheries.	-For the purpose of describing the fishery, the data presented in the two documents are limited to the one-year pilot study of the fishery. These data include landings compositions, catch compositions from experimental surveys and questionnaires, number of vessels and fishing days per vessel. Landings, fishing effort and CPUE trends of the target species are not provided. -The discarded fraction (before sorting) of the catch was estimated to be 52% in Area 3 in 2017. This discarded fraction included stones and mud, plastics, plant and animal debris, as well as living animals that had no commercial value. This cannot be used to estimate discards rates, as these should only include living organisms. The percentage of finfish in the dredge catch after sorting was 13% in Area 1, 20% in Area 2 and 4% in Area 3 (experimental surveys done in 2016-2017). - Length frequency compositions of selected species (e.g. *Bolinus brandaris*, *Penaeus kerathurus*) from the onboard sampling in 2017 are presented (see observations above). In terms of numbers, catches of species subject to minimum sizes in accordance with Annex III of the MEDREG appear to be low in Area 3. -No assessments of the state of exploited stocks have been carried out. -No economic indicators are provided except from estimates of total annual economic gain (landings value) of the fleet derived from the

	shellfish catch in 2017 per fishing area.
ToR1 - Objectives, safeguards and conservation/technical measures - Objectives consistent with article 2 of the CFP and quantifiable targets, such as fishing mortality rates and total biomass. - Measures proportionate to the objectives, the targets and the expected time frame. - Safeguards to ensure that quantifiable targets are met, as well as remedial actions, where needed, including situations where the deteriorating quality of data or non-availability places the sustainability of the main stocks of the fishery at risk. - Other conservation measures, in particular measures to fully monitor catches of the target species, to gradually eliminate discards and to minimise the negative impact of fishing on the ecosystem.	- In section 2 ('Objectives') of document (a), it is stated that the plan "follows the line marked by the Common Fisheries Policy (CFP), adjusting fleet capacity to fishing opportunities in order to generate a scenario enabling the environmental, economic and social sustainability of the activity in the long term." STECF notes that the objective of CFP is to restore and maintain populations of harvested species above levels which can produce maximum sustainable yield (MSY). Levels of fishing opportunities should therefore be consistent with the MSY objective. The plan does not specify quantifiable targets, such as fishing mortality and biomass reference points and measures to achieve and safeguard the MSY objective, no later by 2020 as committed by the CFP. -The plan contains measures to control the fishing activity in space (only in Area 3) and time (total number of fishing days equal to 2428 allocated to 21 vessels and daily period of fishing equal to 10 hours). STECF notes that the total number of fishing days in the new version of the plan is similar to the days realized in 2017, by a higher number of vessels (30). Given also the reduction of fishing grounds, this is likely to result in an increase of fishing pressure locally in area 3. - The plan postulates that specimens of bivalves and gastropods caught below the legal minimum size or weight shall be returned to the sea immediately after sorting, in order to ensure increased survival. No information is however provided on the actual survival rates of the fraction of the catch that is retained and successively discarded to the sea. - No specific measures to fully monitor catches of the target species of the dredges are specified in the plan. This is particularly important, as in the new version of the plan, the dredges will be allowed to be used together with other gears (traps) during the same day. It is however envisaged that the same monitoring activities described in document (a) will be continued. - The management plan postulates the

	establishment of a special Committee, including a coordinator, to follow up the implementation of the plan, as well as it opens the door to adaptive governance and co-management actions, linked to the final approval by the Catalan Government.
ToR1 - Other aspects Quantifiable indicators for periodic monitoring and assessment of progress in achieving the objectives of the plan.	No such quantifiable indicators have been specified. It is said that after 3 years of the management plan, the Committee in charge of the follow up of the plan will evaluate the results based on the monitoring activities.
ToR2 - Recommendations on how to obtain improved scientific/technical supporting material for the plan.	STECF recommends that additional elements be included in the plan to allow for the estimation of CPUEs of target species, discard compositions and respective size compositions of landed and discarded portions of the catch. Based on an adequate data collection scheme, the status of the main target species, especially the purple dye murex (*Bolinus brandaris*) and the striped venus (*Chamelea gallina*), should be assessed and harvest control rules specified to ensure the sustainable exploitation of the stocks. Data on the economic performance of the dredge fishery should also be collected.

STECF response to ToR3 - Catch composition of boat dredges in relation to Article 13(1) of the MEDREG

In addition to document (a), STECF examined the document (b) 'Evaluación y seguimiento del Plan de Gestión de Dragas para Embarcación (ICM-CSIC)', i.e. the results of the one-year experimental study, to evaluate in detail the catch composition of dredges in Area 3 (Sant Carles de la Ràpita) where the new draft management plan will authorize the use of boat dredges.

In the Table below, a comparison of data obtained for Area 3 from different sources (landings, questionnaires and scientific survey) is done, based on figures 9, 11 and 71-79 from the ICM-CSIC report (document [b]) which refer exclusively to the port of "Sant Carles de la Ràpita" (Area 3).

