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Special request for evaluating Baltic cod additional measures (STECF-16-23)

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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. This report deals with a special request for evaluating Baltic cod additional measures.

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

Special request for evaluating Baltic cod additional measures (STECF-16-23)

THIS REPORT WAS ISSUED BY WRITTEN PROCEDURE IN NOVEMBER 2016

Background provided by the Commission

During the October 2016 AGRIFISH Council meeting, ministers reached political agreement on quota levels in the Baltic Sea for 2017. The quota level for the western cod stock is based on the scientific advice and complies with the requirements of the Baltic multiannual management plan (Regulation (EU) No 2016/1139).

The Baltic multiannual management plan requires adopting further measures in cases when the stock is below certain conservation reference points as laid down in the plan. According to the plan such measures should be adopted with the Commission delegated act following the submission of the Joint Recommendation by the Member States concerned. The Joint Recommendation was submitted to the Commission on 11 October 2016.

The Commission should facilitate the cooperation among the Member States and ensure that measures indicated in the joint recommendations are based on the best scientific advice and shall contribute to the achievement of the objectives of the Baltic multiannual management plan.

Therefore the Commission is seeking the advice and the scientific opinion from the STECF to be provided following the Terms of Reference below.

Request to the STECF

STECF is requested to:

1. Assess and quantify the impact of the measures to establish fisheries closure periods on the effort applied in the cod fisheries and its impact on cod stocks, as well as, to the elimination of discards by avoiding and reducing unwanted catches:

    a. the fisheries closure period in subdivisions 22, 23 and 24 to be applicable from 1 February to 31 March to vessels fishing for cod;

    b. the fisheries closure period in subdivisions 24, 25 and 26 to be applicable from 1 July to 31 August to vessels fishing for cod;

    c. the fisheries closure period in subdivisions 27 and 28 to be applicable from 1 July to 31 August to vessels fishing for cod.

2. Assess the impact of the measure to allow cod fishery in waters shallower than 20 m by vessels with a length overall up to 15 m equipped with VMS (except pair trawling) as derogation from measure indicated in paragraph 1a, 1b and 1c.

Background documents

1. *2013-2016 ICES advices on cod stocks in the Baltic Sea.*
2. *2013-2016 ICES WGBFAS reports.*

3. *Baltfish Joint Recommendation ARES(2016)5863715 – 11/10/2016.*

STECF response

To answer the request, two other background documents were made available to STECF, in addition to the three documents mentioned in the request. First, the report of an ad-hoc contract issued in November 2016 entitled "*Evaluating Baltic cod additional measures*" was made available. Following dialogue between STECF, EU Commission and the author of the ad-hoc contract, some revisions and clarifications of the report were brought during the process of STECF evaluation. Second, a working document entitled "*Seasonal development of maturity in Baltic cod (Gadus morhua L.), with special emphasis on the most appropriate timing of spawning closure to protect the Western Baltic cod population*" was sent directly to STECF by the Thünen Institute of Sea Fisheries (Germany).

STECF notes that the BALTFISH Joint Recommendation (JR) on 2017 Fishing Opportunities for the Baltic Sea, issued 10 October 2016, include the following items concerning closures in the Baltic Sea:

- As a short term measure for 2017, the previous spatial closures as set out in Regulation (EC) 1098/2007 shall be maintained, including the derogation granted for SD 27 and 28 according to Article 29.2 and 29.4 thereof.

- A closure period in SD 22-24 shall apply from 1 February to 31 March. The temporal closure in SDs 22-24 shall be combined with a 20 meters depth constraint. Fishing with vessels with a length overall up to 15 m equipped with VMS is permitted (except pair trawling). This provision will have to be assessed.

STECF notes that it is unclear from the JR text whether the 20 meters depth constraint applies to all vessels (i.e. all vessels are permitted to fish in water shallower than 20 m) and small vessels are permitted to fish during the closure, or whether the two conditions apply together. STECF has evaluated this second option as specified in the ToR 2, i.e. that only small vessels are permitted to fish during the closure, and only in the waters shallower than 20m.

With regards to the short-term measure for 2017, STECF notes that ICES stipulated that for the Western Baltic cod stock, the extended duration of the cod closure in 2016 and the adjustment in timing to cover the period when cod catches are normally highest is expected to limit catches and contribute to reducing F.

STECF also notes that the area and seasonal closures do not apply for recreational fisheries.

STECF observations on the ad-hoc contract

The review undertaken by the STECF was restricted to a review of the information and findings presented in the supporting documentation. The methodology, input data, assumptions and model diagnostics have been published in a peer-reviewed scientific journal and are thus not further reviewed by STECF.

<u>Method used and STECF comments on the method</u>

The effects of spatial closure scenarios were assessed and quantified using the spatially-explicit agent-based DISPLACE modelling platform as presented and parameterised in Bastardie et al. (2016). This platform models the fine movement of individual fishing vessels at an hourly time step in a management strategy evaluation framework that reproduces the annual TAC management following F_{MSY} reference levels. In the present model for Baltic cod fisheries, Danish vessels above 12 m are explicitly modelled as individual agents which make decisions on where and when to fish, while the spatial distribution of smaller vessels and vessels from other Baltic

countries for which individual information was not available is modelled based on the historical distribution of catch rates, using the STECF Fisheries Dependent Information (FDI) database. The relative spatio-temporal distribution of cod stocks is based on historical survey data.

The analyses presented were done by conducting 5 years medium term stochastic projections on both Eastern Baltic cod (EBC) and Western Baltic cod (WBC) cod stocks. The model returns estimates of the spawning stock biomass (SSB) and fishing mortality (F) for the two stocks, and of the fisheries revenue earned out of the two Baltic cod stocks.

Seven scenarios were analysed, directly linked to the ToRs:

1. A baseline scenario with no closures (called scenario "stecf_baseline" in the ad-hoc report)
2. A scenario with closures in ICES SD 22, 23 and 24 (1st February-31st March), addressing the impacts for ToR 1a (called scenario "stecf_tor1a").
3. A scenario with closures in ICES SD 24, 25 and 26 (1st July-31st August), addressing the impacts for ToR 1b (called scenario "stecf_tor1b").
4. A scenario with closures in ICES SD 27 and 28 (1st February-31st March) addressing the impacts for ToR 1c (called scenario "stecf_tor1c").
5. A scenario with closures in ICES SD 22, 23 and 24 (1st February-31st March), but with vessels <15m length over all (LOA) allowed fishing in shallower water <20m, addressing the impacts for ToR 2 with the closures of ToR1a (called scenario "stecf_tor2a").
6. A scenario with closures in ICES SD 24, 25 and 26 (1st July-31st August), but with vessels <15m length allowed fishing in shallower water <20m, addressing the impacts for ToR 2 with the closures of ToR1b (called scenario "stecf_tor2b").
7. A scenario with closures in ICES SD 27 and 28 (1st February-31st March), but with vessels <15m length allowed fishing in shallower water <20m, addressing the impacts for ToR 2 with the closures of ToR1c (called scenario "stecf-tor2c").

10 stochastic runs are conducted per scenario. STECF notes that this number of replicates is rather low but it has been constrained by the tight deadline imposed to deliver the report.

STECF notes that because of uncertainty in the current status of the EBC stock, the simulations have a starting point in 2012, which is the last year with an accepted stock assessment available for both cod stocks. However, extra assumptions were made (e.g. slower growth, smaller weight at size and increase in natural mortality) to mimic the poor condition of the EBC stock observed in the latest decade.

STECF notes nevertheless that this earlier starting point implies that the simulations may not be directly compared with the actual situation of the fishery in 2016; in particular, the projected status of WBC in 2016 simulated in the baseline scenario may not be directly comparable with the current status of WBC as estimated by ICES in 2016. Scenarios outcomes are therefore best used in relative comparison with each other rather than in absolute terms.