Data source	Time frame	% finfish in the catch	Main shellfish species	Main finfish species	STECF comments
Landings	Sept 2016-Sept 2017	>10%	-*Octopus vulgaris* (35%) -*Bolinus brandaris* (14%)	-*Sparus aurata* (9%), -*Solea vulgaris* (7%) -*Euthynnus alleterattus* (4%)	Data are not suitable for inferring the catch composition of dredges because the same vessels may also use other small-scale gears (e.g. Octopus traps etc)
Questionnaires		<10%	-*Penaeus kerathurus* (21%) -*Bolinus brandaris* (43%)	-*Solea vulgaris* (6%)	Dredges could not be combined with other gears on the same day. Therefore, catch data coming from questionnaires filled out by the fishermen should represent catches from only the use of dredges
Experimental survey	October 2016-Sept 2017. Nine surveys, 3 fishing operations in each survey	<10%	-*Bolinus brandaris* (up to 86%) -Malacostraca (up to 56%)	The most frequent species was non-commercial gobiid, *Lesueurigobius suerii*, followed by four commercial species: *Arnoglossus laterna*, *Chelidonichthys lucerna*, *Monochirus*	STECF considers that these data have the highest quality and, therefore, STECF conclusions are mainly based

	(total number of fishing operations = 27)			*hispidus* and *Citharus linguatula*	on data from the experimental survey

In summary, STECF considers that the landings data are not suitable for estimating catch composition of dredges, whereas the data derived from questionnaires and the onboard survey are more reliable, especially the latter, and they both indicate that, in Sant Carles de la Ràpita (Area 3), the contribution of fish to the dredge catches does not exceed 10% in total weight.

STECF notes therefore that the statement made in section 4 of document (a) that "The results of the study of ICM-CSIC show conclusively that the boat dredges in the Mediterranean Coast Catalan are behaving as genuine dredges, with a percentage of finfish caught with less than 10 % of the total live catch weight" can only be accepted for Sant Carles de la Ràpita (the southern part of the Ebro Delta)".

STECF conclusions

The objective of the management plan is to adjust fleet capacity to fishing opportunities, however, the levels of fishing opportunities should be consistent with the MSY objective of the CFP.

The revised version of the management plan restricts and specifies the area where dredging will be allowed (Sant Carles de la Ràpita: south of the mouth of Ebro river). The information presented in the documents provided suggests that fishing with dredges in Sant Carles de la Ràpita results in finfish bycatch lower than 10% in weight, and in higher shellfish catch and total value of this catch compared to other fishing areas. Therefore, restriction of the use of dredges in Sant Carles de la Ràpita ((area 3) appears justified.

Compared to its previous version, the new management plan imposes additional measures to control the fishing effort (reduction of the maximum number of authorized vessels, reduction of maximum total number of fishing days, restriction of the daily period of fishing). STECF however notes that the total number of fishing days, allocated to 21 vessels in the new version of the plan, is similar to the days realized in 2017 by a higher number of vessels (30) and a more extended fishing ground. Given the reduction of fishing ground to only Sant Carles de la Ràpita in the new plan, keeping similar number of fishing days is likely to result in the increase of fishing pressure in Sant Carles de la Ràpita (potentially up to 31%), with unknown consequences for the target shellfish stocks.

Catch and CPUE trends should be provided and the status of the main target species, especially the purple dye murex (*Bolinus brandaris*) and striped venus (*Chamelea gallina*),

should be assessed as well as harvest control rules specified to ensure their sustainable exploitation.

Considering the small-scale (artisanal) character of the fishery, information on the particular social and economic characteristics of the fishers involved would be useful. .

6. ITEMS /DISCUSSION POINTS FOR PREPARATION OF EWGS AND OTHER STECF WORK

6.1 Preparation for the EWG 18-19 aquaculture economic report

Request to the STECF

STECF is requested to discuss the terms of reference and propose any special topic relevant in the context of this report that could be addressed in this year's report.

STECF observations

STECF observes that the last economic report for the aquaculture sector in EU was prepared by EWG 16-12 and published as STECF 16-19 in October 2016.

STECF observes that the Terms of Reference for EWG 16-12 resulted in a good overview of the EU aquaculture sector, and that it was feasible to address each ToR adequately, despite a tight time schedule.

STECF also observes that the current EU DCF Multi Annual Plan (EU Decision 1251/2016) provides a sector segmentation that is slightly different compared to the previous EU MAP (EU Decision 93/2010). This could affect the tools used to receive data from MS (data calls format) and for data processing, but the overall structure of the aquaculture report should not be impacted and could be maintained.

STECF PLEN 16-03 provided a number of observations and conclusions for further improvement of the biannual report, which should be taken into account in the EWG 18-19.
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Regarding possible topics for special analysis, STECF observes that the following special topics have been addressed previously:

1) The public support and growth of the EU/National aquaculture sectors (2016)
2) Areas for growth in the EU aquaculture sector (2014)
3) Are production volume and value statistics on EU aquaculture from FAO, Eurostat and DCF aligned? (2013)

STECF exchanged views with the Commission regarding their possible future needs for special topics to be addressed by the EWG. Based on this, it is for the Commission to decide their priorities in relation to the special topic to be analysed during the upcoming EWG 18-19.