STECF notes also that a consequence of this parameterisation on 2012 is that discards of undersized fish are still assumed to occur and are not counted against the TAC. The simulations can thus be considered as a situation where the landing obligation is not strictly enforced, i.e. that catches larger than the TAC might still occur. It is difficult to assess the consequences of not accounting for a perfectly implemented landing obligation in the absence of a comparative baseline. STECF suggests that they could potentially be twofold. In the one hand the results obtained may be slightly more optimistic in terms of revenue, where the same simulations conducted under the assumption of a perfectly implemented landing obligation would likely induce lower estimates of revenue in the short term; In the other hand, the results obtained may be slightly more pessimistic in terms of stock status, as the simulated effort displacement may be more limited if vessels were not allowed to discard. Nevertheless, STECF notes that empirical evidence suggests that the landing obligation is not yet fully implemented in the Baltic Sea and that discarding still occur (ICES, 2016).

STECF notes that the removals from the recreational fishery in SD 22-24 add uncertainties to the total removals of WBC, as the recreational catches are not restricted, which is seen as of particular importance when taking action on WBC.

STECF notes that the simulations are not based on the Long Term Management Plan that was in effect in 2012 (EC, 2007) but on the ICES F_{MSY} approach including a $B_{trigger}$ (ICES, 2016). WBC F_{MSY}= 0.26; $B_{trigger}$=36 400t. EBC F_{MSY}=0.46; $B_{trigger}$=88 200t. STECF notes that since 2015, the current $B_{trigger}$ for WBC cod has been revised to 38400 t (ICES, 2016), and that a new management plan has been in force since 2016.

STECF notes that an important mechanism in the model is that it is assumed that vessels fish at their maximum capacity every month and cannot postpone or reallocate some effort from one time period to another; i.e. a closure implemented in one month induces some spatial effort reallocation toward other fishing grounds in that month, but does not induce higher fishing effort in the other months. As such, fishery closures induce some reduction of total catches in the model, and thus a lower TAC uptake; the status of the stocks may thus comparatively improve. This is an assumption similar to that made in the 2016 ICES advice. STECF notes however that in reality, uncertainty remains whether fisheries might adapt and find other ways to achieve the same amount of total annual catch, especially when the TAC is low. This would not reduce fishing mortality.

Also, STECF notes that the reduction of the total annual catches is the main simulated effect of the closure. The other potential ecological effects of a closure (such as potential improved recruitment conditions due to less disrupted spawning and/or changes in the age structure etc (van Overzee and Rijnsdorp (2015)) are not considered.

Results

The following section summarises the outcomes of the simulations for each of the ToR of the request in comparison with the baseline scenario.

Tor 1a - closures in ICES SD 22, 23 and 24 (1st February-31st March)

The spatial closure appears greatly beneficial to the WBC stock (increased SSB and low F).

However, there is a potential side effect of a displacement of catches to the EBC during the months of closure. The effort displacement increases the declining trend for EB cod that is also observed in the baseline scenario. With the displacement, the EBC cod stock declines more rapidly and the catches of undersized EBC (counted here as discards) increase.

In this scenario it is estimated that the fisheries would reach lower revenue and would also be less energy efficient compared to the baseline, as they would have both higher fuel consumption and a lower volume of catch from both cod stocks.

STECF notes however that the results of this scenario are dependent of the assumption that discards will still occur even though the landing obligation is legally in place. STECF notes that if TAC and landing obligation are fully enforced, the effort displacement would be more limited and there would be no such detrimental effect on EBC.

Tor 1b - closures in ICES SD 24, 25 and 26 (1st July-31st August)

STECF notes this scenario improves the status of both cod stocks compared to the baseline. Some parts of the EBC and WBC stocks are protected during the two months' summer closure and not caught later in the year. This potentially create a surplus of larger fish available for the following months and years, and therefore also providing a potential decrease in the undersized catch rate for both stocks, which are here discarded as the model assumes that landing obligation is not fully enforced.