STECF conclusions

STECF concludes that the Terms of Reference should be in line with the ToR used in EWG 16-12, and furthermore added the text about the special topic to be analysed.

6.2 EWG 18-09 on an effort regime for demersal fisheries in the western Mediterranean

Request to the STECF

The objective is to discuss the preparation of the EWG 18-09, including the draft terms of references, data availability, experts' attendance, identification of possible work to carry out in advance of the meeting, anticipation of any issue and link with the EWG on stock assessments.

STECF response

STECF observations

STECF observes that the Terms of References for EWG 18-09 have already been drafted and published on the STECF meetings web site. STECF appreciates that some of the TORs reflect the conclusions of STECF Plen 17-02 that was already asked to provide advice on the establishment of a fishing effort regime for demersal fisheries in the western Mediterranean.

In particular, STECF observes that TOR 1 (Lessons learned) is aimed at presenting the general knowledge on the use of fishing effort regimes as a management tool for mixed fisheries; however, STECF observes that issues regarding poor monitoring and documentation of the actual effort levels should also be considered as part of this TOR, as requested by STECF 17-02.

STECF observes that the second TOR (What are the main characteristics of the trawl fishing fleet) is based on the analysis of specific sets of data. STECF considers that data should be made available disaggregated by GSA (i.e. GFCM sub-areas 1, 2, 5, 6, 7, 8, 9, 10, 11) and not by Member State as stated in the draft TOR. The list of information could be better defined trying to differentiate variables (like the number of vessels), that should be provided by MS based on data collected under the DCF and indicators (as for instance the "net profit") that need to be calculated. STECF observes that the meaning of the variable "Economic dependency (%)" should be specified.

Regarding the proposed TOR 4 (What is the relationship between effort and fishing mortality) STECF 17-02 already considered that the relationship between fishing effort and fishing mortality is not linear, as there are many technical and human factors that govern the impact of one unit of fishing (e.g. one fishing day) on the exploited stocks, and fishers can also compensate effort reductions with increased fishing efficiency. STECF 17-02 noted that is impossible to define a single adequate effort level for all stocks since large differences in catchability and stock status exist across stocks. STECF also notes that attempts to find the relationship between fishing effort and partial fishing mortality in other

areas (Baltic Sea, North Sea) have shown the similar non-consistency in relationship between fleet segments and metiers (e.g. STECF-14-20).

STECF observes that the annex of the proposed TORs for EWG 18-09 suggests an approach to be used in case there is no meaningful relationship between effort and fishing mortality. STECF considers that it would be beneficial to implement some case studies to test any specific assumption on this relationship.

TOR 5 for EWG 18-09 is aimed at simulating the likely impacts of different management scenarios. STECF considers that DGMARE should clarify which stocks should be included in the model and, therefore, which fleet segments. STECF also observes that no forecast model is suggested. In addition, STECF notes that the WestMed MAP proposal (Brussels, 8.3.2018, COM(2018) 115 final 2018/0050) includes the provisions of technical conservation measures (like closure areas) as complementary measures to the fishing effort regime, but these are not considered in the list of management scenarios to be tested for each effort management unit.

STECF observes that simulations comparing output-based management (TAC) with input-based management (effort limits) have already been implemented by STECF-16-21 (Multiannual plan for demersal fisheries in the Western Mediterranean).

Finally, STECF observes that economic indicators to be considered in the assessment should refer to the most recent guidelines and approach on impact assessment (such as for example those proposed by the SOCIOEC project).

STECF conclusions

STECF concludes that the Terms of Reference for EWG 18-09 are well listed but considers that substantial work should be carried out in advance of the meeting to allow their achievements.

In particular, STECF concludes that:

TOR 1 (Lessons learned) should be based on comments and conclusions of STECF PLEN-02. Experts present during the meeting should integrate and further comment the issues raised by PLEN-02. The expected output is a list of lessons learned from the use of effort management regimes in EU and non-EU fisheries. This list should not only describe, from a scientific-technical perspective, the shortcomings of such regimes and recommendations to avoid similar issues, but it should also report the strengths and how new effort regimes could benefit from it. The TOR should also investigate if appropriate monitoring and documentation of the actual effort levels are already in place in the Western Mediterranean Sea.

TOR 2 (What are the main characteristics of the trawl fishing fleet) should be based on data as specified within the DCF (in terms of variables and temporal disaggregation) but with a lower geographical disaggregation (economic data are collected by supra-regions, but some MS have included in their National Work Plan the collection of economic data at GSA level). STECF concludes that, before the meeting, it should be checked what data are available in the JRC database and if they are consistent. In case data by GSA are not available or they

are not consistent, the chair should ask MS (through National Correspondents) to provide economic data at GSA level, if available. STECF considers that this approach is preferable to an "official" data call, which is a lengthy procedure.

Additional data, apart from those collected within the DCF, should also be made available, such as information on gears, fishing patterns, etc. STECF suggests reviewing studies and research projects, like for instance the MYGEAR project (Sala et al., 2013). Additional data, such as individual trip data for some fisheries allowing estimation of partial fishing mortality per day (Rijnsdorp, 2006, van Oostenbrugge et al., 2008), could also be useful.

The relationship between effort and fishing mortality should be further investigated before the meeting taking into account comments made by STECF 17-02 and available studies and scientific articles.

Models to be used in the simulation should be selected before the meeting as this would also indirectly suggest experts' attendance. Management scenarios should be selected considering DGMARE meeting expectations but also time and resource availability.

References

Rijnsdorp, A. D., Daan, N., and Dekker, W. 2006. Partial fishing mortality per fishing trip: a useful indicator of effective fishing effort in mixed demersal fisheries. e ICES Journal of Marine Science, 63: 556e566.

Sala, A., Brčić, J., Conides, A., De Carlo, F., Klaoudatos, D., Grech, D., Lucchetti, A., Mayans, A., Notti, E., Paci, N., Salom, S., Sartor, P., Sbrana, M., Soler, I., Spedicato, M.T., Virgili, M., 2013. Technical specifications of Mediterranean trawl gears (myGears). Final project report, financed by the European Commission through the Framework service contract for Scientific Advice and other services for the implementation of the Common Fisheries Policy in the Mediterranean (Contract MARE/2009/05-Lot 1), 519 pp.

van Oostenbrugge, H. J. A. E., Powell, J. P., Smit, J. P. G., Poos, J. J., Kraak, S. B. M., and Buisman, E. F. C. 2008. Linking catchability and fisher behaviour under effort management. Aquatic Living Resources, 21: 265–273.

6.5 Reflection on identification of future research and innovation priorities in fisheries science

Request to the STECF

DG MARE wishes to consult STECF on the future research needs in the context of preparation of FP9. Concretely, STECF is asked to discuss and identify what knowledge will be necessary by 2030 to contribute to enabling the sustainable EU's fisheries management and to contribute to the improved performance of EU fishing. STECF is requested to consolidate the (preliminary) conclusions of this discussion in a short document (preferably a 1 pager) with the key elements identified in the knowledge areas. In addition, STECF is requested to provide rationale for knowledge areas identified.

For its discussion, STECF is asked to take into consideration as a background document an internal MARE note prepared by DG MARE CFP Units on possible FP9 priorities and consultation on post-2020 fisheries research and innovation (R&I) strategy. This note contains first reflections on the possible agenda for future research.

STECF response

Documents reviewed

The documents reviewed to produce the conclusions and the rationale behind the knowledge areas identified is the following:

- Contribution from DG MARE CFP Units to possible FP9 priorities and consultation on post-2020 fisheries research and innovation (R&I) strategy. 2017
- EFARO's view on research priorities for H2020 SC2 2018 and beyond. European Fisheries and Aquaculture Research Organisation (EFARO) http://efaro.eu/index.html.
- Strategic Research and Innovation Agenda 2015-2020. JPI OCEANS: http://www.jpi-oceans.eu/
- Strategic research agenda for Fisheries, Aquaculture and Seafood Processing. COFASP http://www.cofasp.eu/.
- "Food from the Oceans" Report 2017. SAPEA https://www.sapea.info/

STECF observations

STECF recalls that the tasks of this committee are, in the field of conservation and management of living marine resources, including biological, economic, environmental, social and technical considerations: (i) to assist the Commission in the preparation of

legislative proposals, delegated acts or policy initiatives, and (ii) to monitor the evolution of policy and bring about an exchange of experience and good practice.

Before discussing the main topics of future research, STECF notes that there are several data and methodological gaps that have been regularly detected in the past and which made difficult or impossible the assessment of some stocks. These deficiencies should be considered alongside the new topics of future research. These include for example the insufficient data for a great number of coastal species or the lack of social data (not only quantitative, i.e. from sociology but also qualitative, i.e. from social anthropology) for some fisheries (particularly the small –scale fishing fleets, where the social component is particularly relevant).

Some reflections appear from the documents reviewed. STECF highlights that these themes have multiple facets and that some of the complex aspects are sometimes omitted. Those need a detailed discussion and analyses regarding the ways to approach them:

- *"Business as usual" is not sustainable from social, economic, and environmental point of view…* innovative changes in all sides (fishers, managers, scientists, consumers) are needed. However, STECF points that there is reticence among stakeholders to change the path, which must be taken into account.
- *Fast-growing global population: How can more food be obtained from the oceans in a sustainable way?* STECF highlights that is it not only about quantity, but also quality. there are scientific voicing arguing that we particularly need to increase the quality (micronutrients, omega 3 fatty acids, etc) and safety (parasites, biotoxins, etc) issues of the seafood. There is also a need to consider the access to food and the distribution of the marine resources in a global scale, considering both developed nations as well as developing nations, from where large quantities of seafood are imported to EU.
- *New stakeholders (multi-use of the space) are emerging at sea, posing economic and social challenges.* However, it is not yet clear how fishers, fisheries managers and scientists can adapt to these changes

Based on the three challenges described in the annex of the DG MARE CFP Units document, the documents reviewed, the reflections given above and the new ideas provided by STECF members during the 18-01 Plenary, STECF identified the main research topics and ideas that complement those described in the document of DG MARE CFP, in order to allow gathering new knowledge by 2030 to contribute to sustainable EU fisheries management, and to contribute to the improved performance of EU fishery.