STECF notes in this scenario, the improvement of the WBC stock leads to higher cumulated catches (summed over 5 years) compared to the baseline. STECF understands that according to the model, some reallocation of effort may occur from SD 24-26 to fishing WBC in SD 22 during

the closure. But these remain limited because of poor economic attractiveness due to long travel distance and low catch rate. Hence, this reallocation is not sufficient to negate the positive effects for the stock status of reduced catches in SD 24.

Conversely, STECF notes that the closure induces large reduction of cumulated EBC catches compared to the baseline, as the fisheries are prevented to operate in the months with high catch rate. As such, the total revenue of Baltic cod fishing alone is reduced by around 50% after 5 years compared to the baseline, at constant fish price conditions.

However, STECF notes that the economic impact of this scenario in terms of e.g. global revenue for the entire fishery appears more limited than in the scenario 1a. STECF notes that in the scenario 1b the fishery shifts towards other stocks and/or other fishing grounds (according to Bastardie et al., 2016, this is especially the case for the large Danish vessels that fish only seasonally in the Baltic Sea). This shift may imply increasing variable costs linked to increased effort and fuel use and, therefore, may result in a decrease of Profits and Gross Value Added (GVA). The biological consequences of this displacement on the other stocks and areas are not estimated in this model.

Concerning both ToR 1a and ToR 1b, STECF notes that the analysis of the distributional effect of the spatial closure at the scale of individual Danish harbours for cod shows that the beneficial or the detrimental effects are relatively well distributed across the harbours. The harbours located on the Eastern side of the Bornholm Island appear though less impacted than the others.

Tor 1c - closures in ICES SD 27 and 28 (1st February-31st March)

The ad-hoc reports that that the fishery closure in this scenario has a slight positive effect on WBC compared to the baseline; This is explained by a cascading effect in the model: a relative increase of EBC stock increases also the relative proportion of that stock in the catches in SD 24; which in returns reduce slightly the relative catches of WBC. STECF notes however that this effect appears quite limited, and that no effect can be observed on the status of EBC. STECF notes also that the displacement effects appear more limited than in the previous scenarios, which may comparatively have a larger negative effect on revenues.

STECF notes that SD 27-28 is presently not considered to be a functioning spawning area for EBC (Köster et al., 2016) so this closure would in reality not function as a spawning closure.

Tor 1(abc) vs Tor 2(abc) – Closures, with and without allowing vessels <15m LOA to fish for cod in shallower water <20m

STECF notes that according to the simulations, restricting the fishing to areas shallower than 20 meters (and only to vessels < 15m) did not significantly impact the outcomes of the simulations, both in terms of stock status and overall economic results. In consequence, the specific derogation for pair trawling in ToR2 was not assessed further. STECF notes that most of the catches for both stocks occur at depth deeper than 20m, so the catches of small coastal vessels represent a limited proportion of the total catches. STECF notes however that since the economic results are not detailed by fleet, it cannot be assessed whether the economic situation of the small coastal vessels is improved in comparison with the equivalent scenarios in ToR 1.

STECF observations on the Working Document: "Seasonal development of maturity in Baltic cod (Gadus morhua L.), with special emphasis on the most appropriate timing of spawning closure to protect the Western Baltic cod population"

The Working Document by Oeberst et al. (2016) sent directly to STECF is an update analysis from the analysis done for the STECF report "Impact Assessment of Baltic cod multi-annual plans (STECF 11-05)"

STECF notes that the main results of the analysis can be summarised as follows:

- The analysis indicate that the main spawning period of female repeat spawning cod in SD 22, the core spawning area of the WBC stock, was mid-February to early April.
- The spawning season in SD 22 apparently started about one month earlier since 2008 while the end of the spawning season did not change.
- The main spawning period of cod in SD 24, characterized by a mixture of specimens of the WBC and EBC stock, was June to early July, with minor spawning activities occurring in March.