STECF considers that the three challenges proposed by DG MARE are timely and therefore STECF has complemented the thoughts provided by DG MARE to tackle these challenges with further ideas. Some of these ideas are already ongoing and started to be covered in the current calls of H2020, whereas other ideas are not and are suggested for future work in the next decade.

The STECF ideas are presented in the following three tables (one for each challenge). STECF discussed about the best format and extension of the research ideas and topics, taking into account the available time frame of the advisory committee (one week), in order to make them helpful for DG MARE. STECF did not have the time that would be necessary to provide more details (e.g. examples or ways to approach the ideas) for each topic/idea, neither to rank these topics / ideas according to some priority (originality or strategic necessity), but considers that the information provided in the following tables constitute a first step that complements the information of DG MARE.

It must also be considered that all topics / ideas need to consider overarching issues of social, economic, environmental and climate change challenges, and that in many occasions the link to other sciences such as medicine, nutrition or veterinary will be needed to tackle the research issues proposed. Therefore, a full interdisciplinary view will be needed if the topics/ideas proposed are to be promoted. The integration of fisheries scientists (whether they come from the biological, social or economic fields) into a multi-disciplinary network of scientists including marine biologists, parasitologists or physicians to support not only the Blue Growth but also the Blue Health is highly needed.

Finally, STECF considers that an important issue to tackle when considering the future of fisheries research is the lack of opportunities for young fisheries scientists. STECF realizes that the current financial tools are too short to effectively invest in fisheries education and research training and do not offer permanent or stable positions to young fisheries scientists.

CHALLENGE 1: Enhancing food security and food sovereignty in a context of a growing human Earth population. Topics of future research with examples and comments (cf annex for further rationale)

TOPIC	IDEAS	STECF COMMENTS
Seafood quality	Increased availability of safe and healthy food for consumers: micronutrients and omega 3 fatty acids. Healthy food - gastronomic value. Seafood certification to support consumer information on environmental production of food from the oceans	Interdisciplinary research needed: fisheries biology, medicine, nutrition, seafood technology, etc
Seafood safety	Emerging issues such as parasites, biotoxins e.g. tetrodotoxin (TTX), ciguatoxin, toxin-producing harmful algae blooms HABs Explore the ecological and climate drivers that may be behind the observed changes in seafood quality	Interdisciplinary research needed: fisheries biology, parasitology, marine biology, medicine, veterinary, etc
Better use of marine resources	Balanced (or better "compensated") harvesting Are there changes in the diversity of our (sea)food systems?	(Eco)system modelling needed, policy, governance, market and cultural barriers
	Reduction of unwanted catches vs the use of unwanted catches Exploration of possible processes to use fish wastes or by-products including viscera	Interdisciplinary research needed: fisheries biology, parasitology, seafood technology
	Exploring the ecological conservation needs and potential impacts of any new harvesting of new resources including e.g. warm-water species; zooplankton, marine algae, deep sea resources, mesopelagic fish, Arctic/Antarctic, etc.	New information needed to better understand the ecological role of these resources and to analyse the consequences of any new harvests. Innovative surveys and methods needed to improve assessments and gather data.

	The potential of sustainable mariculture	Interdisciplinary research needed to solve the problems in traditional mariculture.
	Maximizing the processing efficiency: exploring the integrated full seafood value chain (fisheries, aquaculture and processing industries) in order to reach a full utilization and optimal sustainable use of oceans and seas. Development of new production technologies to maximize the efficiency.	Interdisciplinary research needed involving all stakeholders of the seafood chain.
	New technologies around traceability in the seafood supply chain Increasing the knowledge of the value chain Increase the consumers' acceptability of aquaculture products	Interdisciplinary research needed
	New models: non-market economic valuation, new predictive and diagnostic tools (e.g. artificial intelligence)	
	Climate change and fisheries: fish adaptation and stock management	
Beyond seafood: marine ecosystem goods and services	Marine biotechnology based on fisheries products	Link to medicine and biotechnology
	Recreational fisheries: socioeconomic opportunities (e.g. *pesca turismo/"fishing tourism"*) and challenges (e.g. subsistence fisheries and competition with professional fishers) and ecological impacts	Link to the tourist boom and the economic crisis.

CHALLENGE 2: Consolidating the governance of the Ocean (cf annex for further rationale)

TOPIC	IDEAS	STECF COMMENTS
Better integration of the Human Dimension	Marine Socioecological Systems. Co-management. Societal acceptance & responsibility	Interdisciplinary research needed: fisheries biology, social anthropology, economy, marine governance
	Analysis of different governance systems - fleet based approach: Small-scale traditional fisheries vs large scale fisheries. Use of Territorial Use Rights– TURFs. Analysis of socio-economic development of local and regional communities which depend on the fisheries sector including the search for a wider set of socio-ecological indicators in monitoring CFP and MSFD Fishermen adaptation to climate change	Interdisciplinary research needed: fisheries biology, social anthropology, economy, marine governance
	Consequences of the global seafood trade for the local communities (in developing countries), including potential, future effects linked to potential changes in this trade depending on internal (EU) or external factors.	Research programs with developing fishing nations needed, but also within Europe taking into account that today Europe is a net importer of seafood
	Seafood consumption, human health and wellbeing in a changing environment (including climate change): challenges for the governance	Interdisciplinary research needed: fisheries biology, social anthropology, economy, marine governance. Link to "Oceans & Human Health" This includes a baseline survey and the development of a set of relevant indicators that can be used for monitoring
Innovative governance strategy	Corporate Social and Environmental Responsibility of seafood corporations and fleets	Relate to labelling and certification

linked to innovative management, research and dissemination	Link Marine Strategy Framework Directive (GES) with Habitats Directive - Birds Directive.	
	Raise awareness of fishery issues (including climate change impacts9 to fishers, consumers and public	
	International governance in the open ocean	
New strategic vision in EU fisheries research:	Optimization of research infrastructures, surveys & programmes Innovative and new technologies for research survey and data collection (advantage of using information collected by fishers/vessels) Prioritization of research needs. Computing the value added to society	
	Open access to centralized fishery data New technologies for monitoring fisheries and for stock assessments (i.e. under water drones)	
	Citizen (fishers) science	Self-survey programmes (e.g. Norwegian Reference Fleet) Integration of industry and society in developing relevant information for decision making
	"Multi-use" approach of the oceans.	Coastal and maritime planning
	Interactive advise and science	Science and advise has to become more decision oriented and participatory
	Human capacity building in fisheries science	Need to focus on fisheries education, research training and offering permanent / stable

		positions for young scientists.
Specific measures	Removing harmful subsidies Increase compliance and eliminate IUU fishing	
Global Marine Spatial Planning (MSP)	Develop governance, institutions, rules and tools for global MSP	Need to revisit concepts of MSP: regional scale vs global scale

CHALLENGE 3: Strengthening the resilience of marine ecosystems (cf annex for further rational)

TOPIC	IDEAS	STECF COMMENTS
Minimizing the impacts on marine ecosystems	Vulnerable species and habitats (to fisheries and climate change)	Link to biological conservation initiatives including Natura 2000
	Essential fish habitats (EFHs).	Link to biological conservation initiatives including Natura 2000
	Improve the ecological footprint of fishing methods: use of alternative "low impact" gears (e.g. traps); biodegradable materials to mitigate the consequences of fishing gear loss. Cost-efficiencies of various types of production alternatives	Interdisciplinary research needed; fisheries biology, fisheries technology
	Reducing the environmental impact of fishing activities by using innovative fishing technologies for reducing GHG, other pollutant emissions, and fossil-based fuel consumption	Focus on green and blue technologies to reduce the fuel consumption of fishing activities, increasing the energy efficiency of fishing gears and vessels.
	Ecosystem based management. Food webs.	Ecosystem modelling needed.

	Long term impact of fisheries on genetic diversity	
	Other emerging threats apart from plastics and microplastics: loss of fishing gear and tackle, use of exotic baits, etc.	
Marine Protected Areas (MPAs)	New roles of MPAs to protect habitats and rebuild stocks	Focus on sensitive areas and habitats such as deep sea, coralligenous assemblages, etc
Low Trophic Level fisheries and aquaculture	Develop techniques and tools for more and sustainable low trophic level production	
"Diversification" of fisheries	Diversification of fishermen activities (e.g. tourism) to reduce impacts on ecosystems Explore the role of the circular economy in fisheries	
Social values to enhance fisheries resilience	Need to study cultural values and fishing traditions	

Brief rationale for proposing the topics and ideas in the 3 tables above.

1. Enhancing food security and food sovereignty in a context of a growing human Earth population

Although the enhancement of the food security at a global scale is important, seafood quality and safety aspects are increasingly more relevant for the human health and wellbeing. The potential of seafood as a better source of micronutrients and omega 3 fatty acids for citizens than other foods is arguably more important than its value as a source of protein In this sense, future research will need not only to enhance food security and sovereignty, but also to guarantee the availability of safe and healthy food for consumers by contributing to the provision of accessible, healthy and sustainable food and diets for all. For example, the management of fisheries could take into account the balance between the omega-3 fatty acids and the mercury provided, or the best seasons to exploit fish in accordance with the omega-3 fatty acids they provide. On the other hand, emerging issues such as parasites, biotoxins e.g. tetrodotoxin (TTX), ciguatoxin, toxin- producing harmful algae blooms (HABs) need to be better addressed in the future; there is a need to link these threats to climate change, because many of these emerging issues are related to it (e.g. change in the spatial distribution of warm-water species that are toxic, such as pufferfish, or appearance of ciguatera in areas where it was not observed before due to changes in HABs). To achieve these goals, interdisciplinary research is needed, where different disciplines should be engaged, e.g. fisheries and marine biology, parasitology, medicine, veterinary, nutrition, toxicology, etc.