STECF further notes that the Working Document concludes that, given the present status of the WBC stock ($F >> F_{MSY}$, $SSB << B_{lim}$) a spawning closure is advisable; in SD 22 it should at least cover the period February 15 to March 30. In SD 24, a spawning closure may not be required because there is no directed fishery on summer spawning cod in the Arkona Sea. Alternatively, a spawning closure should cover the period June 1 to July 31 if the aim is to protect the aggregations of cod during peak spawning.

STECF further notes the Working Document concluded that hence, the 8-week spawning closure (February 1 to March 31) imposed for 2017 for the area SD 22, SD 23 and SD 24, fully matches with the spawning season of the western Baltic cod population in SD 22, which is the core spawning area of this stock. STECF also noticed that, according the Working Document, the main spawning periods depend on spawning stock structure and hydrographical conditions which may change over time. Therefore, the biological basis for fishery closures may need to be reconsidered at regular intervals.

STECF conclusions

As a general conclusion, STECF considers technical measures alone do not guarantee a reduction in fishing mortality if the same amount of catches of a stock is taken by other means, in other areas or during other seasons. Therefore, STECF consider that a fishery closure cannot represent a substitute to the reduction of catches required to achieve the MSY objective as indicated by the latest ICES scientific advice (ICES 2016a and b). Spawning closure can potentially be beneficial only as a complement to catch regulation, if they can improve spawning conditions as for example avoid disruption of spawning aggregation. Therefore, STECF consider that the closures recommended by BALTFISH will contribute to achieving the MSY objective for the Baltic cod stocks only if the total catches of WBC and EBC will remain within the limits indicated by the latest ICES scientific advice.

STECF acknowledges that the ecological situation of the Baltic Sea cod fisheries is complex, involving various stock components with various spawning dynamics mixing over various fishery grounds. This is further complicated by the absence of an accepted analytical assessment for EBC. Therefore, quantifying the impact of fishery closures is a difficult task that requires advanced models. STECF acknowledges that by definition a model, even a complex one, involves some degree of simplification of the real processes, and scenarios outcomes are therefore best used in relative comparison with each other rather than in absolute terms.

STECF acknowledges that the model used for evaluating this impact is an established Individual-Based and spatially-explicit bio-economic model designed to investigate the potential displacement of fishing effort when spatial management is implemented. STECF notes however that because of the uncertainty in the actual status of the EBC stock, the simulations have a starting point in 2012 and may not be directly compared with the actual situation of the fishery in 2016. STECF underlines also that the model outcomes are based on the assumption of an imperfectly implemented landing obligation.

STECF notes that the differences between scenarios arise because fisheries are prevented to catch cod in some fishing areas in some months and redistribute their effort to other areas accordingly; the scenarios assume that the fisheries cannot increase their fishing effort in the other periods to compensate for the missed catches during the closure. Hence the overall cumulated cod catches for the year are reduced compared to the baseline scenario and the status of the stocks may comparatively improve. The other potential ecological effects of a spawning closure are not considered.

On the basis of the simulation results presented and considering the abovementioned assumptions, STECF concludes that a spring closure in Western Baltic (scenario a) would be very beneficial for the WBC stock, but effort reallocation may have a negative effect on the status of EBC if discarding may still occur. A summer closure in central and Eastern Baltic (scenario b) would improve the status of both stocks in spite of potential effort displacement. A spring closure in Eastern Baltic (scenario c) would not have any significant effect on the stocks.

Overall, the derogation for small vessels fishing in shallow waters would not have a significant impact on the overall status of the stocks, as most catch occur in water deeper than 20m.

On the basis of the simulation results presented, STECF concludes also that fishery closures would make the fleets less fuel-efficient. The economic impact varies across scenarios, but the results would need to be detailed by fleet segments to assess the specific impact on coastal fleets.

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