The idea of the "better use" of marine resources needs further research. For example, on-going research supports the so-called balanced harvesting approach, though there is not yet an adequate body of evidence on its effects – be they benefits or otherwise (cf. also ToR 5.4 for a discussion about the impact of size-base selectivity). In some places like the Mediterranean, it seems there has been a decline in the diversity of the (sea)food systems whereas in others like the North Atlantic, the opposite may occur. Another example is the need to investigate how a reduction of unwanted catches bycatch/discard can be achieved, and the eventual reuse of unwanted catches including viscera (e.g. livers, which are rich in omega-3), in line with the current commitments to the so-called "circular economy". Another example of future research to improve the way we use the marine resources is the necessity to maximize the processing efficiency by exploring the integrated full seafood value chain (fisheries, aquaculture and processing industries), with the goal to reach a full utilization and optimal sustainable use of oceans and seas. There is a need to develop a better understanding of underutilized material and potential value of available resources with an analysis of the current markets and potential value chains for new products. This needs the research collaboration of seafood processing industry, fisheries sector and aquaculture producers. Policy and governance aspects of the full utilization and optimal sustainable use of the Oceans and Seas of Europe need to be addressed, again in line with the "circular blue bio economy". There is an increased necessity to fully use all of the harvested fish products, be it from aquaculture or wild capture fisheries. This entails optimizing the use for fishmeal and oil coming from the fraction that is left after fish processing (from trimmings) and the use of all co-products for high value products for feed, food, pharmaceuticals and cosmetics. The potential of sustainable mariculture (e.g. reducing the impact on habitats or use of alternatives to fish oils/fish meal and agriculture products) needs to be further explored. Not only should the aquaculture industry be addressed but also consumers, because there is a need to increase the acceptability of aquaculture products among them.

New methods and technologies are needed to tackle the future challenges. For example, new production technologies are needed in order to improve the efficiency of the fisheries sector and the traceability in the seafood supply chain. New models such as e.g. non-market economic valuation in the valuation of recreational fisheries, as well as new predictive and diagnostic tools (e.g. artificial intelligence), should be explored to contribute to the idea of "better use" of marine resources.

The links between climate change and fisheries needs to be further explored considering the expected changes in sea water temperature and other physical variables that may affect directly or indirectly fish stocks, such as river runoff or winds. The physiological adaptation of fish and invertebrate species to the environmental changes produced by climate change, as well as the incorporation of physical variables into stock management (e.g. evaluation of MSY) will need to be further investigated.

The idea of exploring and harvesting new resources needs new data to evaluate if this is ecologically sustainable and socioeconomically feasible. Knowing the ecological role and vulnerability of these new resources to fisheries and climate change is of paramount importance before any potential harvest may be envisaged. The marine ecosystems are home to a large number of resources that are either not exploited or are marginally exploited currently and which could improve food security and the wellbeing of humanity. These include species that are increasing because of climate change, including invasive species; zooplankton, marine algae and mollusks, deep sea resources and mesopelagic fish. Some of these taxonomic groups have been proposed because they have lower trophic levels. However, many questions arise that will need further research: deep sea biota is fragile whereas zooplankton and mesopelagic fish constitute an important food resource for other animals; and marine algae make up an important habitat for other organisms. Therefore, before these new resources can be harvested, new data using innovative sampling methods must be collected to fill in fundamental knowledge gaps and technical shortcomings that currently are raising doubts about the ecological consequences of increasing food from the sea using these new resources.

Apart from being part of a healthy diet, marine resources can offer other type of goods and services that need further research, including the use of marine biological resources through development and application of marine biotechnology (nutraceuticals, cosmeceuticals, biomedical, biopolymers, enzymes with industrial applications) and the social and economic challenges that recreational fisheries represent. The potential effects of recreational fisheries on fish stocks are still little explored whereas the socioeconomic importance of different types of recreational fisheries, including the subsistence one, is still little known.

2. Consolidating the governance of the Ocean

Future research should allow a better integration of the Human Dimension. In this sense, the concept of Marine Socioecological Systems needs to be better developed in order to improve the governance of fisheries and oceans. Co-management and participatory approaches need to be better studied to improve the fisheries governance. Furthermore, the societal acceptance and societal responsibility of fishers and consumers needs to be further investigated, as well as the governance of aspects of fisheries related to human health and wellbeing.

Additionally, an innovative governance strategy linked to innovative management, research and transfer of knowledge is needed. In this sense, the significance of small-

scale traditional fisheries as a model for better governance needs to be considered, particularly because such fleets are often said to be economically, socially and economically more sustainable than large scale fleets (despite in some cases there are particular impacts on particular vulnerable species and habitats that are not yet well understood). EU small-scale coastal fleet represents 47% of the total employment but is not well-represented in the political and economic development agenda. New governance actions such as the use of Territorial Use Rights– TURFs in these fisheries needs to be better explored whereas the competition between small- and large-scale fisheries needs to be better approached. Furthermore, the consequences of the global seafood trade for the local communities (in developing countries), including future effects linked to potential changes in seafood trade needs to be explored because currently Europe is a net importer of fish (ca 60% of the raw material of the processing industry is imported).

Another example of future research in the field of governance are the potential effects of subsidies and the development of Corporate Social Responsibility (CSR) of large food corporations. Governance could be also improved by linking the fisheries management with the management of the marine environment as a whole. There are still overlaps and areas for closer coordination between the Marine Strategy Framework Directive (MSFD) and the Habitats and Birds Directives In this sense, the interactions between the MSFD (Good Environmental Status - .GES), the Habitats Directive (Favourable Conservation Status -FCS) and Birds Directive is an example of research that has been little explored so far despite the two concepts of GES and FCS can be mutually supportive (here, the collaboration between DG MARE and DG Environment is needed). Another example of future research is the development of governance, institutions, rules and tools for global multi spatial planning (MSP). With an increased use of our seas and oceans for the production of food (and feed), energy, tourism or drinking water and conservation, there is a need to revisit concepts of MSP (regional scale vs global scale)

Furthermore, a new strategic vision in EU fisheries research is needed, taking into account the optimization of research infrastructures, surveys and programmes: shared use of research vessels and infrastructures; promotion of open access to centralized fishery data (e.g. survey data, landings, etc); the use of citizen (fishers) science (e.g. engaging fishers to collect scientific information / self-surveys); or the integration of fisheries in the "multi-use" approach of the oceans (e.g. study the links with other maritime sectors including offshore wind, coastal tourism, aquaculture, oil and gas exploration). In order to be able to provide sound advice that integrates social, economic, environmental, policy and management aspects, science has to become more decision-oriented and more participatory in a world that is growing in complexity with an increased use and hence users of the seas and oceans. To improve the governance of fisheries, new ways to raise environmental awareness among fishers, consumers and general public is also need, and cultivation of new approaches to social responsibility must be approached. A final but important governance issue is the necessity to solve the crisis in human capacity building in fisheries science, because the current financial tools are too short to effectively invest in fisheries education, research training and offer permanent or stable positions to young fisheries scientists.

3. Strengthening the resilience of marine ecosystems

In order to strengthen the resilience of marine ecosystems, several actions can be promoted for future research. One is the "diversification" of fishing activities, which should be better studied as a tool to reduce pressure on stocks. The diversification of

fishers towards other activities such as tourism should consider social aspects (e.g. cultural value, traditions), because these social values are important to enhance fisheries resilience and there is yet little information. Another example is the role of marine protected areas (MPAs) to protect habitats and rebuild stocks. Although this is not a novel topic (much research has been conducted on the impacts of MPAs on fish abundances and biomass), it should be further explored to consider the less-known aspects such as e.g. the potential of MPAs to positively affect the life history traits of fish inhabiting these areas, or the use of MPAs as "laboratories" where large scale issues (e.g. climate change impacts on fish, multiple use of the seas, etc) can be approached at a local scale. Other emerging impacts on marine resources apart from plastics and microplastics should be further addressed, including the loss of leads and other fishing tackle and the use of exotic baits by recreational fisheries, or the environmental impacts resulting from the loss of professional fishermen (e.g. "ghost fishing").

Other future research ideas to improve the resilience of stocks may include measures to integrate fisheries science and stakeholders in the multi-use of seas and oceans for Blue Growth and the continuation of long term research and monitoring to minimize the impacts on marine ecosystems. A general challenge to all uses of the marine environment is to develop products and production techniques that not only reduce direct impact on the marine resources, but are produced with the lowest possible impact on the marine ecosystem, including its associated carbon footprint. The development of low impact fishing methods, such as eco-friendly powered vessels and the use of biodegradable materials, should be also addressed, whereas the effect of fisheries and climate change on vulnerable species and habitats including the so-called essential fish habitats (EFHs) must be better understood because sea warming and some fishing methods can have a large impact on fragile species and habitats such as crinoid beds and deep water corals, but currently this impact is little known. Finally, the long term impact of fisheries on genetic diversity must be further explored. Another example of future research idea to improve the resilience of the marine ecosystems is the improvement of ecosystem modelling and fisheries assessments, which need to consider climate change (currently climate change is not taken into account in determining Maximum Sustainable Yields (MSY). The development of Low Trophic Level fisheries and aquaculture is another example must be further explored. In this sense, the development of techniques and tools to exploit or cultivate the low trophic levels in a way that does not compromise other animals of the sea should be better explored.

7. BACKGROUND DOCUMENTS

Background documents are published on the meeting's web site on: https://stecf.jrc.ec.europa.eu/plen1801

8. CONTACT DETAILS OF STECF MEMBERS AND OTHER PARTICIPANTS

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

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